REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

DETAILED SITE INVESTIGATION (DSI)

FOR

PROPOSED ALTERATIONS AND ADDITIONS

AT

KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Date: 24 March 2025

Ref: E32976BT2rpt4-DSI

JKEnvironments

www.jkenvironments.com.au

T: +61 2 9888 5000

JK Environments Pty Ltd

ABN 90 633 911 403

Report prepared by:

Katrina Taylor
Senior Associate | Environmental Scientist

Report reviewed by:

Brendan Page
Principal | Environmental Scientist
CEnvP SC

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

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E32976BT2rpt4-DSI DRAFT	Draft Report	4 March 2025
E32976BT2rpt4-DSI	Final Report	24 March 2025

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.

Executive Summary

Department of education (DoE) ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed alterations and additions at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW. The purpose of the investigation was to characterise the site contamination conditions in order to assess the risks in relation to contamination and establish whether remediation is required. For the purpose of the DSI 'the site' includes the area where the activity will occur, as shown on Figures 1 and 2 in Appendix A. The site is located in the eastern portion of the wider school property.

This report has been prepared to support the Review of Environmental Factors (REF) for proposed alterations and additions to Kogarah Public School, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021 (formerly known as SEPP55).

A geotechnical investigation was undertaken in conjunction with this DSI by JK Geotechnics (JKG). The results of the geotechnical investigation are presented in a separate report (Ref: 32976LT1rpt). This report should be read in conjunction with the JKG report.

A Sampling Analysis Quality Plan (SAQP) was prepared for this investigation (Ref: E32976PTrpt3-SAQP, dated 6 January 2025). The SAQP is attached in Appendix G. JKE have previously undertaken a Phase 1 Preliminary Site Investigation (desktop), and a Phase 2 Preliminary Intrusive Investigation at the site and within the wider school. WSP has also previously prepared a Preliminary Desktop Site Investigation at the site. A summary of this information has been included in Section 3.

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

The objectives of the DSI were to:

- Assess the soil and groundwater contamination conditions via implementation of a sampling and analysis program that considers the potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) identified in the PSI;
- 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.

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

The AEC identified at the site included: fill material; historical bus depot land use; use of pesticides; hazardous building materials; off-site areas (including dry cleaners and mechanics/service stations). The boreholes/test pits encountered fill materials to depths of approximately 0.2m below ground level (BGL) to 1.4mBGL in all locations and was generally underlain by sandstone bedrock. The fill typically comprised of sandy, clayey or gravelly soils with inclusions of igneous, ironstone, and sandstone gravel; plastic, glass, tile, metal and brick fragments; slag; ash; wood and root fibres. No fibre cement fragments (FCF) or asbestos containing material (ACM) was encountered in the fill material during the fieldwork.

A selection of soil and groundwater samples were analysed for the CoPC identified in the CSM. In fill soil, carcinogenic polycyclic aromatic hydrocarbons (PAHs) were reported at concentrations above the health-based SAC. Asbestos (as asbestos fines/fibrous asbestos - AF/FA) was also detected in fill soils at one location, although the concentration of asbestos was below the health-based SAC. As a duty of care, and to meet the requirements under Clause 429 of the

Work Health and Safety Regulation (2017), an asbestos management plan (AMP) (for asbestos in/on soil) should be prepared and implemented for the current land use/operations, until the site is redeveloped. The AMP should be prepared by a Licensed Asbestos Assessor (LAA).

In groundwater, copper, zinc and PAHs (phenanthrene, anthracene, fluoranthene, and benzo(a)pyrene) were reported above the freshwater ecological SAC, and the benzo(a)pyrene concentration also exceeded the drinking water and recreational SAC.

Despite the SAC exceedances, the Tier 1 risk assessment did not identify a trigger for remediation as risks were assessed to be low. However, further investigation of the site is required due to the occurrence of asbestos in fill and to better understand the potential impacts from PAHs in the groundwater.

Based on the data obtained during the DSI, further investigation of the site is required to supplement the existing data. This further investigation is currently underway at the date of this report, and the Sampling, Analysis and Quality Plan (SAQP) for the investigation is attached in Appendix I. The further investigation will confirm whether or not remediation is required. Should remediation be required, then a Remediation Action Plan (RAP) must be prepared for the Project. Notwithstanding, we are of the opinion that the DSI has provided adequate data to enable further refinement of the CSM and for JKE to be confident that the site can be made suitable for the activity via remediation, should the further investigation confirm that remediation is required.

We recommend the following:

1. Prepare an interim AMP to manage potential risks from asbestos in/on soil until the activity occurs;
2. Completion of further investigation (referred to above), together with an associated addendum/supplementary report presenting the results;
3. Preparation and implementation of a RAP, if the need for a RAP is confirmed in the addendum/supplementary report; and
4. Preparation and implementation of a construction-phase AMP.

Preliminary waste classifications are discussed in Section 9 of the report. Confirmatory waste classification assessment is required.

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

Table of Contents

List of Tables

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**
Asbestos Management Plan	**AMP**
Acid Sulfate Soil	**ASS**
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**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
NSW Department of Education	**DoE**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environment Protection Authority	**EPA**
Fibre Cement Fragment(s)	**FCF**
General Approval of Immobilisation	**GAI**
Georges River Local Environmental Plan	**GRLEP**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
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**
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**
Review of Environmental Factors	**REF**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
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**
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 CLIENT SUPPLIED INTRODUCTION

This Detailed Site Investigation (DSI) has been prepared to support the Review of Environmental Factors (REF) being prepared on behalf of the NSW Department of Education (DoE) for the proposed Kogarah Public School upgrade (the activity).

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

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

1.1 Client Provided Site Description

Kogarah Public School is located at 24B Gladstone Street, Kogarah and has area of 1.644ha per Detail Survey. The school is accommodated within the following allotments:

- Lots 1-3 DP 999122;
- Lot 1 DP 179779
- Lot 1 DP 667959
- Lot 2 DP 175247; and
- Lot A DP 391026.

The school site is irregular in shape with existing vehicular access and the car park provided from Gladstone Street along the south western boundary. Pedestrian access is provided from Gladstone Street and Princes Highway. The site accommodates eight (8) permanent buildings and number of modular school buildings with play areas largely confined to the central and north eastern portions of the site.

Development surrounding the school site includes:

- North: Residential flat building at 71 Regent Street, retail tenancies orientated to Princes Highway (39-43 Princes Highway) and a smaller residential flat building at No 41 Princes Highway;
- East: Princes Highway and further to a mix of commercial and mid-rise residential development;
- South: St Paul’s Church complex comprising St Paul’s Childcare Centre, St Paul’s Anglican Church and a residential flat building located at 24-30 Gladstone Street; and
- West: A mix of single dwelling and residential flat building development with Regent Street beyond.

The site is zoned SP2 Educational Establishment in accordance with Georges River Local Environmental Plan 2021 (GRLEP).

An aerial image of the school site is provided in Figure 1 on the next page.

Figure 1: Aerial image of the site (Nearmap, 2024)

1.2 Proposed Activity Description

The proposed Kogarah Public School upgrade works include the following:

- Demolition of existing playground facilities and Covered Outdoor Learning Area (COLA) in addition to footings and services associated with former demountable buildings;
- Tree removal;
- Construction of a new three storey Classroom building and attached amenities facilities;
- Construction of a single storey Hall with attached Covered Outdoor Learning Area;
- New pedestrian pathway connections providing access throughout the site;
- Service upgrades; and
- Site landscaping works.

Any works relating to the existing demountable classrooms will be undertaken via a separate planning pathway. Figure 2 below presents an extract of the proposed Site Plan.

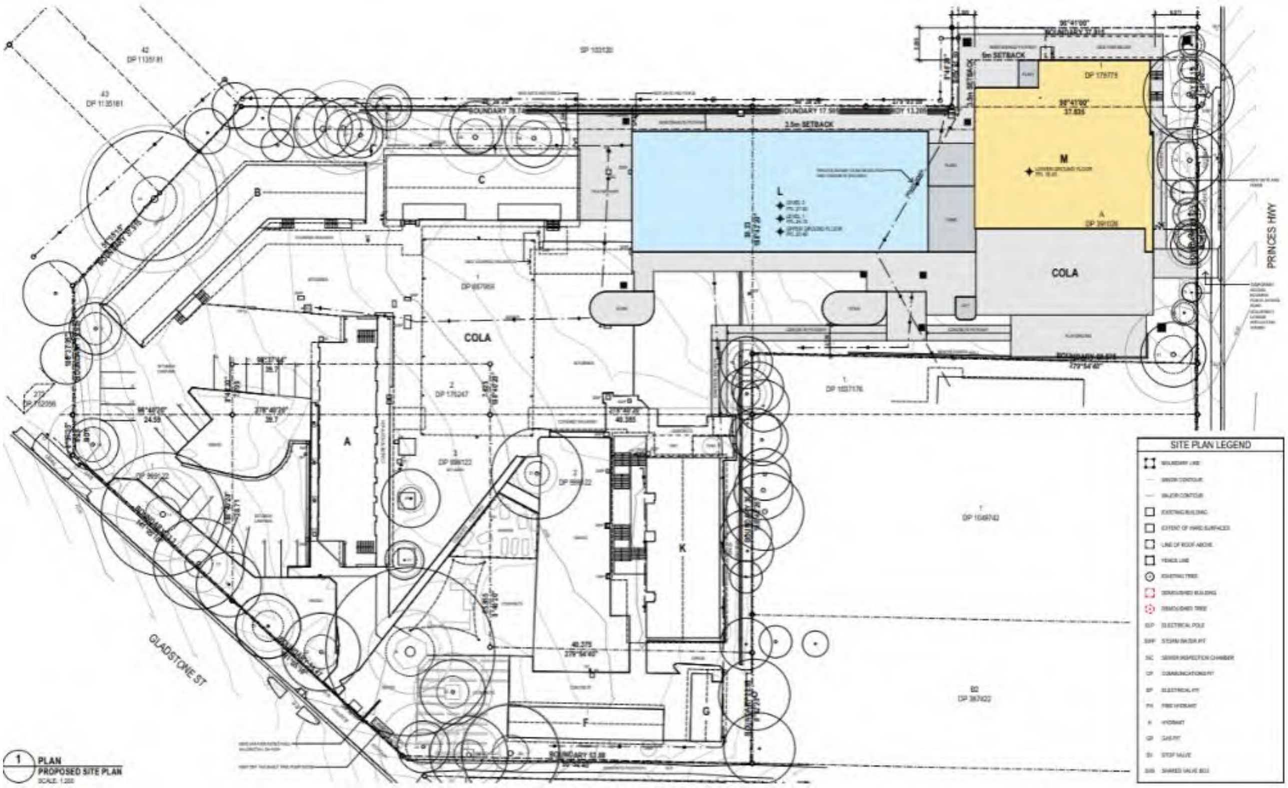


Figure 2: Extract of proposed Site Plan (Fulton Trotter, 2024)

2 DSI INTRODUCTION

DoE ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed alterations and additions at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW. The purpose of the investigation was to characterise the site contamination conditions in order to assess the risks in relation to contamination and establish whether remediation is required. For the purpose of the DSI 'the site' includes the area where the activity will occur, as shown on Figures 1 and 2 in Appendix A. The site is located in the eastern portion of the wider school property.

This report has been prepared to support the REF for proposed alterations and additions to Kogarah Public School, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[1] (formerly known as SEPP55).

A geotechnical investigation was undertaken in conjunction with this DSI by JK Geotechnics (JKG). The results of the geotechnical investigation are presented in a separate report (Ref: 32976LT1rpt)[2]. This report should be read in conjunction with the JKG report.

A Sampling Analysis Quality Plan (SAQP) was prepared for this investigation (Ref: E32976PTrpt3-SAQP, dated 6 January 2025)[3]. The SAQP is attached in Appendix G.

JKE have previously undertaken a Phase 1 Preliminary Site Investigation (desktop), and a Phase 2 Preliminary Intrusive Investigation at the site and within the wider school. WSP has also previously prepared a Preliminary Desktop Site Investigation at the site. A summary of this information has been included in Section 3.

2.1 Aims and Objectives

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

The objectives of the DSI were to:

- Assess the soil and groundwater contamination conditions via implementation of a sampling and analysis program that considers the potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) identified in the PSI;
- 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;

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

[2] JKG, (2025). *Report to NSW Department of Education on Geotechnical Investigation for Proposed School Upgrade at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW* (referred to as JKG report).

[3] JKE, (2025). Report to NSW Department of Education on Sampling Analysis and Quality Plan for Detailed Site Investigation at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW (Ref: E32976PTrpt3-SAQP, dated 6 January 2025) (referred to as SAQP).

- 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.

2.2 Scope of Work

The investigation was undertaken generally in accordance with a JKE proposal (Ref: 32976LTrev1prop) of 13 December 2024 and written acceptance from the client. The scope of work included the following:

- Review of site information, including background and site history information from various sources outlined in the report;
- Preparation of a CSM;
- Design and implementation of a SAQP. The SAQP was prepared prior to the commencement of the DSI and is attached in Appendix G;
- 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)

3 SITE INFORMATION

3.1 Background

JKE undertook previous investigations at the site and wider school property in 2020, and WSP undertook a previous investigation in 2023. The western portion of the wider school property does not form part of the site for the purpose of the DSI (see Figure 1 in Appendix A). A summary of relevant information from the previous investigations is outlined in the table below:

Table 3-1: Previous information summary

Report	Summary of relevant information
Phase 1 Desktop Assessment, JKE 2020[6]	The desktop was undertaken across the wider school property, including the site, and included: review of background and historical information; a walkover site inspection; and preparation of a report presenting the results of the assessment, including a CSM. Site history information indicated that residential style structures had been present on the site, and one of the lots within the site had been utilised as a bus depot. The site and wider school property was progressively developed into the primary school site from 1956. During this time, demolition of the original site structures occurred, along with potential filling of the site. The age of the former and existing buildings indicated the potential for hazardous building materials to be present. During the JKE site inspection, a fibre cement fragment (FCF) of suspected asbestos containing material (ACM) was identified on the site, and fill material (i.e. imported/disturbed soils) was also observed at the site surface in several areas. The location of the FCF (identified as FCF1) is shown on Figure 2 in Appendix A. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/areas of AEC: • Fill material - It was considered possible that minor historical filling had occurred to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It was also considered possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment; • Historical use as a bus depot - Historical title records indicated that the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Fuels, oils and solvents (e.g. toluene/mineral spirit/thinners) may have been used during this site use; • Use of pesticides - Pesticides may have been used beneath the buildings and/or around the site; • Hazardous building materials (i.e. asbestos containing material - ACM) - 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. Hazardous building materials can also occur in fill due to historical demolition activities; and • Up-gradient off-site historical dry cleaners and motor garage/service stations – historical business directories indicated that several of these businesses were located upgradient of the site and may pose a risk to the site via migration of contaminated groundwater. The desktop recommended undertaking a preliminary intrusive investigation to make an initial assessment of contamination-related risks and to inform the design of a DSI.

[6] JKE, (2020a). *Report to School Infrastructure NSW on Phase 1 Desktop Assessment for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt-KPS, dated 28 February 2020) (referred to as desktop)

Report	Summary of relevant information
Phase 2 Preliminary Intrusive Investigation, JKE 2020[7]	The intrusive investigation included a review of existing project information, a site inspection, and soil sampling from 10 boreholes, of which four were located on the current site, including BH107 to BH110 inclusive (refer to Figure 2 in Appendix A). Fill material was encountered to depths of between approximately 0.2m below ground level (BGL) and 1.7m BGL, underlain by natural residual sandy soils. The fill contained inclusions of igneous and ironstone gravel, glass fragments, sand and root fibres. A selection of soil samples was analysed for the CoPC identified in the CSM. FCF1 that was collected by JKE during the desktop was also analysed and was found to contain asbestos. Based on the data from the intrusive investigation, JKE was of the opinion that the potential risk of widespread subsurface contamination in the intrusive investigation area was low as the soil samples analysed did not identify contamination that was assessed to pose an unacceptable risk. FCF1 was non-friable ACM. The source of the asbestos appeared to be a fibre cement board at the base of the neighbouring fence and was considered unlikely to be associated with on-site soils in that vicinity. The ACM was removed and no further fragments were identified in the area. The intrusive investigation report recommended that the investigation data obtained should be supplemented via a detailed investigation in order to fully characterise the contamination conditions at the site and establish whether remediation is required.
Site Contamination Services – Preliminary Desktop Site Investigation, WSP 2023[8]	The WSP PSI comprised a desktop study to review general site details, site environmental setting and history, regulatory databases and client provided reports and information. The site history review was limited to historical aerial photographs and publicly available information on online databases. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/AEC: • Uncontrolled fill materials potentially used historically to raise or level portions of the site; • Historical or recent waste dumping; • Potential ACM or hazardous building materials associated with imported materials or demolished structures; and • Pesticides used historically and recently to maintain the site. The report concluded that the site presented a low to moderate risk of inground contamination due to the potential for uncontrolled fill and poor demolition practices associated with historic development and demolition of residential buildings on the site. It is noted that the investigation did not include a site inspection.

3.2 Site Identification

Table 3-2: Site Identification

Site Address:	24B Gladstone Street, Kogarah, NSW

[7] JKE, (2020b). *Report to School Infrastructure NSW on Phase 2 Preliminary Intrusive Investigation for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt2-KPS, dated 8 May 2020) (referred to as intrusive investigation)

[8] WSP, (2023). *Report to School Infrastructure NSW on Site Contamination Services – Preliminary Desktop Site Investigation, Kogarah Public School.* (Project Ref: PS206292, report dated 7 December 2023) (referred to as WSP PSI)

Lot & Deposited Plan:	Lot 1 in DP179779, Lot A in DP391026, and part of Lot 1 in DP667959
Current Land Use:	Primary School (Kindergarten to Year 6)
Proposed Land Use:	Continued use as a Primary School
Local Government Area:	Georges River Council
Current Zoning:	SP2: Infrastructure
Site Area (m^2) (approx.):	4,375
Geographical Location (decimal degrees) (approx.):	Latitude: -33.9618430 Longitude: 151.1370970
Site Plans:	Appendix A

3.3 Site Location and Regional Setting

The site is located in the eastern portion of the existing Kogarah Public School property, which itself is in a mixed-use area of Kogarah and is bound by the Princes Highway to the east and Gladstone Street to the west. The site is located approximately 535m to the south-west of Muddy Creek and 1.7km to the west of Botany Bay.

The site is situated in gently undulating regional topography, with the site itself gently sloping towards the east at approximately 1° to 2°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

3.4 Site Inspection

A walkover inspection of the site was undertaken by JKE on 15 January 2025. A summary of the inspection findings is outlined below:

- At the time of the inspection, the site comprised a COLA, over asphaltic concrete paved playground in the west of the site. The east of the site comprised soft-fall and artificial grass covered playground areas with garden and landscaped areas around the boundaries of the site. A small toilet block and goods store was also positioned along the southern boundary, and construction fencing was positioned along the central north of the site in an east-west alignment, due to recent demolition activities (removal of demountable classrooms) in this section of the site;
- Where the demolition/removal had taken place in the north of the site, exposed soils and debris from demolition/removal activities were observed at the site surface;
- During the inspection, an unsealed bag of FCF/suspected ACM was identified in the central north of the site. The bag was assumed to be associated with an emu-pick following demolition removal works. JKE sealed the bag and informed the client of this find at the time of the fieldwork;
- There were no other visible or olfactory indicators of contamination observed during the inspection;
- Fill was observed at the ground surface in areas of exposed soils across the site. Imported material/fill was considered likely to be present in garden beds and as a result of general (minor) levelling works across the site; and

- Medium to large trees were observed around the site and a number of grass-covered sections of the site were also observed. Grass coverage was generally good in the unpaved areas, with the exception of some areas beneath large trees and isolated areas of the playground (generally around the interface with pavements).

3.5 Surrounding Land Use

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

- North – high-density high-rise residential apartment buildings, a construction site and Regent Street;
- South – St Paul's Anglican Church (heritage), children's centre (church run);
- East – Princes Highway and low-density residential houses; and
- West – Kogarah Public School (main buildings).

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

3.6 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.

4 GEOLOGY AND HYDROGEOLOGY

4.1 Regional Geology

Regional geological information reviewed as part of the previous investigations indicated that the site is underlain by underlain by Triassic aged deposits of medium to coarse-grained quartz sandstone, and very minor shale and laminate lenses (Hawksbury Sandstone).

A summary of the subsurface conditions encountered during the previous intrusive investigation is present in the table below:

Table 4-1: Summary of Subsurface Conditions encountered during previous JKE intrusive investigation

Profile	Description
Pavement	Asphaltic Concrete (AC) pavement was encountered at the surface in BH109 and was approximately 20mm in thickness.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of between approximately 0.2mBGL to 1.7mBGL. The fill typically comprised silty sandy clay, sandy silt, clayey sandy gravel or silty sand with inclusions of igneous and ironstone gravel, glass fragments, sand and root fibres. Neither staining nor odours were encountered in the fill material during the fieldwork. No FCF/ACM was encountered in the fill material during the fieldwork.
Natural Soil	Natural clayey or sandy residual soil was encountered beneath the fill in BH107 and BH108 and extended to depths of between approximately 1.6mBGL and 3.2mBGL. BH107 was terminated in the natural soils at a depth of 3.2mBGL. Neither staining nor odours were encountered in the natural soils during the fieldwork.
Bedrock	Sandstone bedrock was encountered beneath the fill material or natural soils in BH108, BH109 and BH110 from depths of 0.2m to 1.6mBGL.
Groundwater	Groundwater seepage was encountered in boreholes BH107 and BH110 at depths of approximately 1.0mBGL and 3.5mBGL during drilling. All other boreholes remained dry during and on completion of drilling.

4.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation. (1997)[9].

The site is not mapped as being within an ASS risk area in the Georges River Local Environmental Plan 2021.

4.3 Hydrogeology

Hydrogeological information reviewed for the previous investigations indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to

[9] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)*

moderate productivity. There was a total of 521 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 400m from the site. This was utilised for domestic purposes. The nearest downgradient bore registered for domestic uses was located over 1,500m to the north of the site;
- The majority of the bores were registered for domestic purposes;
- The drillers log information from the closest (within 500m) registered bores typically identified fill and/or sand and clay soil to depths of 3.65m-6.50m. Standing water levels (SWLs) in the bores ranged from 1.5m below ground level (BGL) to 3.0mBGL; and
- Groundwater is likely to be encountered at depths ranging from 3m to 5m below existing surface levels based on previous JKG investigations of nearby properties.

Based on the above subsurface conditions at the site, it is expected to consist of relatively low permeability (residual) soils overlying relatively shallow bedrock. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable as indicated by the number of registered monitoring bores, 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. Notwithstanding, we have conservatively considered consumption of groundwater as part of this DSI.

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

4.4 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water bodyis Muddy Creek, a tributary of the Cooks River located approximately 535m to the north-east of the site. This is down-gradient from the site, and is considered to be a potential receptor.

5 REVIEW AND UPDATE OF CONCEPTUAL SITE MODEL

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

5.1 Potential Contamination Sources/AEC and CoPC

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

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

Source / AEC	CoPC
Fill material – The site has been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It is also possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment. The previous investigation identified fill material to depths of 0.15mBGL to 1.7mBGL. During the inspection, a bag of FCF/ACM was identified. It was unclear if this was associated with recent demolition works onsite or surficial FCF/ACM associated with imported fill.	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 bus depot land use – Historical title records indicated that the south-eastern portion of the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Fuels, oils and solvents may have been used during this site use.	Heavy metals, TRH, and BTEX (solvents such as toluene and mineral spirits would be detectable via the TRH and BTEX analysis).
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. Previous investigations identified surficial FCF/ACM on the southern boundary of the site. During the inspection, a bag of FCF/ACM was identified. It was unclear if this was associated with recent demolition works onsite or surficial FCF/ACM associated with imported fill.	Asbestos, lead and PCBs.

Source / AEC	CoPC
Off-site Area 1 (Dry Cleaners) – Historical business directories indicated that several dry cleaner businesses had been/were located upgradient of the site (south-west) of the site. Impacts to the site are most likely to occur via migration of contaminated groundwater.	Per- and polyfluoroalkyl substances (PFAS), TRHs and VOCs, including tetrachloroethene (also known as perchloroethylene - PCE) and the breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC).
Off-site Area 2 (Mechanics/Service Stations) – Historical business directories indicated that at least two motor mechanics/service station businesses had been/were located up-gradient (south/south-west) of the site. Impacts to the site are most likely to occur via migration of contaminated groundwater.	Heavy metals (lead), TRH and BTEX.

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

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

Table 5-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination. The mechanisms for contamination from off-site sources could have occurred via 'top down' impacts and spills, or sub-surface release. Impacts to the site could occur via the migration of contaminated groundwater.
Affected media	Soil and groundwater have been identified as potentially affected media. At this stage, soil vapour is not being investigated. This is to be considered further in the event that potential vapour risks are identified via the soil and groundwater analysis.
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, and groundwater users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and ecology in down-gradient water bodies.
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, VOCs 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 direct/primary 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.

	Exposure to groundwater may occur in Muddy Creek and/or the Cooks River through direct migration.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed 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; • Contact with groundwater during construction; • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation; and • Migration of groundwater off-site into areas where groundwater is being utilised as a resource (i.e. for domestic or irrigation).
Presence of preferential pathways for contaminant movement	Local services (i.e. those not shown on the DBYD plans) such as stormwater pipe trenches could act as preferential pathways for contaminant migration. This could occur through fill soil and/or via groundwater/seepage. This would be dependent on the contaminant type and transport mechanisms.

6 SUMMARY SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 SAQP Summary

JKE prepared a SAQP for the DSI, which is attached in Appendix G. The SAQP is summarised as follows:

- Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 2.1;
- Soil samples were obtained from 15 grid-based locations (BH201, BH203, and BH207 to BH219) as shown on Figures 2 and 3 in Appendix A;
- Soil samples were obtained using a combination of hand tools and drill rig on 15, 16 and 31 January 2025;
- Three monitoring wells were installed on in BH203 (MW203), BH207 (MW207), and BH208 (MW208), as shown in Figures 2 and 3 in Appendix A. The wells were generally positioned to provide site coverage;
- The monitoring well construction details are documented on the borehole logs for BH203, BH207, and BH208 attached in the appendices;
- MW203 and MW207 were developed on 16 January 2025, and MW208 was developed on 11 February 2025;
- The monitoring wells were allowed to recharged for between 3 to 18 days after installation. Groundwater samples for the DSI were obtained on 13 February;
- The groundwater field monitoring records and calibration data are attached in Appendix G; and
- The relative heights for all monitoring wells were surveyed using a GPS unit on 11 February 2025. This information is documented on the borehole logs and groundwater sampling field sheets attached in the appendices.

6.2 Deviations to the SAQP

The following deviations to the SAQP are noted:

- The fieldwork was split into two mobilisations due to archaeological works which were not completed for the northern area including BH208, BH213 and BH218, or the western area including BH201 and BH209 at the time of commencement of the fieldwork on 15 January. The second mobilisation was undertaken and completed on 31 January 2025;
- The fill was not penetrated in BH210 to BH212 and BH214 to BH217 and BH219, due to limitations associated with the use of hand equipment and/or obstructions in fill; and
- Asbestos bulk quantification/field screening was not undertaken for all fill profiles and the sample volumes for a limited number of samples was below 10L. The lack of sample or low volume was generally due to the use of augers which limited the sample return particularly in subsurface fill profiles.

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

6.3 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 samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	370762, 370762-A, 371803, 371803-A, and 372949
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	MGA0261

It is noted that the groundwater samples were incorrectly labelled on the chain of custody (COC) as the borehole reference rather than the monitoring well reference, i.e. BH203 instead of MW203, BH207 instead of MW207 and BH208 instead of MW208. This was corrected at the laboratory as reported in Envirolab report 372949.

7 SITE ASSESSMENT CRITERIA (SAC)

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

7.1 Soil

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

7.1.1 Human Health

- Health Investigation Levels (HILs) for a 'residential with accessible soils' exposure scenario (HIL-A). These SAC also apply to primary schools;
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B), which also apply to primary schools. 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)[10]; and
- Asbestos was assessed against the HSL-A 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-A criteria were adopted for the assessment of asbestos in soil. The SAC adopted for asbestos were derived from the NEPM 2013 and are based on the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[11]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.01% 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): $$\textbf{\% w/w asbestos in soil} = \frac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$$ 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):

[10] 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*

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

7.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. These have only been applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[12];
- ESLs were adopted based on the soil type;
- EILs for selected metals were generally 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)[13]; and
- Averaged site-specific soil parameters for pH and cation exchange capacity (CEC) were used for EILs for selected metals in BH203 (0.1-0.2m), BH211 (0.2-0.3m), BH214 (0.3-0.4m) and BH217 (0.2-0.3m) for coarse soils. These data have been tabulated below for reference and were used to select the ACL values presented in Schedule B(1) of NEPM (2013) to sum with the published ABC presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995). This method is also considered to be adequate for the Tier 1 screening; and
- Site-specific soil parameters for pH and cation exchange capacity (CEC) were used for EILs for selected metals in BH210 (0.55-0.6m) for fine soils. These data have been tabulated below for reference and were used to select the ACL values presented in Schedule B(1) of NEPM (2013) to sum with the published ABC presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995). This method is also considered to be adequate for the Tier 1 screening.

Table 7-2: Site Specific Soil Parameters – Coarse Soils

Location	Depth	Material type	pH	CEC
BH203	0.1-0.2	Fill: Silty sand	9.1	10
BH211	0.2-0.3	Fill: Silty sand	7.7	7.2
BH214	0.3-0.4	Fill: Silty sand	6.9	3.9
BH217	0.2-0.3	Fill: Silty sand	7.9	13
		Average	7.9	8.53

Table 7-3: Site Specific Soil Parameters – Fine Soils

Location	Depth	Material type	pH	CEC
BH210	0.55-0.6	Fill: Silty sandy clay	7.7	11

[12] 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)

[13] 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

7.1.3 Management Limits for Petroleum Hydrocarbons

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

7.1.4 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[14] as outlined in the following table:

Table 6-4: 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.

7.2 Groundwater

Groundwater data were 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)[15]. Environmental values for the DSI include aquatic ecosystems, human uses (consumption, incidental contact and recreational water use), and human-health risks in non-use scenarios (vapour intrusion).

It is noted that the PFAS National Environmental Management Plan (NEMP) Version 2.0 2020[16] was amended in early 2025. The assessment of the PFAS data was undertaken with regards to the NEPM 2020, rather than NEMP 2025. However, a high-level review of the related SAC indicated that the applicable SAC

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

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

[16] Heads of EPAs Australia and New Zealand (HEPA). PFAS National Environmental Management Plan Version 2.0 - January 2020 (referred to as NEMP 2020)

remain unchanged between the two versions of the NEMP, in the context of those SAC used for this investigation.

7.2.1 Human Health

- The NEPM (2013) HSLs were not strictly applicable for this project as the bedrock at the site was encountered at groundwater was recorded at depths of 0.4 to 1.4mBGL (i.e. shallower than 2m). On this basis, JKE has 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 were considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria were based on the following (as shown in the attached report tables):
    - Australian Drinking Water Guidelines 2011 (updated 2021)[17] for BTEX compounds and selected VOCs;
    - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[18] 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 were no Australian guidelines; and
- The ADWG 2011 were multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater (e.g. within down-gradient water bodies, with bore water used for irrigation, or with seepage water during construction). These have been deemed as 'recreational' SAC;
- The drinking water quality guideline value was adopted for the PFAS assessment based on Table 1 in the NEMP 2020;
- The recreational water quality guideline value was adopted for the PFAS assessment based on Table 1 in NEMP 2020; and
- ADWG 2011 criteria was adopted as screening criteria for consumption of groundwater.

7.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[19]. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist.

---

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

[18] 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)

[19] 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)

The ecological (interim freshwater) water quality guidelines will be adopted for PFAS assessment based on NEMP 2020, based on 95% protection (slightly to moderately disturbed systems).

8 RESULTS

8.1 Summary of Data (QA/QC) Evaluation

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

8.2 Subsurface Conditions

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

Table 7.1: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic concrete pavement was encountered at the surface in BH203, BH210, BH211, BH212, and BH214, between approximately 50mm to 100mm in thickness.
Fill	Fill was encountered at the surface or immediately beneath the pavement in all locations and extended to depths of approximately 0.2mBGL to 1.4mBGL. BH209 to BH217 and BH219 were terminated in the fill soil as a maximum depth of 1.4mBGL. The fill typically comprised of silty sand, silty sandy clay, gravel, gravelly sand, sandy clay, and silty sandy gravel with inclusions of igneous, ironstone, and sandstone gravel, plastic, glass, tile, metal and brick fragments, slag, ash, wood and root fibres. Neither staining nor odours were encountered in the fill material during fieldwork. No FCF or ACM was encountered in the fill material during the fieldwork.
Bedrock	Sandstone bedrock was encountered beneath the fill material in BH201, BH203, BH207, BH208 and BH218. Neither staining nor odours were recorded in the bedrock during fieldwork.
Groundwater	Groundwater seepage was encountered in boreholes BH201, BH209, BH212, BH214, BH216 and BH219 at depths of approximately 0.4mBGL to 0.8mBGL. All other boreholes remained dry during and on completion of drilling.

8.3 Field Screening

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

Table 8-1: 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. The results ranged from 0ppm to 1.8ppm equivalent isobutylene. These results indicate a lack of significant PID detectable VOCs and aligned with other observations in the field such as no staining and odours.

Aspect	Details
Bulk Screening for Asbestos	The bulk field screening results are summarised in the attached report Table S5. No FCF/ACM was encountered in the bulk screening samples and all results were below the SAC.
Groundwater Depth & Flow	The relative heights of the ground surface at each monitoring well location were recorded using a GPS and the relative levels (RLs) of groundwater in each well were calculated based of the SWLs. A contour plot was prepared for the groundwater flow direction using Surfer v8.08 (Surface Mapping Program) as shown on Figure 4. Groundwater flow generally occurs in a down gradient direction perpendicular to the groundwater elevation contours. The contour plot indicates that groundwater generally flow towards the north, which is generally consistent with expectations based on the topography, and down-gradient water bodies.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 4.90 to 5.22; - EC ranged from 941µS/cm to 1,385µS/cm; - Eh ranged from 64.9mV to 180.7mV; and - DO ranged from 1.0mg/L to 5.7mg/L. The PID readings in the monitoring well headspace recorded during sampling ranged from 0ppm in MW203 and MW207, and 1ppm in MW208.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling.

8.4 Soil Laboratory Results

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

8.4.1 Human Health and Environmental (Ecological) Assessment

Table 8-2: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	25	10	0	0	-
Cadmium	25	0.5	0	NSL	-
Chromium (total)	25	22	0	0	-
Copper	25	260	0	1	The copper concentration of 260mg/kg reported in BH214 (0.3-0.4m) exceeded the ecological SAC of 220mg/kg.
Lead	25	290	0	0	-
Mercury	25	0.8	0	NSL	-

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Nickel	25	33	0	0	-
Zinc	25	450	0	0	-
Total PAHs	25	50	0	NSL	-
Benzo(a)pyrene	25	3.5	NSL	0	
Carcinogenic PAHs (as BaP TEQ)	25	5	2	NSL	The carcinogenic PAHs concentrations of 4.9mg/kg and 5mg/kg reported in BH208 (0.45-0.55m) and BH211 (0.2-0.3m) respectively, exceeded the health-based SAC of 3mg/kg.
Naphthalene	25	<1	0	NSL	-
DDT+DDE+DDD	16	<0.1	0	NSL	-
DDT	16	<0.1	NSL	0	-
Aldrin and dieldrin	16	<0.1	0	NSL	-
Chlordane	16	<0.1	0	NSL	-
Heptachlor	16	<0.1	0	NSL	-
Chlorpyrifos (OPP)	16	<0.1	0	NSL	-
PCBs	16	<.01	0	NSL	-
TRH F1	25	<25	0	0	-
TRH F2	25	65	0	0	-
TRH F3	25	460	0	0	The TRH F3 concentrations of between 370mg/kg and 460mg/kg reported in BH203 (0.1-0.2m), BH209 (0-0.1m) and BH210 (0.05-0.1m), exceeded the ecological SAC of 300mg/kg.
TRH F4	25	680	0	0	-
Benzene	25	<PQL	0	0	-
Toluene	25	<PQL	0	0	-
Ethylbenzene	25	<PQL	0	0	-

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Xylenes	25	<PQL	0	0	-
Asbestos (in soil) (%w/w)	17	<0.01 % w/w ACM <0.001%w/w AF/FA	0	NA	None of the results were above the SAC. AF/FA was detected in one sample from BH203 (0.1-0.2m), at a concentration below the SAC of 0.001%w/w.

Notes:

N: Total number (primary samples)

NSL: No set limit

NL: Not limiting

8.4.2 Waste Classification Assessment

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

Table 8-3: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Arsenic	25	0	0	-
Cadmium	25	0	0	-
Chromium	25	0	0	-
Copper	25	NSL	NSL	-
Lead	25	6	0	Lead concentrations exceeded the CT1 criterion in six primary fill samples collected from BH201 (0.9-1.0m), BH210 (0.55-0.6m), BH211 (0.2-0.3m), BH217 (0.2-0.3m) and BH218 (0-0.1m). Lead also exceeded the CT1 criterion in a laboratory triplicate sample from BH203 (0.1-0.2m). The maximum lead concentration was 290mg/kg.
Mercury	25	0	0	-
Nickel	25	0	0	-
Zinc	25	NSL	NSL	-
TRH (C_6-C_9)	25	0	0	-
TRH (C_{10}-C_{36})	25	0	0	
BTEX	25	0	0	-

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Total PAHs	25	0	0	-
Benzo(a)pyrene	25	3	0	Benzo(a)pyrene concentrations exceeded the CT1 criterion in three fill samples collected from BH208 (0.45-0.55m), BH211 (0.2-0.3m), and BH214 (0.3-0.4). The maximum benzo(a)pyrene concentration was 3.5mg/kg.
OCPs & OPPs	16	0	0	-
PCBs	16	0	0	-
Asbestos	17	-	-	Asbestos was detected in the fill sample analysed from BH203 (0.1-0.2m).

N: Total number (primary samples)

NSL: No set limit

Table 8-4: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	N	N > TCLP Criteria	Comments
Lead	5	0	The five fill samples with the highest lead concentrations were analysed for TCLP lead. All results were less than the TCLP1 criterion.
Benzo(a)pyrene	3	0	All samples with CT1 exceedances were analysed for TCLP benzo(a)pyrene. All results were less than the TCLP1 criterion.

N: Total number (primary samples)

8.4.3 Statistical Analysis

We have undertaken 95% upper confidence limit (UCL) calculations using the available carcinogenic PAH, lead, and benzo(a)pyrene data, and we have also undertaken combined risk value (CRV) calculations on the carcinogenic PAH fill soil data (as there were exceedances of the HIL-A SAC for this CoPC), from all locations. The statistical analysis has been used as a line of evidence in assessing risks as part of the Tier 1 risk assessment process for carcinogenic PAHs. The UCL and CRV for carcinogenic PAHs have been considered in the context of human receptors and health-based risk.

The UCLs for lead and benzo(a)pyrene have been considered in the context of the preliminary waste classification assessment as lead and benzo(a)pyrene were encountered at concentrations that exceeded the CT1 criteria.

A summary of these calculations is presented below:

8.4.3.1 UCL calculations

Statistical calculations undertaken on the results using ProUCL (Version 5.1) are shown on Tables S1 and S7 attached in the appendices. In summary:

Table 8-5: Summary of 95% UCL calculations

Analyte	N ^	Standard Deviation (mg/kg)	95% UCL (mg/kg)	Comment
Carcinogenic PAHs	25	1.3	2.16	Both the UCL and the standard deviation were less than the HIL-A SAC.
Lead	25	78.4	114.8	The UCL was greater than the CT1 criterion, but less than the SCC1 criterion.
Benzo(a)pyrene	25	0.92	0.99	The UCL was greater than the CT1 criterion, but less than the SCC1 criterion.

Notes:

N^: Total number of samples, using the sample with the highest concentration where duplicates exist

8.4.3.2 Combined Risk Value Method (CRV)

A CRV calculation was undertaken for the carcinogenic PAH fill soil data with reference to Section 7.2 of the NSW EPA Sampling Design Part 1 – Application (2022)[20], Contaminated Land Guidelines. The CRV method is used to assess the minimum number of samples required to have an acceptable level of certainty around making Type I or Type II decision errors in determining whether or not a site is or is not contaminated (i.e. whether the power of the statistical tests is sufficient). These statistical tests have been used as a line of evidence in the Tier 1 risk assessment, with regards to the SAQP.

The number of samples (n) required for carcinogenic PAH, calculated using the CRV method, was 2.8. As the number of samples (n) is less than the number of samples analysed, this suggests (also considering the associated UCLs) that the site is not contaminated with carcinogenic PAHs to the extent that there would be an unacceptable risk to human receptors, i.e. there is sufficient power and reliability in the UCL to reject the null hypothesis (H_0). This is discussed further in the Tier 1 risk assessment.

8.5 Groundwater Laboratory Results

The groundwater laboratory results were assessed against the SAC presented in Section 7.2. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

Table 8-6: 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	5	0	0	-

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

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
Cadmium	3	<0.1	0	0	-
Chromium (total)	3	2	0	0	-
Copper	3	2	0	1	The copper concentration reported in MW208 exceeded the freshwater ecological SAC of 1.4µg/L.
Lead	3	<1	0	0	-
Mercury	3	<0.05	0	0	-
Nickel	3	7	0	0	-
Zinc	3	71	0	1	The zinc concentration reported in MW208 exceeded the freshwater ecological SAC of 8µg/L.
Total PAHs	3	6.3	0	0	-
Other PAHs Phenanthrene Anthracene Fluoranthene Benzo(a)pyrene Naphthalene	3	 0.9 0.2 1.2 0.4 <0.1	 0 0 0 1 0	 1 1 1 1 0	The phenanthrene concentration reported in MW208 exceeded the freshwater ecological SAC of 0.6µg/L. The anthracene concentration reported in MW208 exceeded the freshwater ecological SAC of 0.01µg/L. The fluoranthene concentration reported in MW208 exceeded the freshwater ecological SAC of 1µg/L. The benzo(a)pyrene concentration reported in MW208 exceeded the freshwater ecological SAC of 0.1µg/L and the drinking water SAC of 0.01µg/L.
TRH F1	3	<10	0	NSL	-
TRH F2	3	62	0	NSL	-
TRH F3	3	120	NSL	NSL	-
TRH F4	3	<100	NSL	NSL	-
Benzene	3	<1	0	0	-
Toluene	3	<1	0	0	-
Ethylbenzene	3	<1	0	0	-

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
m+p-Xylene	3	<2	0	0	-
o-Xylene	3	<1	0	0	-
Total Xylenes	3	<1	0	0	-
VOCs Chloroform	3	4	0	0	-
PFOS	3	0.0044	NSL	0	-
PFOS + PFHxS	3	0.0081	0	NSL	-
PFOA	3	0.0048	0	0	-

Notes:

^: Primary samples

N: Total number

NSL: No set limit

NL: Not limiting

9 WASTE CLASSIFICATION ASSESSMENT

9.1 Waste Classification of Fill

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

Fill containing asbestos cannot be considered for recycling purposes and any waste must be disposed of to a suitably licensed facility.

The waste classification(s) must be confirmed prior to the off-site disposal of any waste. Final waste classifications must consider all available data, and the waste quantities must be specified.

9.2 Classification of Natural Soil

Based on the scope of work undertaken for this assessment, and at the time of reporting, it is possible that some of the natural soils and bedrock at the site could classifiable as VENM for off-site disposal or re-use purposes. However, due to the presence of manmade contaminants (i.e. asbestos, PAHs, and TRHs) in the overlying fill, such classification would need to be confirmed following removal of the overlying fill based on a robust assessment process.

10 DISCUSSION

10.1 Tier 1 Risk Assessment and Review of CSM

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

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

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

10.1.1 Soil

10.1.1.1 Health based Risk

Carcinogenic PAHs (PAHs) were detected at concentrations that exceeded the health-based SAC in fill at two locations (refer to Figure 3). The source of the PAHs is considered likely to be associated with imported fill material containing trace amounts of ash and slag. Statistical calculations were run on the entire fill soil dataset for PAHs. The 95% UCL for PAHs in the fill soil were below the SAC.

The potential risks associated with PAHs in fill soils is considered to be low in the context of the current and future land use.

Although below the SAC, asbestos as AF/FA was detected in fill soil at one location (refer to Figure 3). The source of asbestos in fill at this location is considered likely to either be associated with historical demolition activities, or imported fill material which was encountered to varying depths across the site. The asbestos was detected in fill soils beneath asphaltic concrete pavement.

It is also noted that a bag of FCF/ACM was identified during the site inspection. It was unclear if the material in the bag was associated with the demolition works recently undertaken at the site, or associated with surficial FCF/ACM identified on the exposed fill soils beneath these buildings (i.e. associated with imported fill).

Given JKE did not observe asbestos/ACM on the site surface during the DSI, a majority of the fill soils at the site were either grass-covered, covered by artificial turf, or covered by hardstand, it is our opinion that asbestos in fill soils poses a relatively low risk in the current site configuration and while the fill soils are not disturbed as there is a low potential for airborne asbestos fibres to generate due to the lack of disturbance. As a duty of care, and to meet the requirements under Clause 429 of the Work Health and Safety Regulation (2017), an Asbestos Management Plan (AMP) (for asbestos in/on soil) must be prepared and implemented to manage the site until the activity occurs. Clause 429 will also apply in the context of the proposed construction works and will therefore need to be addressed.

Based on various lines of evidence, asbestos in/on fill/soil is considered likely to be a widespread issue at the site and all fill/soil should be treated as asbestos containing unless until demonstrated otherwise. We note that sampling was undertaken from boreholes which poses limitations for identifying asbestos in fill due in part to low volume of soils that are inspected. However, the use of boreholes was necessary due to the hardstand surface cover/on-going school operations, existing buildings/structures and due to archaeological constraints. Sampling was not undertaken beneath the existing buildings/structures. The guidelines require an increased sampling density for asbestos when it is confirmed/known to exist in soil.

The asbestos concentrations reported to date do not definitively trigger a need for remediation, however, further investigation will be required to assess the soils for asbestos. Following consultation with the client, due to access and time constraints, it is proposed that this investigation occurs under the provisions of a Remediation Action Plan (RAP) that includes a requirement for further investigation when access is available, and also includes remediation contingencies to address a possible scenario where such investigation confirms that asbestos remediation is required. We are of the opinion this is a reasonable approach given that asbestos in soil remediation is expected to be straight forward, should it be required, and outlining these details in a RAP provides adequate confidence that the site can be rendered suitable for the proposed development from a contamination viewpoint.

10.1.1.2 Ecological Risk

Copper and TRH F3 were detected at concentrations that exceeded the ecological SAC in fill soil at the site (refer to Figure 3). The source of these contaminants is considered likely to be associated with the imported fill material identified at the site, or potentially on-site land uses (e.g. former bus depot, fuel/oil spills etc). In regards to the TRH F3 exceedances, the laboratory chromatographs were reviewed and indicated the concentrations from BH203 and BH206 most closely resembled asphaltic concrete, which is likely to mixed with the soil matrix as part of the construction of the overlying asphaltic concrete hardstand as both these samples are from the fill profiles immediately beneath the pavement. The chromatograph has been attached in Appendix D. The chromatograph for the TRH F3 in BH209 was inconclusive.

Based on the existing condition of the vegetation (in proximity to the locations) and the fact that the site is situated in an urban setting and is not located in an ecological sensitive area, the potential ecological risks associated with the identified occurrence of copper and TRH are considered to be low. The localised nature of these impacts also contributes to our assessment of low ecological risk. This is to be further assessed as part of the supplementary investigation, and in the RAP (if prepared) when the final activity details and all cut/fill earthworks are known.

10.1.1.3 Other CoPC

Elevated concentrations of the remaining CoPC were below the adopted SAC in the soil samples analysed during the DSI.

10.1.2 Groundwater

The groundwater sample from MW208 encountered concentrations of heavy metals (copper and zinc), and PAHs (phenanthrene, anthracene, fluoranthene, and benzo(a)pyrene) above the ecological SAC which is applicable to freshwater ecological receptors. The benzo(a)pyrene concentration also exceeded the drinking water and recreational SAC. The detections of these contaminants are likely associated with sediment in the sample and/or potentially due to the shorter time between development and sampling of

MW208. Although MW208 was allowed to recharge between sampling and development for a period of time that exceeded the minimum time specified in NEPM 2013, it is possible that better equilibration occurred in the other two wells. On this basis, we consider it unlikely that the conditions in MW208 are indicative of a site contamination issue that would warrant remediation. However, additional groundwater sampling will be required to confirm this.

Where temporary construction dewatering is required, it is expected that the management of such water would occur in accordance with the regulatory requirements so that no unacceptable construction-phase risks occur.

10.1.2.1 Other CoPC

Elevated concentrations of the other CoPC were not encountered above the adopted SAC in the groundwater samples analysed and therefore unacceptable risks to the receptors have not been identified to date.

A detection of chloroform reported in MW208 may be indicative of leaking potable water infrastructure containing trihalomethanes. A detection of TRH F2 was also reported in the groundwater sample from MW208. No odours or staining were reported in the soils/bedrock during fieldwork. As previously noted in relation to the PAHs exceedances, these detections may be indicative of residual impacts from former land use as a bus depot. None of the reported concentrations were assessed to pose an unacceptable risk to receptors in the context of the proposed development.

In our opinion, the reported groundwater concentrations indicated that there is a low potential for unacceptable vapour risks that would warrant remediation. Additional groundwater sampling will be required to confirm this.

10.2 Decision Statements

The decision statements are addressed below:

Are any results above the SAC?

Yes. Reference should be made to Section 10.1.

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

Unacceptable risks associated with complete SPR linkages were not identified. However, there are potential health risks associated with asbestos in fill soil. Risks relate to future soil disturbance and the potential mobilisation of asbestos fibres from ACM in soil to air.

Risks associated with groundwater were assessed to be low in the context of the proposed development, however, further sampling and risk assessment is required to confirm this.

Is further investigation/remediation required and what is likely to be involved?

Based on the data obtained during the DSI, further investigation of the site is required to provide a conclusive outcome regarding whether the land is suitable in its current state, or whether remediation is required (relating to Clause 4.6 of the Resilience and Hazards SEPP). Notwithstanding, we are of the opinion that the DSI has provided adequate data to enable further refinement of the CSM and for us to be satisfied that the site can be made suitable for the activity via remediation.

Further investigation of the site would involve another round of groundwater sampling to better understand the potential impacts from PAHs in the groundwater, and additional soil sampling for asbestos to achieve a higher density (this is triggered now that asbestos is "known" to exist in soil).

What is the preliminary waste classification of the in-situ fill material and natural soils/bedrock sampled and is further sampling/analysis required to confirm the waste classification(s)?

Refer to Section 9. Further sampling/analysis will be required to confirm these classifications.

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 that the site can be made suitable for the proposed development outlined in Section 1.2, subject to further assessment of the soil and groundwater at the site, and, if required, preparation of a remediation action plan (RAP), followed by remediation, and validation.

10.3 Review of CSM and Data Gaps

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

Table 10-1: Data Gap Assessment

Data Gap	Assessment
Fill material	Fill ranging in depth between approximately 0.2mBGL to 1.4mBGL was encountered across the site during the DSI. The fill contained anthropogenic inclusions such as plastic, glass, tile, metal and brick fragments, slag, ash, and wood. It is noted that sampling occurred from boreholes which poses limitation for identifying asbestos in fill due in part to the hardstand surface cover and the archaeological constraints. Further investigation of the fill will be required following demolition of the remaining buildings/structures on site, and removal of hardstand when access becomes available to assess the full extent of risk associated with AEC. A higher density of fill sampling is required for asbestos characterisation unless remediation proceeds on the assumption that all fill is contaminated with asbestos. In our opinion, this work can be incorporated into the pre-remediation (supplementary) investigation under provisions in the RAP and this data gap does not alter our recommendations.
Historical bus depot land use	Historical title records indicated that the south-eastern portion of the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Exceedances of carcinogenic PAHs in fill soil and PAHs in groundwater were reported at the site during the DSI. Risks associated with the fill/soil and

Data Gap	Assessment
	groundwater were assessed to be low in the context of the proposed development, however, further sampling and risk assessment is required to confirm this. In our opinion, this work can be incorporated into the supplementary investigation under provisions in the RAP and this data gap does not alter our recommendations.
Use of pesticides	Based on the reported results to date, and at the time of reporting, risks associated with this AEC are considered to be low. However, sampling has not been completed adjacent to or beneath the existing buildings yet to be demolished (toilet block on southern side of site). Further investigation of the fill soils adjacent to/beneath the existing buildings to be demolished will be required to assess the full extent of risks associated with this AEC. In our opinion, this work can be incorporated into the supplementary investigation under provision in the RAP and this data gap does not alter our recommendations.
Hazardous Building Material	Former structures have been demolished across the site. Given the age of the existing and former buildings, hazardous building materials are considered likely to be present and may have impacted the site during demolition in the past when demolition practices were not as closely regulated. Asbestos was identified as a surficial FCF/ACM during previous investigations, in a bag of FCF/ACM during the site inspection for the DSI and in fill/soil during the DSI, and it is possible the asbestos is associated with this AEC and/or with imported fill. Further investigation of the fill soils will be required to assess the full extent of risks associated with this AEC. In our opinion, this work can be incorporated into the supplementary investigation under provisions in the RAP and this data gap does not alter our recommendations.
Off-site Area 1 (Dry Cleaners)	Based on the reported results to date, and at the time of reporting, risks associated with this AEC are considered to be low and do not require further assessment.
Off-site Area 2 (Mechanics/Service Stations)	Based on the reported results to date, and at the time of reporting, risks associated with this AEC are considered to be low and do not require further assessment.

11 CONCLUSIONS AND RECOMMENDATIONS

The DSI included a review of existing project information, a site inspection, soil sampling from 15 boreholes and groundwater sampling from three monitoring wells. The AEC identified at the site included: fill material; historical bus depot land use; use of pesticides; hazardous building materials; off-site areas (including dry cleaners and mechanics/service stations).

The boreholes/test pits encountered fill materials to depths of approximately 0.2mBGL to 1.4mBGL in all locations and was generally underlain by sandstone bedrock. The fill typically comprised of sandy, clayey or gravelly soils with inclusions of igneous, ironstone, and sandstone gravel; plastic, glass, tile, metal and brick fragments; slag; ash; wood and root fibres. No FCF or ACM was encountered in the fill material during the fieldwork.

A selection of soil and groundwater samples were analysed for the CoPC identified in the CSM. In fill soil carcinogenic PAHs were reported at concentrations above the health-based SAC. Asbestos (as AF/FA) was also detected in fill soils at one location, although the concentration of asbestos was below the health-based SAC. As a duty of care, and to meet the requirements under Clause 429 of the Work Health and Safety Regulation (2017), an AMP (for asbestos in/on soil) should be prepared and implemented for the current land use/operations, until the site is redeveloped. The AMP should be prepared by a Licensed Asbestos Assessor (LAA).

In groundwater, copper, zinc and PAHs (phenanthrene, anthracene, fluoranthene, and benzo(a)pyrene) were reported above the freshwater ecological SAC, and the benzo(a)pyrene concentration also exceeded the drinking water and recreational SAC.

The Tier 1 risk assessment did not identify a trigger for remediation, however further investigation of the site is required due to the occurrence of asbestos in fill and to better understand the potential impacts from PAHs in the groundwater.

Based on the data obtained during the DSI, further investigation of the site is required to supplement the DSI data. This further investigation is currently underway at the date of this report, and the SAQP for the investigation is attached in Appendix I. The further investigation will confirm whether or not remediation is required. Should remediation be required, then a Remediation Action Plan (RAP) must be prepared for the Project. Notwithstanding, we are of the opinion that the DSI has provided adequate data to enable further refinement of the CSM and for JKE to be confident that the site can be made suitable for the activity via remediation, should the further investigation confirm that remediation is required.

We recommend the following:

1. Prepare an interim AMP to manage potential risks from asbestos in/on soil until the activity occurs;
2. Completion of further investigation (referred to above), together with an associated addendum/supplementary report presenting the results;
3. Preparation and implementation of a RAP, if the need for a RAP is confirmed in the addendum/ supplementary report; and
4. Preparation and implementation of a construction-phase AMP.

Preliminary waste classifications are discussed in Section 9. Confirmatory waste classification assessment is required.

The requirement to report site 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)[21] must be assessed by a suitably qualified consultant as part of the additional investigation process. At this stage we are of the opinion that the notification triggers have not been met.

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

11.1 Mitigation Measures – REF Requirement

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

Table 11-1: Mitigation Measures Relating to DSI Findings

Mitigation Number / Name	Aspect / Section	Mitigation Measure	Reason for Mitigation Measure
Interim AMP	As soon as reasonably practicable.	Preparation of an interim AMP.	As a duty of care, and to meet the requirements under Clause 429 of the WHS Regulation, an AMP (for asbestos in/on soil) is required to be prepared and implemented to manage the site until activity occurs.
RAP	Prior to development.	Preparation of a RAP.	Further investigation will occur to confirm whether there is a need for a RAP. Should the RAP be required, it will be due to the occurrence of contamination that triggers a need for remediation and it would be implemented so that contamination-related risks are suitably mitigated during construction and so that the site is made suitable for the proposed activity prior to use.
Construction Phase AMP	Prior to soil disturbance, remediation and construction.	Preparation of a Construction phase AMP.	To meet the requirements under Clause 429 of the WHS Regulation a construction phase AMP is required for the proposed construction works.

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)

11.2 Evaluation of Environmental Impacts – REF Requirement

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

Where any remediation is undertaken, a site validation report must be prepared on completion to demonstrate that the remedial and validation actions have been completed and to confirm that the site is suitable for the activity form a contamination perspective.

12 LIMITATIONS

The report limitations are outlined below:

- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

Important Information About This Report

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

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

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

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

Changes in Subsurface Conditions

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

This Report is based on Professional Interpretations of Factual Data

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

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

Investigation Limitations

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

Misinterpretation of Site Investigations by Design Professionals

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

Logs Should not be Separated from the Investigation Report

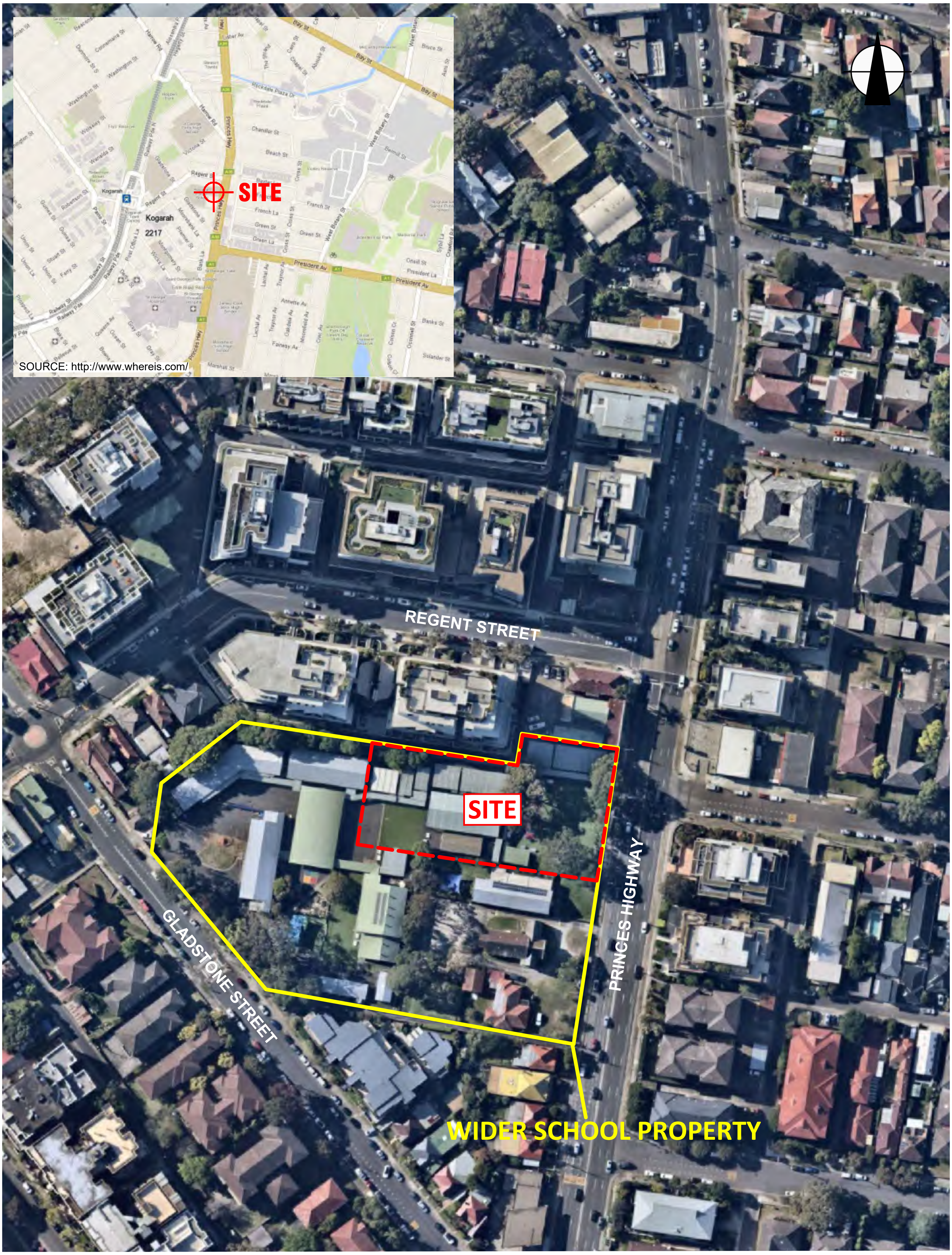
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

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

Read Responsibility Clauses Closely

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

Appendix A: Report Figures



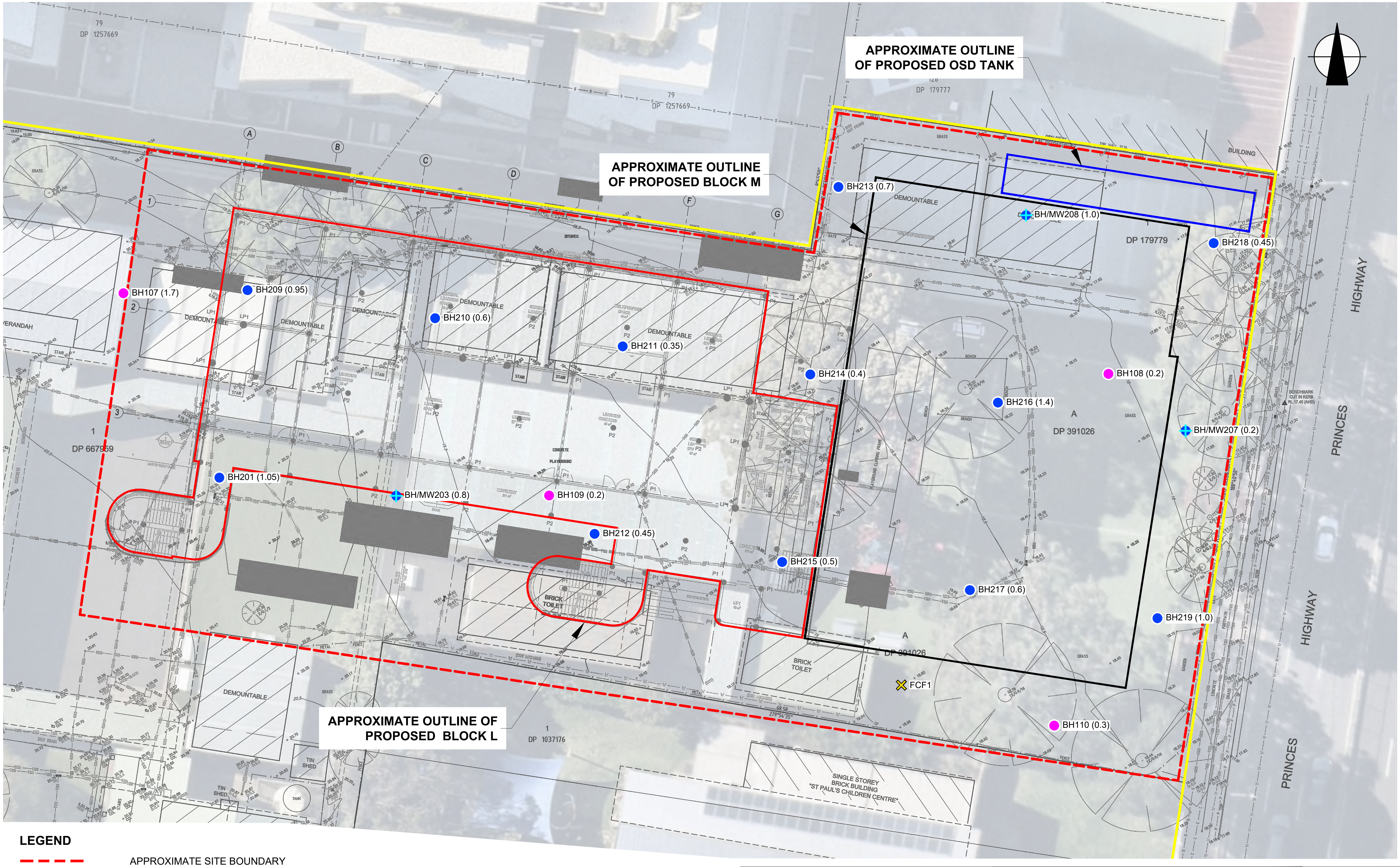
PLOT DATE: 4/03/2025 2:32:32 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CAD\E32976BT2.DWG

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	SITE LOCATION PLAN
Location:	24B GLADSTONE STREET, KOGARAH, NSW
Project No: E32976BT2	Figure No: 1

JKEnvironments



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI, 2025)
BH/MW203	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI 2025)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

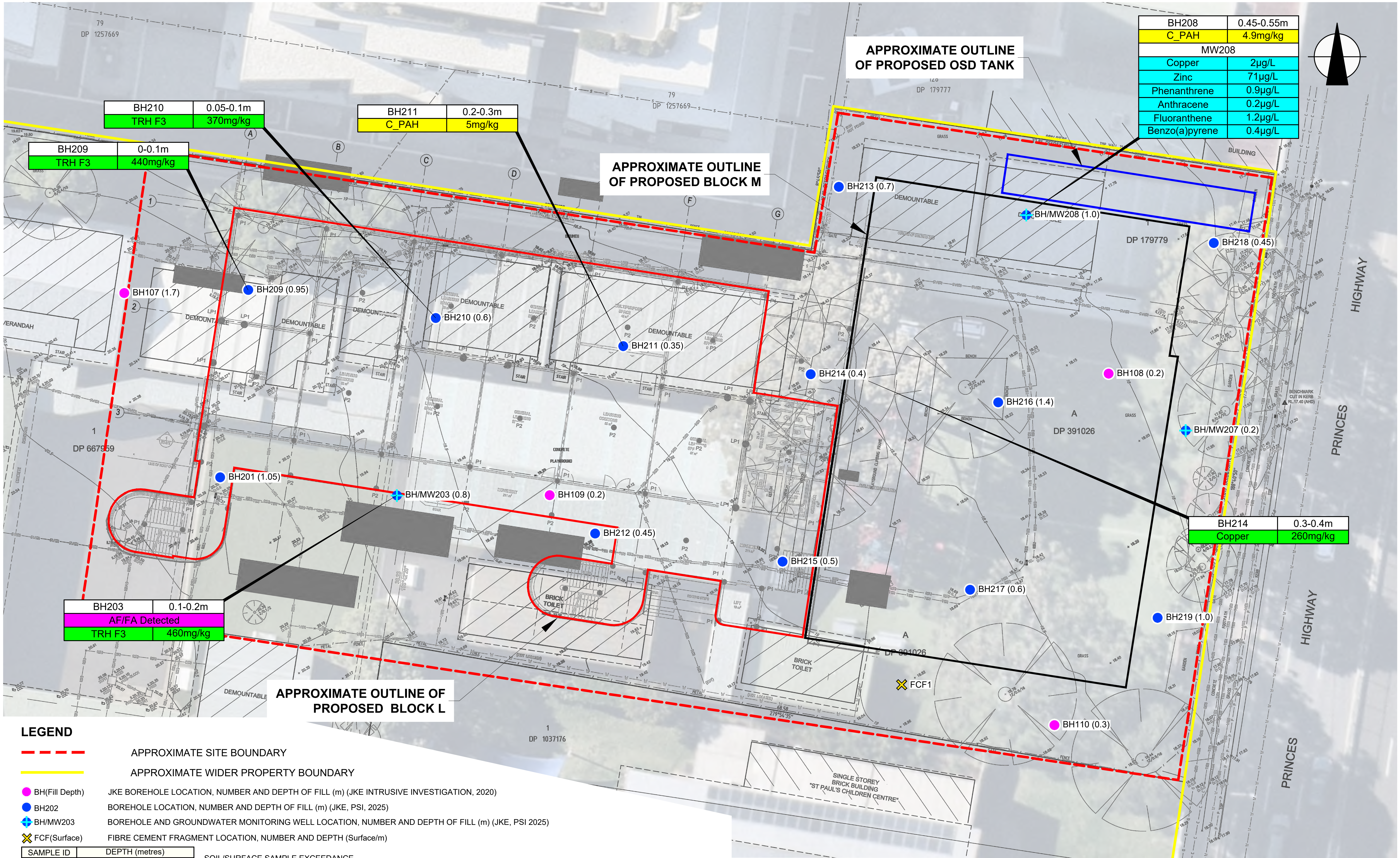
Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976BT2

Figure No: 2

JKEnvironments

PLOT DATE: 4/03/2025 2:32:48 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CADE32976BT2.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI, 2025)
BH/MW203	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI 2025)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
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 FOR HUMAN HEALTH RISK
(green)	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
(cyan)	GROUNDWATER CONTAMINATION ABOVE SAC
(magenta)	ASBESTOS DETECTED - NOT ABOVE SAC

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

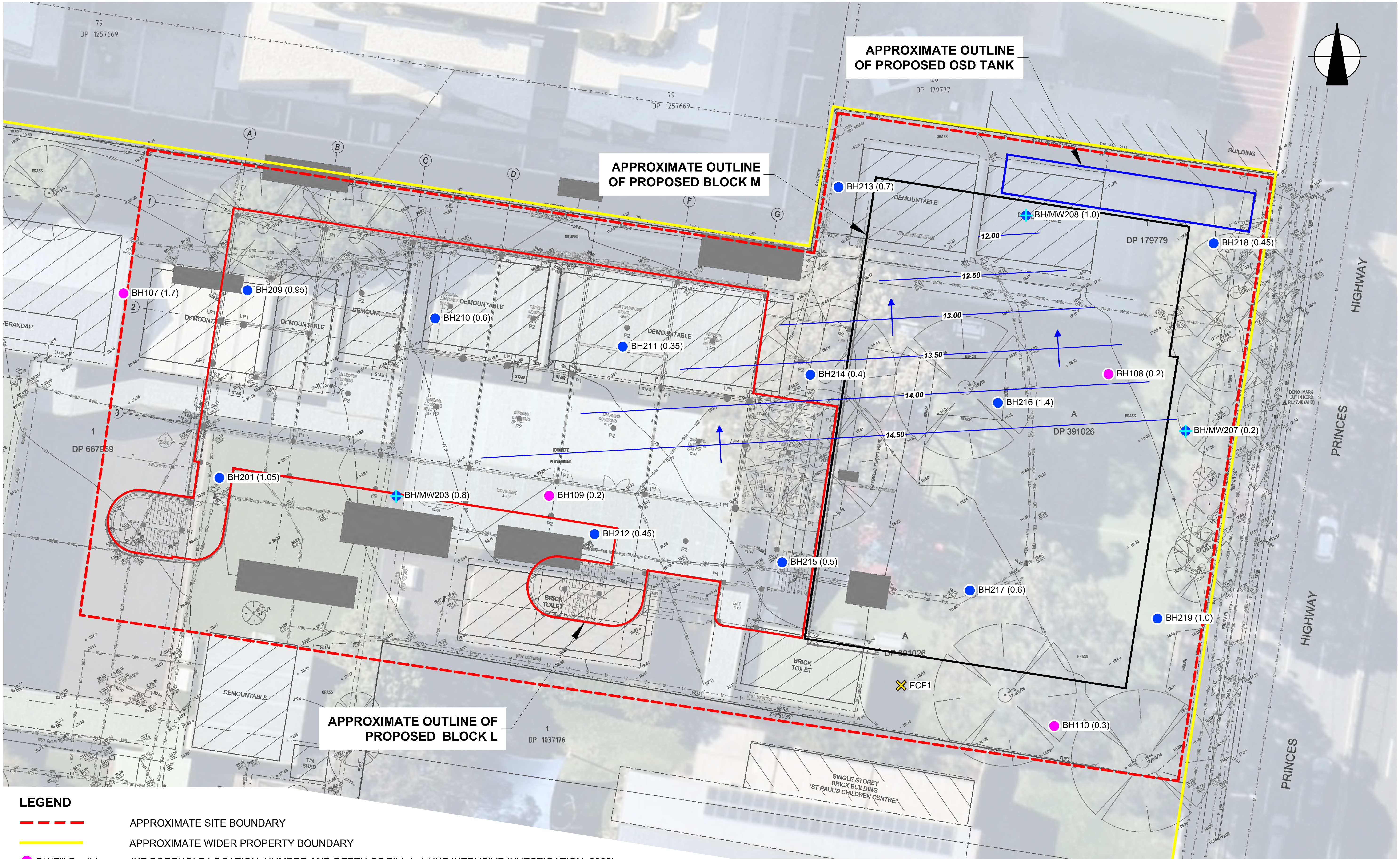
Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976BT2

Figure No: 3

JKEnvironments

PLOT DATE: 4/03/2025 2:33:07 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CAD\E32976BT2.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI, 2025)
BH/MW203	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, PSI 2025)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
13.50	GROUNDWATER CONTOUR INTERVALS (m)
(blue arrow)	INFERRED GROUNDWATER FLOW DIRECTION

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: **GROUNDWATER CONTOUR PLAN**

Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976BT2

Figure No: 4

JKEnvironments

PLOT DATE: 4/03/2025 2:33:24 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CAD\E32976BT2.DWG

Appendix B: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC:	Ambient Background Concentration
ACM:	Asbestos Containing Material
ADWG:	AustralianDrinking Water Guidelines
AF:	Asbestos Fines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CEC:	Cation Exchange Capacity
CRC:	Cooperative Research Centre
CT:	Contaminant Threshold
EILs:	Ecological Investigation Levels
ESLs:	Ecological Screening Levels
FA:	Fibrous Asbestos
GIL:	Groundwater Investigation Levels
GSW:	General Solid Waste
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
kg/L	kilograms per litre
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
%w/w:	weight per weight
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
pH_{KCL} :	pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} :	pH of filtered 1:20 1M KCl after peroxide digestion
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
RSW:	Restricted Solid Waste
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
S_{Cr}:	Chromium reducible sulfur
S_{POS}:	Peroxide oxidisable Sulfur
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TAA:	Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TCLP:	Toxicity Characteristics Leaching Procedure
TPA:	Total Potential Acidity, 1M KCL peroxide digest
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
TSA:	Total Sulfide Acidity (TPA-TAA)
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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.

Detailed Site Investigation (DSI)
24B Gladstone Street, Kogarah, NSW
E32976BT2

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)	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)			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**																				
BH201	0.1-0.2	Fill: Silty Gravel	<4	<0.4	**15**	**43**	**6**	<0.1	**7**	**29**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	<4	<0.4	**17**	**50**	**6**	<0.1	**9**	**28**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201	0.9-1	Fill: Silty Sandy Clay	**6**	<0.4	**15**	**38**	**130**	**0.4**	**3**	**120**	**8.1**	**1.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.1-0.2	Fill: Silty Sand	<4	<0.4	**17**	**89**	**32**	<0.1	**26**	**54**	**9.5**	**1.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	<4	<0.4	**18**	**74**	**67**	<0.1	**22**	**79**	**6.4**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH203 - [TRIPLICATE]	0.1-0.2	Fill: Silty Sand	<4	**0.5**	**11**	**32**	**290**	**0.4**	**6**	**400**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.3-0.4	Fill: Silty Sandy Clay	**4**	<0.4	**12**	**20**	**120**	<0.1	**4**	**84**	**5**	**0.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**23**	**11**	<0.1	**8**	**44**	**0.06**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH208	0-0.1	Fill: Silty Sand	**5**	<0.4	**12**	**15**	**36**	<0.1	**6**	**67**	**6.2**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH208	0.45-0.55	Fill: Silty Sandy Clay	**7**	<0.4	**22**	**11**	**84**	**0.2**	**10**	**78**	**50**	**4.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.1	Fill: Silty Sand	**4**	<0.4	**14**	**24**	**55**	**0.1**	**6**	**160**	**1.7**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH209	0.6-0.8	Fill: Sandy Clay	**5**	<0.4	**20**	<1	**23**	<0.1	**2**	**12**	**0.07**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0.05-0.1	Fill: Gravel	<4	<0.4	**5**	**50**	**9**	<0.1	**29**	**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
BH210	0.55-0.6	Fill: Silty Sandy Clay	**4**	<0.4	**10**	**18**	**140**	**0.8**	**4**	**250**	**3.2**	**0.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH211	0.2-0.3	Fill: Silty Sand	**4**	**0.5**	**12**	**32**	**250**	**0.4**	**7**	**400**	**37**	**4.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	**10**	**0.5**	**13**	**36**	**240**	**0.3**	**15**	**400**	**40**	**5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH212	0.1-0.15	Fill: Gravel	**5**	<0.4	**12**	**35**	**29**	<0.1	**33**	**47**	**4.6**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH213	0-0.1	Fill: Silty Sand	<4	<0.4	**17**	**15**	**17**	<0.1	**10**	**42**	**0.4**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH214	0.2-0.3	Fill: Silty Sand	**6**	<0.4	**12**	**24**	**92**	**0.1**	**3**	**73**	**1.4**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH214	0.3-0.4	Fill: Silty Sand	<4	<0.4	**7**	**260**	**100**	<0.1	**2**	**83**	**23**	**2.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH215	0-0.1	Fill: Silty Sand	<4	<0.4	**12**	**17**	**25**	<0.1	**8**	**60**	**3.6**	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH215	0.2-0.3	Fill: Silty Sand	<4	<0.4	**12**	**9**	**65**	**0.1**	**4**	**140**	**4.3**	**0.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH216	0-0.1	Fill: Silty Sand	<4	<0.4	**11**	**16**	**9**	<0.1	**5**	**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
BH216	1-1.3	Fill: Sandy Clay	<4	<0.4	**15**	<1	**4**	<0.1	**1**	**16**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH217	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**21**	**18**	<0.1	**8**	**60**	**0.95**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH217	0.2-0.3	Fill: Silty Sand	<4	<0.4	**12**	**25**	**170**	**0.1**	**7**	**450**	**5**	**0.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH218	0-0.1	Fill: Silty Sand	<4	<0.4	**9**	**19**	**160**	**0.1**	**6**	**110**	**6.6**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH219	0-0.1	Fill: Silty Sand	<4	<0.4	**13**	**27**	**13**	<0.1	**9**	**44**	**1.5**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**21**	**12**	<0.1	**7**	**45**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH219	0.5-0.6	Fill Silty Sand	<4	<0.4	**9**	**7**	**23**	<0.1	**2**	**19**	**2.7**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	<4	<0.4	**13**	**23**	**20**	<0.1	**14**	**50**	**1.4**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP202	BH207 (0-0.1m)	Fill: Silty Sand	<4.0	<0.40	**12**	**18**	**17**	<0.10	**5.9**	**60**	**6.6**	**0.82**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
Total Number of Samples			32	32	32	32	32	32	32	32	31	31	22	22	22	22	22	22	22	22	22	11
Maximum Value			10	0.5	22	260	290	0.8	33	450	50	5	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																						
Number of Fill Samples			NC	NC	NC	NC	NC	NC	NC	NC	NC	**25**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	NC	NC	NC	NC	NC	**1.07**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	NC	NC	NC	NC	NC	**1.3**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	NC	NC	NC	NC	NC	**95**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	NC	NC	NC	NC	NC	**2.158**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Concentration above the SAC — **VALUE**
Concentration above the PQL — **Bold**
Asbestos Detected — **Detected**
Standard deviation exceeds data assessment criteria — **VALUE**

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**								
BH201	0.1-0.2	Fill: Silty Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH201	0.9-1	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH203	0.1-0.2	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH203	0.3-0.4	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH207	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH208	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH208	0.45-0.55	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH209	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	**65**	<0.2	<0.5	<1	<1	<1	0
BH209	0.6-0.8	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH210	0.05-0.1	Fill: Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1
BH210	0.55-0.6	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.8
BH211	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH212	0.1-0.15	Fill: Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH213	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH214	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
BH214	0.3-0.4	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.5
BH215	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH215	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH216	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH216	1-1.3	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH217	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH217	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
BH218	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219	0.5-0.6	Fill Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP202	BH207 (0-0.1m)	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	-
Total Number of Samples					31	31	31	31	31	31	31	29
Maximum Value					<PQL	65	<PQL	<PQL	<PQL	<PQL	<PQL	1.8

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
BH201	0.1-0.2	Fill: Silty Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201	0.9-1	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH203	0.1-0.2	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH203	0.3-0.4	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH207	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH208	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH208	0.45-0.55	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH209	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH209	0.6-0.8	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH210	0.05-0.1	Fill: Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH210	0.55-0.6	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH211	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH212	0.1-0.15	Fill: Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH213	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH214	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH214	0.3-0.4	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH215	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH215	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH216	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH216	1-1.3	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH217	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH217	0.2-0.3	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH218	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219	0.5-0.6	Fill Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP202	BH207 (0-0.1m)	Fill: 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**				
BH201	0.1-0.2	Coarse	<25	<50	<100	<100
BH201 - [LAB_DUP]	0.1-0.2	Coarse	<25	<50	<100	<100
BH201	0.9-1	Fine	<25	<50	<100	<100
BH203	0.1-0.2	Coarse	<25	<50	**460**	**680**
BH203 - [LAB_DUP]	0.1-0.2	Coarse	<25	<50	**400**	**610**
BH203	0.3-0.4	Fine	<25	<50	**130**	**140**
BH207	0-0.1	Coarse	<25	<50	<100	<100
BH208	0-0.1	Coarse	<25	<50	**200**	**100**
BH208	0.45-0.55	Fine	<25	<50	**260**	<100
BH209	0-0.1	Coarse	<25	**65**	**440**	**190**
BH209	0.6-0.8	Fine	<25	<50	<100	<100
BH210	0.05-0.1	Coarse	<25	<50	**370**	**490**
BH210	0.55-0.6	Fine	<25	<50	<100	<100
BH211	0.2-0.3	Coarse	<25	<50	**120**	<100
BH211 - [LAB_DUP]	0.2-0.3	Coarse	<25	<50	**140**	<100
BH212	0.1-0.15	Coarse	<25	<50	**160**	**200**
BH213	0-0.1	Coarse	<25	<50	<100	<100
BH214	0.2-0.3	Coarse	<25	<50	<100	<100
BH214	0.3-0.4	Coarse	<25	<50	**140**	<100
BH215	0-0.1	Coarse	<25	<50	<100	<100
BH215	0.2-0.3	Coarse	<25	<50	**100**	<100
BH216	0-0.1	Coarse	<25	<50	<100	<100
BH216	1-1.3	Fine	<25	<50	<100	<100
BH217	0-0.1	Coarse	<25	<50	<100	<100
BH217	0.2-0.3	Coarse	<25	<50	<100	<100
BH218	0-0.1	Coarse	<25	<50	<100	<100
BH219	0-0.1	Coarse	<25	<50	**100**	**130**
BH219 - [LAB_DUP]	0-0.1	Coarse	<25	<50	<100	<100
BH219	0.5-0.6	Coarse	<25	<50	<100	<100
SDUP201	BH217 (0-0.1m)	Coarse	<25	<50	<100	<100
SDUP202	BH207 (0-0.1m)	Coarse	<25	<50	<100	<100
Total Number of Samples			31	31	31	31
Maximum Value			<PQL	65	460	680

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)
BH201	0.1-0.2	Coarse	700	1000	2500	10000
BH201 - [LAB_DUP]	0.1-0.2	Coarse	700	1000	2500	10000
BH201	0.9-1	Fine	800	1000	3500	10000
BH203	0.1-0.2	Coarse	700	1000	2500	10000
BH203 - [LAB_DUP]	0.1-0.2	Coarse	700	1000	2500	10000
BH203	0.3-0.4	Fine	800	1000	3500	10000
BH207	0-0.1	Coarse	700	1000	2500	10000
BH208	0-0.1	Coarse	700	1000	2500	10000
BH208	0.45-0.55	Fine	800	1000	3500	10000
BH209	0-0.1	Coarse	700	1000	2500	10000
BH209	0.6-0.8	Fine	800	1000	3500	10000
BH210	0.05-0.1	Coarse	700	1000	2500	10000
BH210	0.55-0.6	Fine	800	1000	3500	10000
BH211	0.2-0.3	Coarse	700	1000	2500	10000
BH211 - [LAB_DUP]	0.2-0.3	Coarse	700	1000	2500	10000
BH212	0.1-0.15	Coarse	700	1000	2500	10000
BH213	0-0.1	Coarse	700	1000	2500	10000
BH214	0.2-0.3	Coarse	700	1000	2500	10000
BH214	0.3-0.4	Coarse	700	1000	2500	10000
BH215	0-0.1	Coarse	700	1000	2500	10000
BH215	0.2-0.3	Coarse	700	1000	2500	10000
BH216	0-0.1	Coarse	700	1000	2500	10000
BH216	1-1.3	Fine	800	1000	3500	10000
BH217	0-0.1	Coarse	700	1000	2500	10000
BH217	0.2-0.3	Coarse	700	1000	2500	10000
BH218	0-0.1	Coarse	700	1000	2500	10000
BH219	0-0.1	Coarse	700	1000	2500	10000
BH219 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
BH219	0.5-0.6	Coarse	700	1000	2500	10000
SDUP201	BH217 (0-0.1m)	Coarse	700	1000	2500	10000
SDUP202	BH207 (0-0.1m)	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		82,000	62,000	85,000	120,000	1,100	120,000	85,000	130,000	29,000	
Site Use		**Intrusive Maintenance Worker - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH201	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
BH201 - [LAB_DUP]	0.1-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
BH201	0.9-1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH203	0.1-0.2	<25	<50	**460**	**680**	<0.2	<0.5	<1	<1	<1	**0.2**
BH203 - [LAB_DUP]	0.1-0.2	<25	<50	**400**	**610**	<0.2	<0.5	<1	<1	<1	**0.2**
BH203	0.3-0.4	<25	<50	**130**	**140**	<0.2	<0.5	<1	<1	<1	0
BH207	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH208	0-0.1	<25	<50	**200**	**100**	<0.2	<0.5	<1	<1	<1	0
BH208	0.45-0.55	<25	<50	**260**	<100	<0.2	<0.5	<1	<1	<1	0
BH209	0-0.1	<25	**65**	**440**	**190**	<0.2	<0.5	<1	<1	<1	0
BH209	0.6-0.8	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH210	0.05-0.1	<25	<50	**370**	**490**	<0.2	<0.5	<1	<1	<1	**1**
BH210	0.55-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.8**
BH211	0.2-0.3	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<1	0
BH211 - [LAB_DUP]	0.2-0.3	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	0
BH212	0.1-0.15	<25	<50	**160**	**200**	<0.2	<0.5	<1	<1	<1	0
BH213	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH214	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.4**
BH214	0.3-0.4	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	**0.5**
BH215	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH215	0.2-0.3	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<1	0
BH216	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH216	1-1.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH217	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH217	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
BH218	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH219	0-0.1	<25	<50	**100**	**130**	<0.2	<0.5	<1	<1	<1	0
BH219 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH219	0.5-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
SDUP201	BH217 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP202	BH207 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<1	-
Total Number of Samples		31	31	31	31	31	31	31	31	31	29
Maximum Value		<PQL	65	460	680	<PQL	<PQL	<PQL	<PQL	<PQL	1.8

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

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**					**0.01**			**0.001**			**0.001**											**0.01**	**0.001**
31/01/2025	BH201	0-0.05	No	10L	1,160	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	371803	BH201	0-0.05	710.96	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
31/01/2025	BH201	0.1-0.25	No	10L	1,270	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	371803	BH201	0.6-0.8	153.98	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	371803	BH201	0.9-1	715.12	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
15/01/2025	BH203	0.1-0.4	No	<10L	60	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH203	0.1-0.2	828.21	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	Chrysotile	–	0.0001	<0.01	<0.001
15/01/2025	BH203	0.5-0.8	No	<10L	150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/01/2025	BH205	0.1-0.5	No	<10L	305	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/01/2025	BH206	0-0.05	No	<10L	776	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/01/2025	BH207	0-0.1	No	10L	1,235	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH207	0-0.1	775.06	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
31/01/2025	BH208	0-0.1	No	10L	1,055	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	371803	BH208	0-0.1	286.88	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	371803	BH208	0.45-0.55	731.51	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
31/01/2025	BH209	0-0.1	No	10L	1,025	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	371803	BH209	0.85-0.95	431.65	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	370762	BH210	0.05-0.1	237	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	370762	BH211	0.2-0.3	407.35	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
16/01/2025	BH212	0.15-0.45	No	<10L	85	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH212	0.1-0.15	717.73	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	371803	BH213	0.3-0.5	670.67	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
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	370762	BH214	0.2-0.3	478.05	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
15/01/2025	BH215	0-0.1	No	10L	1,488	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH215	0-0.1	926.09	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
15/01/2025	BH215	0.2-0.5	No	10L	1,165	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/01/2025	BH216	0-0.1	No	10L	1,265	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH216	0-0.1	939.21	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
16/01/2025	BH216	0.1-0.2	No	10L	1,070	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/01/2025	BH216	0.4-0.7	No	<10L	215	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/01/2025	BH216	0.9-1.3	No	<10L	225	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/01/2025	BH217	0-0.1	No	10L	1,322	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH217	0-0.1	869.43	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
15/01/2025	BH217	0.1-0.3	No	10L	1,014	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/01/2025	BH219	0-01	No	10L	1,003	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	370762	BH219	0-0.1	920.43	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
15/01/2025	BH219	0.1-0.5	No	10L	1,215	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	370762	BH219	0.5-0.6	808.71	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
15/01/2025	BH219	0.7-1	No	10L	74	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**																				
BH201	0.1-0.2	Fill: Silty Gravel	Coarse	NA	NA	NA	<4	**15**	**43**	**6**	**7**	**29**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	Coarse	NA	NA	NA	<4	**17**	**50**	**6**	**9**	**28**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201	0.9-1	Fill: Silty Sandy Clay	Fine	NA	NA	NA	**6**	**15**	**38**	**130**	**3**	**120**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.79**
BH203	0.1-0.2	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	<4	**17**	**89**	**32**	**26**	**54**	<1	<0.1	<25	<50	**460**	**680**	<0.2	<0.5	<1	<1	**0.74**
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**18**	**74**	**67**	**22**	**79**	<1	<0.1	<25	<50	**400**	**610**	<0.2	<0.5	<1	<1	**0.58**
BH203 - [TRIPLICATE]	0.1-0.2	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	<4	**11**	**32**	**290**	**6**	**400**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.3-0.4	Fill: Silty Sandy Clay	Fine	NA	NA	NA	**4**	**12**	**20**	**120**	**4**	**84**	<1	NA	<25	<50	**130**	**140**	<0.2	<0.5	<1	<1	**0.5**
BH207	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**15**	**23**	**11**	**8**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
BH208	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	**5**	**12**	**15**	**36**	**6**	**67**	<1	<0.1	<25	<50	**200**	**100**	<0.2	<0.5	<1	<1	**0.5**
BH208	0.45-0.55	Fill: Silty Sandy Clay	Fine	NA	NA	NA	**7**	**22**	**11**	**84**	**10**	**78**	<1	NA	<25	<50	**260**	<100	<0.2	<0.5	<1	<1	**3.3**
BH209	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	**4**	**14**	**24**	**55**	**6**	**160**	<1	<0.1	<25	**65**	**440**	**190**	<0.2	<0.5	<1	<1	**0.2**
BH209	0.6-0.8	Fill: Sandy Clay	Fine	NA	NA	NA	**5**	**20**	<1	**23**	**2**	**12**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
BH210	0.05-0.1	Fill: Gravel	Coarse	NA	NA	NA	<4	**5**	**50**	**9**	**29**	**25**	<1	<0.1	<25	<50	**370**	**490**	<0.2	<0.5	<1	<1	<0.05
BH210	0.55-0.6	Fill: Silty Sandy Clay	Fine	**7.7**	**11**	NA	**4**	**10**	**18**	**140**	**4**	**250**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
BH211	0.2-0.3	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	**4**	**12**	**32**	**250**	**7**	**400**	<1	<0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	**3.3**
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	**10**	**13**	**36**	**240**	**15**	**400**	<1	<0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	**3.5**
BH212	0.1-0.15	Fill: Gravel	Coarse	NA	NA	NA	**5**	**12**	**35**	**29**	**33**	**47**	<1	<0.1	<25	<50	**160**	**200**	<0.2	<0.5	<1	<1	**0.4**
BH213	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**17**	**15**	**17**	**10**	**42**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
BH214	0.2-0.3	Fill: Silty Sand	Coarse	NA	NA	NA	**6**	**12**	**24**	**92**	**3**	**73**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
BH214	0.3-0.4	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	<4	**7**	**260**	**100**	**2**	**83**	<1	NA	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	**1.9**
BH215	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**12**	**17**	**25**	**8**	**60**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.3**
BH215	0.2-0.3	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**12**	**9**	**65**	**4**	**140**	<1	NA	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	**0.4**
BH216	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**11**	**16**	**9**	**5**	**35**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH216	1-1.3	Fill: Sandy Clay	Fine	NA	NA	NA	<4	**15**	<1	**4**	**1**	**16**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH217	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**15**	**21**	**18**	**8**	**60**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
BH217	0.2-0.3	Fill: Silty Sand	Coarse	**7.9**	**8.53**	NA	<4	**12**	**25**	**170**	**7**	**450**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
BH218	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**9**	**19**	**160**	**6**	**110**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.62**
BH219	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**13**	**27**	**13**	**9**	**44**	<1	<0.1	<25	<50	**100**	**130**	<0.2	<0.5	<1	<1	**0.2**
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**15**	**21**	**12**	**7**	**45**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH219	0.5-0.6	Fill Silty Sand	Coarse	NA	NA	NA	<4	**9**	**7**	**23**	**2**	**19**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**13**	**23**	**20**	**14**	**50**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
SDUP202	BH207 (0-0.1m)	Fill: Silty Sand	Coarse	NA	NA	NA	<4.0	**12**	**18**	**17**	**5.9**	**60**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.55**
Total Number of Samples				7	7	0	32	32	32	32	32	32	31	22	31	31	31	31	31	31	31	31	31
Maximum Value				7.9	11	NA	10	22	260	290	33	450	<PQL	<PQL	<PQL	65	460	680	<PQL	<PQL	<PQL	<PQL	3.5

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
BH201	0.1-0.2	Fill: Silty Gravel	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH201	0.9-1	Fill: Silty Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH203	0.1-0.2	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	170	180	180	120	300	2800	50	85	70	105	20
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH203 - [TRIPLICATE]	0.1-0.2	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	--	--	--	--	--	--	--	--	--	--	--
BH203	0.3-0.4	Fill: Silty Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH207	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH208	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH208	0.45-0.55	Fill: Silty Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH209	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH209	0.6-0.8	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH210	0.05-0.1	Fill: Gravel	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH210	0.55-0.6	Fill: Silty Sandy Clay	Fine	7.7	11	NA	100	200	240	1300	280	820	170	--	180	120	1300	5600	65	105	125	45	20
BH211	0.2-0.3	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	170	180	180	120	300	2800	50	85	70	105	20
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	170	180	180	120	300	2800	50	85	70	105	20
BH212	0.1-0.15	Fill: Gravel	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH213	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH214	0.2-0.3	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH214	0.3-0.4	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	170	--	180	120	300	2800	50	85	70	105	20
BH215	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH215	0.2-0.3	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH216	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH216	1-1.3	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH217	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH217	0.2-0.3	Fill: Silty Sand	Coarse	7.9	8.53	NA	100	200	220	1300	180	520	170	--	180	120	300	2800	50	85	70	105	20
BH218	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH219	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH219	0.5-0.6	Fill Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
SDUP202	BH207 (0-0.1m)	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

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**																									
BH201	0.1-0.2	Fill: Silty Gravel	<4	<0.4	**15**	**43**	**6**	<0.1	**7**	**29**	<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
BH201 - [LAB_DUP]	0.1-0.2	Fill: Silty Gravel	<4	<0.4	**17**	**50**	**6**	<0.1	**9**	**28**	<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
BH201	0.9-1	Fill: Silty Sandy Clay	**6**	<0.4	**15**	**38**	**130**	**0.4**	**3**	**120**	**8.1**	**0.79**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH203	0.1-0.2	Fill: Silty Sand	<4	<0.4	**17**	**89**	**32**	<0.1	**26**	**54**	**9.5**	**0.74**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**220**	**430**	**650**	<0.2	<0.5	<1	<1	Detected
BH203 - [LAB_DUP]	0.1-0.2	Fill: Silty Sand	<4	<0.4	**18**	**74**	**67**	<0.1	**22**	**79**	**6.4**	**0.58**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**180**	**400**	**580**	<0.2	<0.5	<1	<1	NA
BH203 - [TRIPLICATE]	0.1-0.2	Fill: Silty Sand	<4	**0.5**	**11**	**32**	**290**	**0.4**	**6**	**400**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.3-0.4	Fill: Silty Sandy Clay	**4**	<0.4	**12**	**20**	**120**	<0.1	**4**	**84**	**5**	**0.5**	NA	NA	NA	NA	NA	<25	<50	<100	**100**	**100**	<0.2	<0.5	<1	<1	NA
BH207	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**23**	**11**	<0.1	**8**	**44**	**0.06**	**0.06**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH208	0-0.1	Fill: Silty Sand	**5**	<0.4	**12**	**15**	**36**	<0.1	**6**	**67**	**6.2**	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**180**	**180**	<0.2	<0.5	<1	<1	NA
BH208	0.45-0.55	Fill: Silty Sandy Clay	**7**	<0.4	**22**	**11**	**84**	**0.2**	**10**	**78**	**50**	**3.3**	NA	NA	NA	NA	NA	<25	<50	**180**	**110**	**290**	<0.2	<0.5	<1	<1	NA
BH209	0-0.1	Fill: Silty Sand	**4**	<0.4	**14**	**24**	**55**	**0.1**	**6**	**160**	**1.7**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	**59**	**270**	**260**	**589**	<0.2	<0.5	<1	<1	NA
BH209	0.6-0.8	Fill: Sandy Clay	**5**	<0.4	**20**	<1	**23**	<0.1	**2**	**12**	**0.07**	**0.07**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH210	0.05-0.1	Fill: Gravel	<4	<0.4	**5**	**50**	**9**	<0.1	**29**	**25**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**120**	**390**	**510**	<0.2	<0.5	<1	<1	Not Detected
BH210	0.55-0.6	Fill: Silty Sandy Clay	**4**	<0.4	**10**	**18**	**140**	**0.8**	**4**	**250**	**3.2**	**0.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH211	0.2-0.3	Fill: Silty Sand	**4**	**0.5**	**12**	**32**	**250**	**0.4**	**7**	**400**	**37**	**3.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH211 - [LAB_DUP]	0.2-0.3	Fill: Silty Sand	**10**	**0.5**	**13**	**36**	**240**	**0.3**	**15**	**400**	**40**	**3.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**100**	<100	**100**	<0.2	<0.5	<1	<1	NA
BH212	0.1-0.15	Fill: Gravel	**5**	<0.4	**12**	**35**	**29**	<0.1	**33**	**47**	**4.6**	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**150**	**150**	<0.2	<0.5	<1	<1	Not Detected
BH213	0-0.1	Fill: Silty Sand	<4	<0.4	**17**	**15**	**17**	<0.1	**10**	**42**	**0.4**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH214	0.2-0.3	Fill: Silty Sand	**6**	<0.4	**12**	**24**	**92**	**0.1**	**3**	**73**	**1.4**	**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
BH214	0.3-0.4	Fill: Silty Sand	<4	<0.4	**7**	**260**	**100**	<0.1	**2**	**83**	**23**	**1.9**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH215	0-0.1	Fill: Silty Sand	<4	<0.4	**12**	**17**	**25**	<0.1	**8**	**60**	**3.6**	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH215	0.2-0.3	Fill: Silty Sand	<4	<0.4	**12**	**9**	**65**	**0.1**	**4**	**140**	**4.3**	**0.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH216	0-0.1	Fill: Silty Sand	<4	<0.4	**11**	**16**	**9**	<0.1	**5**	**35**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH216	1-1.3	Fill: Sandy Clay	<4	<0.4	**15**	<1	**4**	<0.1	**1**	**16**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH217	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**21**	**18**	<0.1	**8**	**60**	**0.95**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH217	0.2-0.3	Fill: Silty Sand	<4	<0.4	**12**	**25**	**170**	**0.1**	**7**	**450**	**5**	**0.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH218	0-0.1	Fill: Silty Sand	<4	<0.4	**9**	**19**	**160**	**0.1**	**6**	**110**	**6.6**	**0.62**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH219	0-0.1	Fill: Silty Sand	<4	<0.4	**13**	**27**	**13**	<0.1	**9**	**44**	**1.5**	**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
BH219 - [LAB_DUP]	0-0.1	Fill: Silty Sand	<4	<0.4	**15**	**21**	**12**	<0.1	**7**	**45**	<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
BH219	0.5-0.6	Fill Silty Sand	<4	<0.4	**9**	**7**	**23**	<0.1	**2**	**19**	**2.7**	**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
SDUP201	BH217 (0-0.1m)	Fill: Silty Sand	<4	<0.4	**13**	**23**	**20**	<0.1	**14**	**50**	**1.4**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP202	BH207 (0-0.1m)	Fill: Silty Sand	<4.0	<0.40	**12**	**18**	**17**	<0.10	**5.9**	**60**	**6.6**	**0.55**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
Total Number of Samples			32	32	32	32	32	32	32	32	31	31	22	22	22	22	22	31	31	31	31	31	31	31	31	31	11
Maximum Value			10	0.5	22	260	290	0.8	33	450	50	3.5	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	59	270	430	650	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																											
Number of Fill Samples			NC	NC	NC	NC	**25**	NC	NC	NC	NC	**25**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	**75**	NC	NC	NC	NC	**0.63**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	**78.4**	NC	NC	NC	NC	**0.92**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	**95**	NC	NC	NC	NC	**95**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	**114.8**	NC	NC	NC	NC	**0.992**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Concentration above the CT1	VALUE	Standard deviation exceeds data assessment criteria	VALUE
Concentration above SCC1	VALUE		
Concentration above the SCC2	VALUE		
Concentration above PQL	**Bold**		
Asbestos Detected > Special Waste (asbestos)	Detected		

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

			Lead	B(a)P
PQL - Envirolab Services			0.03	0.001
TCLP1 - General Solid Waste			5	0.04
TCLP2 - Restricted Solid Waste			20	0.16
TCLP3 - Hazardous Waste			>20	>0.16
Sample Reference	**Sample Depth**	**Sample Description**		
BH201	0.9-1.0	Fill: Silty Sandy Clay	**0.34**	NA
BH201 - LAB DUP	0.9-1.0	Fill: Silty Sandy Clay	**0.34**	NA
BH203	0.1-0.2	Fill: Silty Sand	**0.06**	NA
BH208	0.45-0.55	Fill: Silty Sandy Clay	NA	<0.0001
BH211	0.2-0.3	Fill: Silty Sand	**0.1**	<0.0001
BH211 - LAB DUP	0.2-0.3	Fill: Silty Sand	NA	<0.0001
BH214	0.3-0.4	Fill: Silty Sand	NA	<0.0001
BH217	0.2-0.3	Fill: Silty Sand	**0.3**	NA
BH218	0.3-0.45	Fill: Silty Sand	<0.07	NA
Total Number of samples			6	4
Maximum Value			0.34	<PQL

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

TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.05*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH217	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	0.1	<0.2	0.1	0.1	<0.1	0.1
laboratory	SDUP201	BH217 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	0.2	0.1	0.1	0.2	0.2	<0.1	<0.1	0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.075	nc	0.2	0.2	0.1	0.1	0.15	0.15	0.075	nc	0.1
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	67%	nc	0%	0%	0%	0%	67%	67%	67%	nc	0%
Inter	BH207	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	0.06	<0.1	<0.1	<0.1
laboratory	SDUP202	BH207 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.10	<0.10	<0.10	<0.10	0.75	0.23	1.2	1.3	0.46	0.5	0.81	0.55	0.37	<0.10	0.42
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.4	0.14	0.625	0.675	0.255	0.275	0.455	0.305	0.21	nc	0.235
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	175%	129%	184%	185%	161%	164%	156%	161%	152%	nc	157%
Field	TB-S201	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
Blank	15/01/25																									
Field	FR-HA-201	µg/L	<10	180	<100	<100	<1	<1	<1	<2	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinsate	16/01/25																									
Trip	TS-S201		-	-	-	-	82%	82%	81%	82%	81%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/01/25																									

			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	BH217	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	SDUP201	BH217 (0-0.1m)	<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	BH207	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	SDUP202	BH207 (0-0.1m)	<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-S201	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blank	15/01/25																					
Field	FR-HA-201	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rinsate	16/01/25																					
Trip	TS-S201		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/01/25																					

			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	BH217	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	15	21	18	<0.1	8	60
laboratory	SDUP201	BH217 (0-0.1m)	<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	13	23	20	<0.1	14	50
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	14	22	19	nc	11	55
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	14%	9%	11%	nc	55%	18%
Inter	BH207	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	15	23	11	<0.1	8	44
laboratory	SDUP202	BH207 (0-0.1m)	<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	<0.40	12	18	17	<0.10	5.9	60
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	13.5	20.5	14	nc	6.95	52
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	22%	24%	43%	nc	30%	31%
Field	TB-S201	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	<0.4	<1	<1	<1	<0.1	<1	<1
Blank	15/01/25																						
Field	FR-HA-201	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.01	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.02
Rinsate	16/01/25																						
Trip	TS-S201		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/01/25																						

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

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				
			MW203	ME203 - LAB DUP	MW207	MW208	GWDUP-201 (MW207)
Metals and Metalloids							
Arsenic (As III)	1	24	**1**	**1**	**5**	<1	**5**
Cadmium	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (SAC for Cr III adopted)	1	3.3	**2**	**2**	**2**	**1**	**2**
Copper	1	1.4	<1	<1	<1	**2**	<1
Lead	1	3.4	<1	<1	<1	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	11	**1**	**1**	**3**	**7**	**3**
Zinc	1	8	**4**	**4**	**4**	**71**	**6**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	950	<1	NA	<1	<1	<1
Toluene	1	180	<1	NA	<1	<1	<1
Ethylbenzene	1	80	<1	NA	<1	<1	<1
m+p-xylene	2	75	<2	NA	<2	<2	<2
o-xylene	1	350	<1	NA	<1	<1	<1
Total xylenes	2	NSL	<2	NA	<2	<2	<2
Volatile Organic Compounds (VOCs), including chlorinated VOCs							
Dichlorodifluoromethane	10	NSL	<10	NA	<10	<10	<10
Chloromethane	10	NSL	<10	NA	<10	<10	<10
Vinyl Chloride	10	100	<10	NA	<10	<10	<10
Bromomethane	10	NSL	<10	NA	<10	<10	<10
Chloroethane	10	NSL	<10	NA	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	NA	<10	<10	<10
1,1-Dichloroethene	1	700	<1	NA	<1	<1	<1
Trans-1,2-dichloroethene	1	NSL	<1	NA	<1	<1	<1
1,1-dichloroethane	1	90	<1	NA	<1	<1	<1
Cis-1,2-dichloroethene	1	NSL	<1	NA	<1	<1	<1
Bromochloromethane	1	NSL	<1	NA	<1	<1	<1
Chloroform	1	370	<1	NA	<1	**4**	<1
2,2-dichloropropane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloroethane	1	1900	<1	NA	<1	<1	<1
1,1,1-trichloroethane	1	270	<1	NA	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	NA	<1	<1	<1
Cyclohexane	1	NSL	<1	NA	<1	<1	<1
Carbon tetrachloride	1	240	<1	NA	<1	<1	<1
Benzene	1	950	<1	NA	<1	<1	<1
Dibromomethane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloropropane	1	900	<1	NA	<1	<1	<1
Trichloroethene	1	330	<1	NA	<1	<1	<1
Bromodichloromethane	1	NSL	<1	NA	<1	<1	<1
trans-1,3-dichloropropene	1	NSL	<1	NA	<1	<1	<1
cis-1,3-dichloropropene	1	NSL	<1	NA	<1	<1	<1
1,1,2-trichloroethane	1	6500	<1	NA	<1	<1	<1
Toluene	1	180	<1	NA	<1	<1	<1
1,3-dichloropropane	1	1100	<1	NA	<1	<1	<1
Dibromochloromethane	1	NSL	<1	NA	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	NA	<1	<1	<1
Tetrachloroethene	1	70	<1	NA	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	NA	<1	<1	<1
Chlorobenzene	1	55	<1	NA	<1	<1	<1
Ethylbenzene	1	80	<1	NA	<1	<1	<1
Bromoform	1	NSL	<1	NA	<1	<1	<1
m+p-xylene	2	75	<2	NA	<2	<2	<2
Styrene	1	NSL	<1	NA	<1	<1	<1
1,1,2,2-tetrachloroethane	1	400	<1	NA	<1	<1	<1
o-xylene	1	350	<1	NA	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	NA	<1	<1	<1
Isopropylbenzene	1	30	<1	NA	<1	<1	<1
Bromobenzene	1	NSL	<1	NA	<1	<1	<1
n-propyl benzene	1	NSL	<1	NA	<1	<1	<1
2-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
4-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
1,3-dichlorobenzene	1	260	<1	NA	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,4-dichlorobenzene	1	60	<1	NA	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	NA	<1	<1	<1
1,2-dichlorobenzene	1	160	<1	NA	<1	<1	<1
n-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	NA	<1	<1	<1
1,2,4-trichlorobenzene	1	85	<1	NA	<1	<1	<1
Hexachlorobutadiene	1	NSL	<1	NA	<1	<1	<1
1,2,3-trichlorobenzene	1	3	<1	NA	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	0.2	16	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	**0.1**	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1	<0.1	**0.9**	<0.1
Anthracene	0.1	0.01	<0.1	<0.1	<0.1	**0.2**	<0.1
Fluoranthene	0.1	1	<0.1	<0.1	<0.1	**1.2**	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	**1.2**	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	**0.5**	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	**0.6**	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	**0.7**	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	**0.4**	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	**0.2**	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	**0.3**	<0.1

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

JKEnvironments

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 MW203	ME203 - LAB DUP	MW207	MW208	GWDUP-201 (MW207)
Metals and Metalloids							
Arsenic (As III)	1	100	**1**	**1**	**5**	<1	**5**
Cadmium	0.1	20	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (total)	1	500	**2**	**2**	**2**	**1**	**2**
Copper	1	20000	<1	<1	<1	**2**	<1
Lead	1	100	<1	<1	<1	<1	<1
Total Mercury (inorganic)	0.05	10	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	200	**1**	**1**	**3**	**7**	**3**
Zinc	1	30000	**4**	**4**	**4**	**71**	**6**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	10	<1	NA	<1	<1	<1
Toluene	1	8000	<1	NA	<1	<1	<1
Ethylbenzene	1	3000	<1	NA	<1	<1	<1
m+p-xylene	2	NSL	<2	NA	<2	<2	<2
o-xylene	1	NSL	<1	NA	<1	<1	<1
Total xylenes	2	6000	<2	NA	<2	<2	<2
Volatile Organic Compounds (VOCs), including chlorinated VOCs							
Dichlorodifluoromethane	10	NSL	<10	NA	<10	<10	<10
Chloromethane	10	NSL	<10	NA	<10	<10	<10
Vinyl Chloride	10	3	<10	NA	<10	<10	<10
Bromomethane	10	NSL	<10	NA	<10	<10	<10
Chloroethane	10	NSL	<10	NA	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	NA	<10	<10	<10
1,1-Dichloroethene	1	300	<1	NA	<1	<1	<1
Trans-1,2-dichloroethene	1	600	<1	NA	<1	<1	<1
1,1-dichloroethane	1	NSL	<1	NA	<1	<1	<1
Cis-1,2-dichloroethene	1	600	<1	NA	<1	<1	<1
Bromochloromethane	1	2500	<1	NA	<1	<1	<1
Chloroform	1		<1	NA	<1	**4**	<1
2,2-dichloropropane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloroethane	1	30	<1	NA	<1	<1	<1
1,1,1-trichloroethane	1	NSL	<1	NA	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	NA	<1	<1	<1
Cyclohexane	1	NSL	<1	NA	<1	<1	<1
Carbon tetrachloride	1	30	<1	NA	<1	<1	<1
Benzene	1	10	<1	NA	<1	<1	<1
Dibromomethane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloropropane	1	NSL	<1	NA	<1	<1	<1
Trichloroethene	1	NSL	<1	NA	<1	<1	<1
Bromodichloromethane	1	NSL	<1	NA	<1	<1	<1
trans-1,3-dichloropropene	1	1000	<1	NA	<1	<1	<1
cis-1,3-dichloropropene	1	1000	<1	NA	<1	<1	<1
1,1,2-trichloroethane	1	NSL	<1	NA	<1	<1	<1
Toluene	1	8000	<1	NA	<1	<1	<1
1,3-dichloropropane	1	NSL	<1	NA	<1	<1	<1
Dibromochloromethane	1	NSL	<1	NA	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	NA	<1	<1	<1
Tetrachloroethene	1	500	<1	NA	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	NA	<1	<1	<1
Chlorobenzene	1	3000	<1	NA	<1	<1	<1
Ethylbenzene	1	3000	<1	NA	<1	<1	<1
Bromoform	1	NSL	<1	NA	<1	<1	<1
m+p-xylene	2	NSL	<2	NA	<2	<2	<2
Styrene	1	300	<1	NA	<1	<1	<1
1,1,2,2-tetrachloroethane	1	NSL	<1	NA	<1	<1	<1
o-xylene	1	NSL	<1	NA	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	NA	<1	<1	<1
Isopropylbenzene	1	NSL	<1	NA	<1	<1	<1
Bromobenzene	1	NSL	<1	NA	<1	<1	<1
n-propyl benzene	1	NSL	<1	NA	<1	<1	<1
2-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
4-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
1,3-dichlorobenzene	1	200	<1	NA	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,4-dichlorobenzene	1	400	<1	NA	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	NA	<1	<1	<1
1,2-dichlorobenzene	1	15000	<1	NA	<1	<1	<1
n-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	NA	<1	<1	<1
1,2,4-trichlorobenzene	1	300	<1	NA	<1	<1	<1
1,2,3-trichlorobenzene	1		<1	NA	<1	<1	<1
Hexachlorobutadiene	1	7	<1	NA	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	0.2	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	**0.1**	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	<0.1	<0.1	**0.9**	<0.1
Anthracene	0.1	NSL	<0.1	<0.1	<0.1	**0.2**	<0.1
Fluoranthene	0.1	NSL	<0.1	<0.1	<0.1	**1.2**	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	**1.2**	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	**0.5**	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	**0.6**	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	**0.7**	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	**0.4**	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	**0.2**	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	**0.3**	<0.1
Organochlorine Pesticides (OCPs)							
alpha-BHC	0.001	NSL	NA	NA	NA	NA	NA
HCB	0.001	NSL	NA	NA	NA	NA	NA
beta-BHC	0.001	NSL	NA	NA	NA	NA	NA
gamma-BHC	0.001	NSL	NA	NA	NA	NA	NA
delta-BHC	0.001	NSL	NA	NA	NA	NA	NA
Heptachlor	0.001	3	NA	NA	NA	NA	NA
Heptachlor Epoxide	0.001		NA	NA	NA	NA	NA
Aldrin	0.001	3	NA	NA	NA	NA	NA
Dieldrin	0.001		NA	NA	NA	NA	NA
gamma-Chlordane	0.001	20	NA	NA	NA	NA	NA
alpha-Chlordane	0.001		NA	NA	NA	NA	NA
Endosulfan I	0.002	200	NA	NA	NA	NA	NA
Endosulfan II	0.002		NA	NA	NA	NA	NA
Endosulfan Sulphate	0.001		NA	NA	NA	NA	NA
DDT	0.001	90	NA	NA	NA	NA	NA
pp-DDD	0.001		NA	NA	NA	NA	NA
pp-DDE	0.001		NA	NA	NA	NA	NA
Endrin	0.001	NSL	NA	NA	NA	NA	NA
Endrin Aldehyde	0.001	NSL	NA	NA	NA	NA	NA
Methoxychlor	0.001	3,000	NA	NA	NA	NA	NA
Organophosphate Pesticides (OPPs)							
Azinphos-methyl (Guthion)	0.02	300	NA	NA	NA	NA	NA
Bromophos ethyl	0.01	100	NA	NA	NA	NA	NA
Chlorpyriphos	0.009	100	NA	NA	NA	NA	NA
Chlorpyriphos-methyl	0.01	NSL	NA	NA	NA	NA	NA
Diazinon	0.01	40	NA	NA	NA	NA	NA
Dichlorovos	0.01	50	NA	NA	NA	NA	NA
Dimethoate	0.01	70	NA	NA	NA	NA	NA
Ethion	0.01	40	NA	NA	NA	NA	NA
Fenitrothion	0.01	70	NA	NA	NA	NA	NA
Malathion (Maldison)	0.05	700	NA	NA	NA	NA	NA
Ronnel (Fenchlorphos)	0.01	NSL	NA	NA	NA	NA	NA
Parathion	0.004	200	NA	NA	NA	NA	NA
Methyl Parathion	0.01	7	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (PCBs)							
Aroclor 1016	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1221	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1232	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1242	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1248	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1254	0.01	NSL	NA	NA	NA	NA	NA
Aroclor 1260	0.01	NSL	NA	NA	NA	NA	NA
Total PCBs	0.01	NSL	NA	NA	NA	NA	NA

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

TABLE G3
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO DRINKING WATER GILs
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011	SAMPLES				
			MW203	ME203 - LAB DUP	MW207	MW208	GWDUP-201 (MW207)
Metals and Metalloids							
Arsenic (As III)	1	10	**1**	**1**	**5**	<1	**5**
Cadmium	0.1	2	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (total)	1	50	**2**	**2**	**2**	**1**	**2**
Copper	1	2000	<1	<1	<1	**2**	<1
Lead	1	10	<1	<1	<1	<1	<1
Total Mercury (inorganic)	0.05	1	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	1	20	**1**	**1**	**3**	**7**	**3**
Zinc	1	3000	**4**	**4**	**4**	**71**	**6**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)							
Benzene	1	1	<1	NA	<1	<1	<1
Toluene	1	800	<1	NA	<1	<1	<1
Ethylbenzene	1	300	<1	NA	<1	<1	<1
m+p-xylene	2	NSL	<2	NA	<2	<2	<2
o-xylene	1	NSL	<1	NA	<1	<1	<1
Total xylenes	2	600	<2	NA	<2	<2	<2
Volatile Organic Compounds (VOCs), including chlo	1						
Dichlorodifluoromethane	10	NSL	<10	NA	<10	<10	<10
Chloromethane	10	NSL	<10	NA	<10	<10	<10
Vinyl Chloride	10	0.3	<10	NA	<10	<10	<10
Bromomethane	10	NSL	<10	NA	<10	<10	<10
Chloroethane	10	NSL	<10	NA	<10	<10	<10
Trichlorofluoromethane	10	NSL	<10	NA	<10	<10	<10
1,1-Dichloroethene	1	30	<1	NA	<1	<1	<1
Trans-1,2-dichloroethene	1	60	<1	NA	<1	<1	<1
1,1-dichloroethane	1	NSL	<1	NA	<1	<1	<1
Cis-1,2-dichloroethene	1	60	<1	NA	<1	<1	<1
Bromochloromethane	1	250	<1	NA	<1	<1	<1
Chloroform	1		<1	NA	<1	**4**	<1
2,2-dichloropropane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloroethane	1	3	<1	NA	<1	<1	<1
1,1,1-trichloroethane	1	NSL	<1	NA	<1	<1	<1
1,1-dichloropropene	1	NSL	<1	NA	<1	<1	<1
Cyclohexane	1	NSL	<1	NA	<1	<1	<1
Carbon tetrachloride	1	3	<1	NA	<1	<1	<1
Benzene	1	1	<1	NA	<1	<1	<1
Dibromomethane	1	NSL	<1	NA	<1	<1	<1
1,2-dichloropropane	2	NSL	<1	NA	<1	<1	<1
Trichloroethene	1	NSL	<1	NA	<1	<1	<1
Bromodichloromethane	2	NSL	<1	NA	<1	<1	<1
trans-1,3-dichloropropene	1	100	<1	NA	<1	<1	<1
cis-1,3-dichloropropene	1	100	<1	NA	<1	<1	<1
1,1,2-trichloroethane	1	NSL	<1	NA	<1	<1	<1
Toluene	1	800	<1	NA	<1	<1	<1
1,3-dichloropropane	1	NSL	<1	NA	<1	<1	<1
Dibromochloromethane	1	NSL	<1	NA	<1	<1	<1
1,2-dibromoethane	1	NSL	<1	NA	<1	<1	<1
Tetrachloroethene	1	50	<1	NA	<1	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	NA	<1	<1	<1
Chlorobenzene	1	300	<1	NA	<1	<1	<1
Ethylbenzene	1	300	<1	NA	<1	<1	<1
Bromoform	1	NSL	<1	NA	<1	<1	<1
m+p-xylene	2	NSL	<2	NA	<2	<2	<2
Styrene	1	30	<1	NA	<1	<1	<1
1,1,2,2-tetrachloroethane	1	NSL	<1	NA	<1	<1	<1
o-xylene	1	NSL	<1	NA	<1	<1	<1
1,2,3-trichloropropane	1	NSL	<1	NA	<1	<1	<1
Isopropylbenzene	1	NSL	<1	NA	<1	<1	<1
Bromobenzene	1	NSL	<1	NA	<1	<1	<1
n-propyl benzene	1	NSL	<1	NA	<1	<1	<1
2-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
4-chlorotoluene	1	NSL	<1	NA	<1	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
Tert-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	NA	<1	<1	<1
1,3-dichlorobenzene	1	20	<1	NA	<1	<1	<1
Sec-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,4-dichlorobenzene	1	40	<1	NA	<1	<1	<1
4-isopropyl toluene	1	NSL	<1	NA	<1	<1	<1
1,2-dichlorobenzene	1	1500	<1	NA	<1	<1	<1
n-butyl benzene	1	NSL	<1	NA	<1	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	NA	<1	<1	<1
1,2,4-trichlorobenzene	1	30	<1	NA	<1	<1	<1
1,2,3-trichlorobenzene	1		<1	NA	<1	<1	<1
Hexachlorobutadiene	1	0.7	<1	NA	<1	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)							
Naphthalene	0.2	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	**0.1**	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	<0.1	<0.1	**0.9**	<0.1
Anthracene	0.1	NSL	<0.1	<0.1	<0.1	**0.2**	<0.1
Fluoranthene	0.1	NSL	<0.1	<0.1	<0.1	**1.2**	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	**1.2**	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	**0.5**	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	**0.6**	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	**0.7**	<0.2
Benzo(a)pyrene	0.1	0.01	<0.1	<0.1	<0.1	**0.4**	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	**0.2**	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	**0.3**	<0.1

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

TABLE G4
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 BH203	BH203 - LAB DUP	BH207	BH208	GWDUP-201
Total Recoverable Hydrocarbons (TRH)									
C_6-C_9 Aliphatics (assessed using F1)	10	-	100	-	<10	NA	<10	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	100	-	<50	[NT]	<50	**62**	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)									
Benzene	1	1	-	-	<1	NA	<1	<1	<1
Toluene	1	800	-	-	<1	NA	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	NA	<1	<1	<1
Total xylenes	2	600	-	-	<2	NA	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	1	-	-	6.1	<1	NA	<1	<1	<1
Volatile Organic Compounds (VOCs), including chlorinated VOCs									
Dichlorodifluoromethane	10	-	-	-	<10	NA	<10	<10	<10
Chloromethane	10	-	-	-	<10	NA	<10	<10	<10
Vinyl Chloride	10	0.3	-	-	<10	NA	<10	<10	<10
Bromomethane	10	-	-	-	<10	NA	<10	<10	<10
Chloroethane	10	-	-	-	<10	NA	<10	<10	<10
Trichlorofluoromethane	10	-	-	-	<10	NA	<10	<10	<10
1,1-Dichloroethene	1	30	-	-	<1	NA	<1	<1	<1
Trans-1,2-dichloroethene	1	60	-	-	<1	NA	<1	<1	<1
1,1-dichloroethane	1	-	-	-	<1	NA	<1	<1	<1
Cis-1,2-dichloroethene	1	60	-	-	<1	NA	<1	<1	<1
Bromochloromethane	1	250	-	-	<1	NA	<1	<1	<1
Chloroform	1		-	-	<1	NA	<1	**4**	<1
2,2-dichloropropane	1	-	-	-	<1	NA	<1	<1	<1
1,2-dichloroethane	1	3	-	-	<1	NA	<1	<1	<1
1,1,1-trichloroethane	1	-	-	-	<1	NA	<1	<1	<1
1,1-dichloropropene	1	-	-	-	<1	NA	<1	<1	<1
Cyclohexane	1	-	-	-	<1	NA	<1	<1	<1
Carbon tetrachloride	1	3	-	-	<1	NA	<1	<1	<1
Benzene	1	1	-	-	<1	NA	<1	<1	<1
Dibromomethane	1	-	-	-	<1	NA	<1	<1	<1
1,2-dichloropropane	1	-	-	-	<1	NA	<1	<1	<1
Trichloroethene	1	-	-	-	<1	NA	<1	<1	<1
Bromodichloromethane	1	-	-	-	<1	NA	<1	<1	<1
trans-1,3-dichloropropene	1	100	-	-	<1	NA	<1	<1	<1
cis-1,3-dichloropropene	1	100	-	-	<1	NA	<1	<1	<1
1,1,2-trichloroethane	1	-	-	-	<1	NA	<1	<1	<1
Toluene	1	800	-	-	<1	NA	<1	<1	<1
1,3-dichloropropane	1	-	-	-	<1	NA	<1	<1	<1
Dibromochloromethane	1	-	-	-	<1	NA	<1	<1	<1
1,2-dibromoethane	1	-	-	-	<1	NA	<1	<1	<1
Tetrachloroethene	1	50	-	-	<1	NA	<1	<1	<1
1,1,1,2-tetrachloroethane	1	-	-	-	<1	NA	<1	<1	<1
Chlorobenzene	1	300	-	-	<1	NA	<1	<1	<1
Ethylbenzene	1	300	-	-	<1	NA	<1	<1	<1
Bromoform	1	-	-	-	<1	NA	<1	<1	<1
m+p-xylene	2	-	-	-	<2	NA	<2	<2	<2
Styrene	1	30	-	-	<1	NA	<1	<1	<1
1,1,2,2-tetrachloroethane	1	-	-	-	<1	NA	<1	<1	<1
o-xylene	1	-	-	-	<1	NA	<1	<1	<1
1,2,3-trichloropropane	1	-	-	-	<1	NA	<1	<1	<1
Isopropylbenzene	1	-	-	-	<1	NA	<1	<1	<1
Bromobenzene	1	-	-	-	<1	NA	<1	<1	<1
n-propyl benzene	1	-	-	-	<1	NA	<1	<1	<1
2-chlorotoluene	1	-	-	-	<1	NA	<1	<1	<1
4-chlorotoluene	1	-	-	-	<1	NA	<1	<1	<1
1,3,5-trimethyl benzene	1	-	-	-	<1	NA	<1	<1	<1
Tert-butyl benzene	1	-	-	-	<1	NA	<1	<1	<1
1,2,4-trimethyl benzene	1	-	-	-	<1	NA	<1	<1	<1
1,3-dichlorobenzene	1	20	-	-	<1	NA	<1	<1	<1
Sec-butyl benzene	1	-	-	-	<1	NA	<1	<1	<1
1,4-dichlorobenzene	1	40	-	-	<1	NA	<1	<1	<1
4-isopropyl toluene	1	-	-	-	<1	NA	<1	<1	<1
1,2-dichlorobenzene	1	1500	-	-	<1	NA	<1	<1	<1
n-butyl benzene	1	-	-	-	<1	NA	<1	<1	<1
1,2-dibromo-3-chloropropane	1	-	-	-	<1	NA	<1	<1	<1
1,2,4-trichlorobenzene	1	30	-	-	<1	NA	<1	<1	<1
1,2,3-trichlorobenzene	1		-	-	<1	NA	<1	<1	<1
Hexachlorobutadiene	1	7	-	-	<1	NA	<1	<1	<1

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

TABLE Q2
GROUNDWATER QA/QC SUMMARY

		Dichlorodifluoromethane	Chloromethane	Vinyl Chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethene	Trans-1,2-dichloroethene	1,1-dichloroethane	Cis-1,2-dichloroethene	Bromochloromethane	Chloroform	2,2-dichloropropane	1,2-dichloroethane	1,1,1-trichloroethane	1,1-dichloropropene	Cyclohexane	Carbon tetrachloride	Benzene	Dibromomethane	1,2-dichloropropane	Trichloroethene	Bromodichloromethane	trans-1,3-dichloropropene	cis-1,3-dichloropropene	1,1,2-trichloroethane	Toluene	1,3-dichloropropane	Dibromochloromethane	1,2-dibromoethane
	PQL Envirolab SYD	*10*	*10*	*10*	*10*	*10*	*10*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
	PQL Envirolab VIC	*10*	*10*	*10*	*10*	*10*	*10*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Intra	MW207	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	GWDUP-201	<10	<10	<10	<10	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

		Tetrachloroethene	1,1,1,2-tetrachloroethane	Chlorobenzene	Ethylbenzene	Bromoform	m+p-xylene	Styrene	1,1,2,2-tetrachloroethane	o-xylene	1,2,3-trichloropropane	Isopropylbenzene	Bromobenzene	n-propyl benzene	2-chlorotoluene	4-chlorotoluene	1,3,5-trimethyl benzene	Tert-butyl benzene	1,2,4-trimethyl benzene	1,3-dichlorobenzene	Sec-butyl benzene	1,4-dichlorobenzene	4-isopropyl toluene	1,2-dichlorobenzene	n-butyl benzene	1,2-dibromo-3-chloropropane	1,2,4-trichlorobenzene	Hexachlorobutadiene	1,2,3-trichlorobenzene
	PQL Envirolab SYD	*1*	*1*	*1*	*1*	*1*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
	PQL Envirolab VIC	*1*	*1*	*1*	*1*	*1*	*2*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Intra	MW207	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
laboratory	GWDUP-201	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc

		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	MW207	<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	5	<0.1	2	<1	<1	<0.05	3	4
laboratory	GWDUP-201	<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	5	<0.1	2	<1	<1	<0.05	3	6
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	5	nc	2	nc	nc	nc	3	5
	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	0%	nc	0%	nc	nc	nc	0%	40%
Field Blank	TB-201 13/02/2025	<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	<1
Trip Spike	TS-201 13/02/2025	-	-	-	-	111%	111%	106%	106%	107%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Result outside of QA/QC acceptance criteria Value

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

CT:	Contaminant Threshold
FTS:	Fluorotelomer sulfonic acid
NA:	Not Analysed
NC:	Not Calculated
NEMP	National Environmental Management Plan
NSL:	No Set Limit
PFAS	Per- and polyfluoroalkyl substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
SAC:	Site Assessment Criteria
SCC:	Specific Contaminant Concentration
TB:	Trip Blank
TCLP:	Toxicity Characteristics Leaching Procedure
TS:	Trip Spike
UCL:	Upper Level Confidence Limit on Mean Value

Table Specific Explanations:

Groundwater Ecology Tables:

- 95% refers to a concentration that has been derived to protect 95% of aquatic species

TABLE P1
SUMMARY OF PFAS CONCENTRATIONS IN GROUNDWATER - HUMAN HEALTH
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NEMP 2020 Recreational	NEMP 2020 Drinking	SAMPLES			
				MW203	MW207	MW208	GWDUP-201 MW207
PFAS Compound							
Perfluorobutanesulfonic acid	0.1	NSL	NSL	**0.002**	**0.001**	**0.002**	**0.001**
Perfluoropentanesulfonic acid	0.1	NSL	NSL	<0.001	<0.001	**0.001**	<0.001
Perfluorohexanesulfonic acid - PFHxS	0.1	NSL	NSL	<0.0002	<0.0002	**0.0037**	**0.001**
Perfluoroheptanesulfonic acid	0.1	NSL	NSL	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonic acid PFOS	0.1	NSL	NSL	**0.0029**	<0.0002	**0.0044**	<0.0002
Perfluorodecanesulfonic acid	0.2	NSL	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	0.2	NSL	NSL	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid	0.2	NSL	NSL	<0.01	<0.01	**0.005**	<0.01
Perfluorohexanoic acid	0.1	NSL	NSL	**0.003**	**0.002**	**0.0096**	**0.004**
Perfluoroheptanoic acid	0.1	NSL	NSL	**0.002**	**0.002**	**0.0049**	**0.001**
Perfluorooctanoic acid PFOA	0.1	10	0.56	**0.0022**	**0.002**	**0.0048**	**0.002**
Perfluorononanoic acid	0.1	NSL	NSL	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	0.5	NSL	NSL	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	0.5	NSL	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	0.5	NSL	NSL	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	0.5	NSL	NSL	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	5	NSL	NSL	<0.05	<0.05	<0.05	<0.05
4:2 FTS	0.1	NSL	NSL	<0.001	<0.001	<0.002	<0.002
6:2 FTS	0.1	NSL	NSL	**0.003**	**0.001**	<0.0004	**0.002**
8:2 FTS	0.1	NSL	NSL	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	0.1	NSL	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	1	NSL	NSL	<0.01	<0.01	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide	1	NSL	NSL	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	1	NSL	NSL	<0.1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	1	NSL	NSL	<0.05	<0.05	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	5	NSL	NSL	<0.5	<0.5	<0.5	<0.5
MePerfluorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf-amid oacetic acid	0.2	NSL	NSL	<0.002	<0.002	<0.002	<0.002
Total Positive PFHxS & PFOS	0.1	2	0.07	**0.0029**	<0.0002	**0.0081**	**0.001**
Total Positive PFOS & PFOA	0.1	NSL	NSL	**0.0051**	**0.002**	**0.0092**	**0.002**
Total Positive PFAS	0.1	NSL	NSL	**0.014**	**0.0081**	**0.036**	**0.01**

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

TABLE P2
SUMMARY OF PFAS CONCENTRATIONS IN GROUNDWATER - ECOLOGY
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NEMP 2018 95% Freshwater	SAMPLES			
			MW203	MW207	MW208	GWDUP-201 MW207
PFAS Compound						
Perfluorobutanesulfonic acid	0.1	NSL	**0.002**	**0.001**	**0.002**	**0.001**
Perfluoropentanesulfonic acid	0.1	NSL	<0.001	<0.001	**0.001**	<0.001
Perfluorohexanesulfonic acid - PFHxS	0.1	NSL	<0.0002	<0.0002	**0.0037**	**0.001**
Perfluoroheptanesulfonic acid	0.1	NSL	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonic acid PFOS	0.1	0.13	**0.0029**	<0.0002	**0.0044**	<0.0002
Perfluorodecanesulfonic acid	0.2	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	0.2	NSL	<0.02	<0.02	<0.02	<0.02
Perfluoropentanoic acid	0.2	NSL	<0.01	<0.01	**0.005**	<0.01
Perfluorohexanoic acid	0.1	NSL	**0.003**	**0.002**	**0.0096**	**0.004**
Perfluoroheptanoic acid	0.1	NSL	**0.002**	**0.002**	**0.0049**	**0.001**
Perfluorooctanoic acid PFOA	0.1	220	**0.0022**	**0.002**	**0.0048**	**0.002**
Perfluorononanoic acid	0.1	NSL	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	0.5	NSL	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	0.5	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	0.5	NSL	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	0.5	NSL	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	5	NSL	<0.05	<0.05	<0.05	<0.05
4:2 FTS	0.1	NSL	<0.001	<0.001	<0.002	<0.002
6:2 FTS	0.1	NSL	**0.003**	**0.001**	<0.0004	**0.002**
8:2 FTS	0.1	NSL	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	0.1	NSL	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	1	NSL	<0.01	<0.01	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide	1	NSL	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	1	NSL	<0.1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	1	NSL	<0.05	<0.05	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	5	NSL	<0.5	<0.5	<0.5	<0.5
MePerfluorooctanesulf-amid oacetic acid	0.2	NSL	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf-amid oacetic acid	0.2	NSL	<0.002	<0.002	<0.002	<0.002
Total Positive PFHxS & PFOS	0.1	NSL	**0.0029**	<0.0002	**0.0081**	**0.001**
Total Positive PFOS & PFOA	0.1	NSL	**0.0051**	**0.002**	**0.0092**	**0.002**
Total Positive PFAS	0.1	NSL	**0.014**	**0.0081**	**0.036**	**0.01**

Positive PFAS result	**Bold**
PFAS result above the SAC	**Bold**

JKEnvironments

TABLE Q3
SUMMARY OF PFAS FIELD QA/QC IN GROUNDWATER
Units are µg/L unless stated otherwise.

		Perfluorobutanesulfonic acid	Perfluoropentanesulfonic acid	Perfluorohexanesulfonic acid - PFHxS	Perfluoroheptanesulfonic acid	Perfluorooctanesulfonic acid PFOS	Perfluorodecanesulfonic acid	Perfluorobutanoic acid	Perfluoropentanoic acid	Perfluorohexanoic acid	Perfluoroheptanoic acid	Perfluorooctanoic acid PFOA	Perfluorononanoic acid	Perfluorodecanoic acid	Perfluoroundecanoic acid	Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorotetradecanoic acid	4:2 FTS	6:2 FTS	8:2 FTS	10:2 FTS	Perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamide	N-Ethyl perfluorooctanesulfon amide	N-Me perfluorooctanesulfonamid oethano	N-Et perfluorooctanesulfonamid oethanol	MePerfluorooctanesulf-amid oacetic acid	EtPerfluorooctanesulf-amid oacetic acid	Total Positive PFHxS & PFOS	Total Positive PFOS & PFOA	Total Positive PFAS
PQL Envirolab		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.5*	*0.5*	*0.5*	*0.5*	*5*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*1*	*1*	*1*	*5*	*0.2*	*0.2*	*0.1*	*0.1*	*0.1*
Intra	MW207	0.001	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.02	<0.01	0.002	0.002	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.0004	<0.002	<0.01	<0.05	<0.1	<0.05	<0.5	<0.002	<0.002	<0.0002	0.002	0.0081
laboratory	GWDUP-201	0.001	<0.001	0.001	<0.001	<0.0002	<0.002	<0.02	<0.01	0.004	0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.002	0.002	<0.0004	<0.002	<0.02	<0.05	<0.1	<0.05	<0.5	<0.002	<0.002	0.001	0.002	0.01
duplicate	MEAN	0.001	nc	0.0255	nc	nc	nc	nc	nc	0.003	0.0015	0.002	nc	nc	nc	nc	nc	nc	nc	0.0015	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.0255	0.002	0.00905
	RPD %	0%	nc	192%	nc	nc	nc	nc	nc	67%	67%	0%	nc	nc	nc	nc	nc	nc	nc	67%	nc	nc	nc	nc	nc	nc	nc	nc	nc	192%	0%	21%
Field	TB-201	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.0002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.002	<0.01	<0.05	<0.1	<0.05	<0.5	<0.002	<0.002	<0.0002	<0.0002	<0.0002
Blank	13/02/2025																															

Result outside of QA/QC acceptance criteria: Value

Appendix C: Borehole Logs

JKGeotechnics

BOREHOLE LOG

Borehole No.
201

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** HAND AUGER / SPIRAL AUGER **R.L. Surface:** ~20.3 m
Date: 31/1/25 TO 12/2/25 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ON COMPLETION OF AUGERING			20				FILL: Silty sand, fine to coarse grained, brown.	M			SCREEN: 11.60kg, 0-0.05m, NO FCF
							FILL: Sandy gravel, fine to medium grained, grey, igneous, fine to coarse grained sand, trace of cemented sand nodules.	w>PL			SCREEN: 12.7kg(<10L), 0.1-0.25m, NO FCF
				1			FILL: Sandy silty clay, low plasticity, dark brown, fine to coarse grained sand, trace of fine to medium grained ironstone gravel.				HAND AUGER TO 1.05m
			19			-	FILL: Sandy silty clay, low plasticity, dark brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel, and tile fragments.	MW	M - H		HAWKESBURY SANDSTONE
							SANDSTONE: fine to medium grained, light grey and orange brown.				MODERATE TO HIGH 'TC' BIT RESISTANCE
				2			REFER TO CORED BOREHOLE LOG				
			18								
				3							
			17								
				4							
			16								
				5							
			15								
				6							
			14								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
201

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~20.3 m
Date: 31/1/25 TO 12/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Columns: Water Loss\Level | Barrel Lift | RL (m AHD) | Depth (m) | Graphic Log | CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components) | Weathering | Strength | POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH) | DEFECT DETAILS: SPACING (mm) (600, 200, 60, 20); DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General | Formation

RL (m AHD): 19, 18, 17, 16, 15, 14, 13
Depth (m): 2, 3, 4, 5, 6, 7

START CORING AT 1.24m

Core Description	Weathering	Strength
SANDSTONE: fine to medium grained, orange brown, with occasional light grey bands, bedded at 0-5°.	MW	M - H
SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.	FR	L
Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey, fine to medium grained sand.	XW	Hd
SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.	FR	M
		H
SANDSONTE: fine grained, grey, with occasional dark grey siltstone bands, bedded at 0-5°.		

Water Loss\Level: 50% RETURN

Point load strength index values (top to bottom): 1.1, 0.80, 1.1, 0.90, 0.90, 1.0, 0.60, 0.40, 0.30, 0.30, 1.0, 1.0, 1.4, 1.0, 2.3

Defect details (specific):
- (1.32m) J, 70°, P, R, Cn
- (1.64m) Be, 0°, P, R, Fe Sn, 35 mm.t
- (4.71m) Be, 5°, P, S, Fe Sn
- (4.83m) CS, 0°, 1 mm.t
- (5.10-5.33m) HP: >600, >600, >600 kPa
- (6.39m) XWS, 0°, 120 mm.t
- (6.70m) XWS, 0°, 20 mm.t
- (7.37m) Be, 5°, P, S, Clay Vn
- (7.69m) XWS, 0°, 20 mm.t

Formation: Hawkesbury Sandstone

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 201

3 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~20.3 m
Date: 31/1/25 TO 12/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK305 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL-0.1, L-0.3, M-1, H-3, VH-10, EH)	DEFECT DETAILS: SPACING (mm) (600, 200, 60, 20)	DEFECT DETAILS: DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
50% RETURN		12			SANDSONTE: fine grained, grey, with occasional dark grey siltstone bands, bedded at 0-5°.	FR	H	2.1		(7.98m) XWS, 0°, 30 mm.t (8.02m) XWS, 0°, 10 mm.t	Hawkesbury Sandstone
					SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.			1.5		(8.88m) CS, 5°, 2 mm.t	
		11	9					1.1			
					SANDSTONE: fine to medium grained, light brown, bedded at 0-10°.	MW		1.6 2.2		(9.42m) XWS, 0°, 20 mm.t (9.47m) Be, 0°, P, S, Clay Ct	
		10	10					1.1			
					END OF BOREHOLE AT 10.38 m						
		9	11								
		8	12								
		7	13								
		6	14								

JK 9.02.4 LIB.GLB Log JK CORED BOREHOLE - MASTER 32976LT1 KOGARAH - JKE.GPJ <<DrawingFile>> 04/03/2025 14:50 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
202

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~18.6 m
Date: 11/2/25 **Datum:** AHD
Plant Type: JK330 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES / U50 / DB / DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING						-	ASPHALTIC CONCRETE: 40mm.t				
							FILL: Silty sandy gravel, fine to medium grained, igneous, dark grey, fine to coarse grained sand.	M			
	DS	N = 2 3,2,0	18			SP	SAND: fine to coarse grained, orange brown and light brown, trace of fine to medium grained sandstone gravel.	M	VL		RESIDUAL
	DS			1			as above, but light grey mottled orange brown.				
	DS	N=SPT 5/ 150mm REFUSAL	17			-	SANDSTONE: fine to medium grained, light grey and orange brown.	MW	VL		HAWKESBURY SANDSTONE VERY LOW 'TC' BIT RESISTANCE
			16	2					M		MODERATE TO HIGH RESISTANCE
			15, 14, 13, 12	3, 4, 5, 6			REFER TO CORED BOREHOLE LOG				

CORED BOREHOLE LOG

Borehole No.
202
2 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 | **Core Size:** NMLC | **R.L. Surface:** ~18.6 m
Date: 11/2/25 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK330 | **Bearing:** N/A | **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
		16			START CORING AT 2.72m					
98% RETURN					SANDSTONE: fine to medium grained, light grey, bedded at 0-5°.	FR	M	0.60		Hawkesbury Sandstone
		15	3		Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey, fine to medium grained sand, with very low strength sandstone bands.	XW	Hd	0.030	(2.96-4.29m) HP: >600, >600, >600 kPa	
		14	4		SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-10°.	HW	VL - L	0.070, 0.10	(4.29m) Be, 0°, P, R, Fe Sn; (4.79m) CS, 0°, 3 mm.t; (5.23m) XWS, 0°, 40 mm.t	
		13, 12	5, 6			FR	M	0.40, 0.90, 0.70	(5.55m) XWS, 0°, 25 mm.t	
			7				M - H	1.2, 0.90		
		11			as above, but grey and light grey, with dark grey siltstone bands.				(7.24m) XWS, 0°, 65 mm.t; (7.31m) XWS, 0°, 25 mm.t; (7.38m) XWS, 0°, 60 mm.t	
			8		SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-5°.			1.4, 1.0	(7.79m) CS, 5°, 2 mm.t; (8.29m) Jh, 60°, P; (8.49m) Be, 0°, P, R, Fe Sn, 30 mm.t	
		10			SANDSTONE: fine to medium grained, light brown and light grey, with red brown bands, bedded at 0-10°, and occasional siltstone clasts.	MW	H	1.9		

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 | **Core Size:** NMLC | **R.L. Surface:** ~18.6 m
Date: 11/2/25 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK330 | **Bearing:** N/A | **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DESCRIPTION — Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
98% RETURN		9			SANDSTONE: fine to medium grained, light brown and light grey, with red brown bands, bedded at 0-10°, and occasional siltstone clasts. *(continued)*	MW	H	1.4, 1.3		Hawkesbury Sandstone
		8	10		SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-15°.	FR		1.5, 2.0	(10.45m) Be, 15°, P, R, Clay Vn	
		7	11					2.9, 1.3		
		6, 5, 4, 3	12, 13, 14, 15		END OF BOREHOLE AT 11.82 m					

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
203

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~19.9 m
Date: 15/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES (ES / U50 / DB / DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING							ASPHALTIC CONCRETE: 100mm.t				
						-	FILL: Silty sand, fine to medium grained, dark grey.	M			SCREEN: 0.6kg, 0.1-0.4m, NO FCF
		N > 3 1,3/ 150mm REFUSAL					FILL: Sandy silty clay, low plasticity, dark grey, fine to medium grained sand, trace of fine to medium grained sandstone gravel.	w>PL			SCREEN: 1.5kg, 0.5-0.8m, NO FCF
			19			-	SANDSTONE: fine to medium grained, light grey.	MW	M		HAWKESBURY SANDSTONE
				1			REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE
											GROUNDWATER MONITORING WELL INSTALLED TO 12.18m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.18m TO 12.18m. CASING 0.1m TO 2.18m. 2mm SAND FILTER PACK 0.85m TO 12.18m. BENTONITE SEAL 0.1m TO 3.85m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
			18	2							
			17	3							
			16	4							
			15	5							
			14	6							
			13								

CORED BOREHOLE LOG

Borehole No.
203

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1	**Core Size:** NMLC	**R.L. Surface:** ~19.9 m
Date: 15/1/25	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK308	**Bearing:** N/A	**Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH)	DEFECT DETAILS SPACING (mm) (600, 200, 60, 20)	DEFECT DETAILS DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
		19	1		START CORING AT 1.00m						
ON COMPLETION OF CORING		18			SANDSTONE: fine to medium grained, light grey, with orange brown bands, bedded at 0-15°.	MW	M - H	0.90, 0.70		(1.35m) Be, 5°, P, R, Clay Vn	Hawkesbury Sandstone
98% RETURN		17, 16	2, 3, 4		SANDSTONE: fine to medium grained, orange brown and light brown, with grey laminae, bedded at 0-15°.			1.1, 0.80, 0.90, 1.0, 1.2	600 200 60 20	(3.41m) XWS, 5°, 30 mm.t (4.44m) Be, 0°, P, R, Fe Vn	
4 HRS AFTER COMPLETION					SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-5°.	FR		0.70			
ON 13/2/25		15	5		Extremely Weathered sandstone: sandy CLAY, low plasticity, light grey, fine to medium grained sand.	XW	Hd			(4.61-5.05m) HP: >600, >600, >600 kPa	
		14, 13	6		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.	FR	M - H	0.80, 0.40, 1.1, 1.0	600 200 60 20	(5.67m) Be, 0°, P, R, Clay Vn (6.05m) XWS, 0°, 10 mm.t	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
203
3 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 | **Core Size:** NMLC | **R.L. Surface:** ~19.9 m
Date: 15/1/25 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK308 | **Bearing:** N/A | **Logged/Checked By:** J.F./A.B.

Depth (m)	RL (m AHD)	Core Description	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Specific	Formation
		SANDSTONE: as above	FR	M - H		(7.04m) XWS, 0°, 5 mm.t	Hawkesbury Sandstone
		SANDSTONE: fine grained, grey, with Siltstone, dark grey laminae, bedded at 0-5°.			1.6		
		LAMINITE: Sandstone, fine grained, grey, interlaminated with Siltstone, dark grey, bedded at 0-5°.		L - M	0.30	(7.80m) XWS, 0°, 10 mm.t	
8	12	SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-10°.		H	1.4	(8.23m) Be, 0°, P, S, Clay Ct	
					1.2	(8.79m) Be, 0°, P, S, Clay Ct	
9	11	SANDSTONE: fine to medium grained, light brown and orange brown, bedded at 0-20°.	MW			(9.00m) Be, 0°, P, S, Fe Sn	
					1.6		
10	10				2.2		
					1.8	(10.39m) Be, 10°, P, R, Fe Sn	
11	9				1.7		
					1.0		
					3.2		
12	8	SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-15°.	FR		1.1	(11.96m) Be, 0°, P, R, Clay Ct	
		END OF BOREHOLE AT 12.18 m					
13	7						
	6						

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~18.5 m
Date: 17/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record: DRY ON COMPLETION OF AUGERING

Field Tests	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
	-	SPRAYED SEAL: 5mm.t	M			APPEARS POORLY COMPACTED
		FILL: Silty sandy gravel, fine to medium grained, dark grey, fine to coarse grained sand.	w>PL			SCREEN: 2.15kg, 0.1-0.5, NO FCF
N = 3 1,1,2		FILL: Sandy silty clay, low plasticity, dark grey, fine to medium grained sand.	M			SCREEN: 3.55kg, 0.5-1.0m, NO FCF
		FILL: Silty sand, fine to medium grained, grey, with fine to medium grained ironstone gravel.				
	CL	Sandy silty CLAY: low plasticity, orange brown, fine to medium grained sand.	w>PL	(St)		SCREEN: 4.45kg, 1-1.75m, NO FCF RESIDUAL
N > 20 10,20/ 100mm REFUSAL				Hd		TOO FRIABLE FOR HP TESTING
	-	SANDSTONE: fine to medium grained, light grey and orange brown.	MW	M		HAWKESBURY SANDSTONE
		REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 32976LT1 KOGARAH - JKE.GPJ <<DrawingFile>> 04/03/2025 14:48 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

JKGeotechnics

CORED BOREHOLE LOG

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1	**Core Size:** NMLC	**R.L. Surface:** ~18.5 m
Date: 17/1/25	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK308	**Bearing:** N/A	**Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (600, 200, 60, 20)	DEFECT DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific / General)	Formation
		17			START CORING AT 1.92m						
			2		NO CORE 0.33m						
70% RETURN		16			SANDSTONE: fine to medium grained, light brown and brown, massive.	MW	M	0.30		(2.37m) Be, 0°, P, R, Clay Ct	Hawkesbury Sandstone
			3		Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey, fine to medium grained sand.	XW	Hd			(2.72m) J, 30°, P, R, Clay Ct (2.75-3.44m) HP: >600, >600, >600 kPa	
ON COMPLETION OF CORING		15			SANDSTONE: fine to medium grained, light grey and red brown, bedded at 0-10°.	MW	L	0.20		(3.58m) XWS, 0°, 25 mm.t (3.70m) XWS, 0°, 25 mm.t (3.80m) XWS, 0°, 30 mm.t (3.82m) Be, 0°, P, R, Fe Sn	
		14	4		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.	SW	L	0.20 0.20		(4.61m) Be, 0°, P, R, XW IN FILL, 10mm.t	
		13	5			FR	M	0.80 0.90			
		12	6			FR	M	0.80 0.90		(6.42m) XWS, 0°, 80 mm.t	
						FR	M - H	1.9			
		11	7		SANDSTONE: fine grained, grey, bedded at 0-5°.	FR / SW	M - H	1.3 0.90		(7.39m) XWS, 5°, 10 mm.t (7.48m) Be, 0°, P, S, Clay Ct	
					SANDSTONE: as below	MW	H			(7.89m) Be, 0°, P, R, Fe Sn	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
204

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.5 m
Date: 17/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (600, 200, 60, 20)	DEFECT DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific / General	Formation
70% RETURN		10	9		SANDSTONE: fine to medium grained, orange brown, red brown and light grey, grey and dark grey laminae, with fine grained quartz gravel, bedded at 0-20°.	MW	H	1.5, 1.4, 2.1		(8.80m) Be, 10°, P, R, Cb	Hawkesbury Sandstone
		9	10		SANDSTONE: fine to medium grained, light brown, massive.			2.4, 3.0			
		8	11		SANDSTONE: fine to medium grained, brown, with brown laminae, bedded at 5-20°.			3.1, 2.8		(10.94m) Be, 20°, P, S, Clay Vn	
		7, 6, 5, 4	12, 13, 14		END OF BOREHOLE AT 11.29 m						

 FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
205
1 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~18.8 m
Date: 16/1/25 TO 17/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING	■			■					-	SPRAYED SEAL: 5mm.t	M			
										FILL: Silty sandy gravel, fine to medium grained, dark grey, igneous, fine to medium grained sand.				SCREEN: 3.05kg, 0.1-0.5m, NO FCF
				■					-	FILL: Silty sand, fine to medium grained, dark grey, trace of igneous gravel.	MW	M		HAWKESBURY SANDSTONE
						18	1			SANDSTONE: fine to medium grained, orange brown.				MODERATE 'TC' BIT RESISTANCE
										REFER TO CORED BOREHOLE LOG				
						17	2							
						16	3							
						15	4							
						14	5							
						13	6							
						12								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
205

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.8 m
Date: 16/1/25 TO 17/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	SPACING (mm)	DEFECT DETAILS – DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness – Specific / General	Formation
					START CORING AT 0.61m						
ON COMPLETION OF CORING; 98% RETURN		18, 17, 16	1, 2		SANDSTONE: fine to medium grained, orange brown and light brown, with light grey bands, indistinctly bedded at 0-10°.	MW	M	0.80, 0.60, 0.70, 1.0		(0.75m) J, 25°, P, R, Cn (0.85m) Be, 5°, P, R, Clay Vn	Hawkesbury Sandstone
			3		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.	FR		1.0, 0.30		(2.91m) XWS, 0°, 30 mm.t (2.95m) Be, 0°, P, S, Clay Ct (3.32m) XWS, 0°, 30 mm.t	
		15	4		Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey, fine to medium grained sand.	XW	Hd			(3.52-4.25m) HP: 420, 430, 450 kPa	
		14, 13	5, 6		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, indistinctly bedded at 0-20°.	FR	M	0.50, 0.40, 0.30, 0.60, 0.80		(4.88m) Be, 5°, P, S, Clay Vn (5.17m) Be, 0°, P, S, Clay Ct	
					SANDSTONE: fine grained, grey, with dark grey laminae, bedded at 0-5°.		H	1.2		(6.16m) Be, 0°, P, S, Clay Ct (6.66m) XWS, 0°, 20 mm.t	
		12			SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-10°.			1.2			

Strength scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing scale: 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
205

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.8 m
Date: 16/1/25 TO 17/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Core Description (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Description (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
98% RETURN				SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-15°.	FR	H	1.8		Hawkesbury Sandstone
		11	8			M	0.90	(7.62m) Be, 0°, P, S, Clay Ct; (7.77m) Be, 0°, P, R, Clay FILLED, 5 mm.t	
				SANDSTONE: fine to medium grained, orange brown and light brown, with grey and brown bands, bedded at 0-20°.	MW		0.70	(8.13m) Be, 0°, P, R, Fe Sn	
		10	9			H	1.6, 2.2	(9.44m) XWS, 0°, 5 mm.t	
		9	10	SANDSTONE: fine to medium grained, light brown, massive, with occasional fine grained quartz gravel.			2.2, 2.4		
		8	11				2.1		
				SANDSTONE: fine to medium grained, light brown, with brown laminae, bedded at 5-20°.			1.7, 2.7		
		7	12					(12.11m) XWS, 0°, 30 mm.t	
				SANDSTONE: fine to medium grained, orange brown, massive.			1.4, 1.0		
		6	13	END OF BOREHOLE AT 12.73 m					
		5							

Strength scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing (mm): 600, 200, 60, 20. Defect columns: Specific, General.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
206

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~19.0 m
Date: 15/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING	■			■				-	FILL: Silty sand, fine to coarse grained, dark brown, trace of rubber fragments and slag.	M			SYNTHETIC GRASS COVER SCREEN: 7.76kg, 0-0.05m, NO FCF
									CONCRETE: 50mm.t				NO OBSERVED REINFORCEMENT
								-	FILL: Silty sand, fine to medium grained, dark grey brown.	M			
								-	SANDSTONE: fine to medium grained, orange brown.	MW	M		HAWKESBURY SANDSTONE MODERATE 'TC' BIT RESISTANCE HIGH RESISTANCE 'TC' BIT REFUSAL
						18	1		REFER TO CORED BOREHOLE LOG				
						17	2						
						16	3						
						15	4						
						14	5						
						13	6						

CORED BOREHOLE LOG

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~19.0 m
Date: 15/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
					START CORING AT 0.60m					Hawkesbury Sandstone
98% RETURN					SANDSTONE: fine to medium grained, light brown and orange brown, bedded at 0-5°.	MW	M	0.70, 0.60		
20% RETURN		18	1		NO CORE 0.94m					
		17	2		SANDSTONE: fine to medium grained, orange brown and light brown, with occasional light grey and red brown bands, massive.	MW	M	0.90, 1.0, 0.30	(2.07m) Be, 0°, P, R, Clay Vn	Hawkesbury Sandstone
		16	3		as above, but with occasional red brown laminae, bedded at 0-10°.			0.80	(2.92m) Be, 5°, P, R, Clay Vn	
					SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-10°.	FR	L	0.20		
		15	4		Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey, fine to medium grained sand, with very low strength bands.	XW	Hd	0.090	(3.76-4.68m) HP: >600, >600, >600 kPa	
		14	5		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, indistinctly bedded at 0-10°.	FR	L / M	0.20, 0.60, 0.60, 0.80		
		13	6		LAMINITE: Sandstone, fine grained, grey, interlaminated with Siltstone, dark grey, bedded at 0-5°.		H	1.8, 1.8	(6.08m) Be, 0°, P, S, Clay Vn; (6.79m) Be, 0°, P, S, Clay Ct	
					SANDSTONE: as below		M - H	0.70		

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
206

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~19.0 m
Date: 15/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT DETAILS SPACING (mm) 600 200 60 20	DEFECT DETAILS DESCRIPTION Specific (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	General	Formation
20% RETURN		11, 10	8, 9		SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, and occasional siltstone bands, bedded at 0-20°.	FR	M - H	1.0, 1.0, 1.0, 0.90, 1.0		(7.73m) Be, 0°, P, S, Clay Ct		Hawkesbury Sandstone
		9, 8, 7, 6	10, 11, 12, 13		END OF BOREHOLE AT 9.13 m							

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
207
1 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~17.9 m
Date: 16/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING										FILL: Silty sand, fine to coarse grained, dark brown, trace of rubber and plastic fragments.	M			SYNTHETIC GRASS COVER
									-	SANDSTONE: fine to medium grained, light grey, red brown and orange brown.	MW	M		SCREEN: 12.35kg, 0-0.1m, NO FCF
														HAWKESBURY SANDSTONE
						17				REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE
							1							'TC' BIT REFUSAL
						16	2							GROUNDWATER MONITORING WELL INSTALLED TO 12.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.0m TO 12.7m. CASING 0.1m TO 3.5m. 2mm SAND FILTER PACK 1.8m TO 12.7m. BENTONITE SEAL 0.5m TO 1.8m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						15	3							
						14	4							
						13	5							
						12	6							
						11								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 207

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1	**Core Size:** NMLC	**R.L. Surface:** ~17.9 m
Date: 16/1/25	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK308	**Bearing:** N/A	**Logged/Checked By:** J.F./A.B.

Water Loss\Level	RL (m AHD)	Depth (m)	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) – Specific	Formation
		0–0.68	START CORING AT 0.68m					
98% RETURN	17	0.68–1	SANDSTONE: fine to medium grained, light brown, with light grey bands, massive.	MW	M	0.60, 0.60		Hawkesbury Sandstone
	16	2	as above, but with brown laminae, cross bedded at 0-20°.	MW	M	0.70, 0.90		
ON COMPLETION OF CORING	15	3	SANDSTONE: fine to coarse grained, light grey, with red brown bands and grey laminae, bedded at 0-10°.	HW	L	0.10, 0.20, 0.20	(2.32m) XWS, 0°, 25 mm.t (2.38m) Be, 10°, P, R, Clay Vn (2.52m) Be, 10°, P, R, Clay FILLED, 5 mm.t (2.58m) Be, 5°, P, R, Clay FILLED, 5 mm.t (2.71m) Be, 5°, P, R, Clay Vn (3.01m) XWS, 5°, 10 mm.t (3.11m) XWS, 1°, 10 mm.t	
			Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey and red brown, fine to medium grained sand.	XW	Hd		(3.68m) Be, 0°, P, R, Fe Sn	
ON 13/2/25	14	4	SANDSTONE: fine to medium grained, light grey, with orange brown laminae, bedded at 0-25°.	HW	L	0.30	(4.00m) Be, 0°, P, S, Clay FILLED, 5 mm.t (4.10m) XWS, 0°, 50 mm.t (4.23m) XWS, 10°, 70 mm.t	
	13	5	as above, but light grey, with grey and dark grey laminae.	HW	L / M	0.20, 0.20, 0.40, 0.60	(5.25m) Be, 10°, P, S, Clay Vn (5.58m) Be, 5°, P, R, Clay Ct	
	12	6	LAMINITE: Sandstone, fine to medium grained, grey, interbedded with Siltstone, dark grey, bedded at 0-5°.	FR	M - H	1.2		
	11		SANDSTONE: as below	FR	M - H	0.90	(6.64m) J, 60°, P, R, Cn (6.78m) Be, 0°, P, S, Clay Vn	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

CORED BOREHOLE LOG

Borehole No. 207

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~17.9 m
Date: 16/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: Specific	Formation
98% RETURN					SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, and occasional siltstone bands, bedded at 0-5°	FR	M - H	1.3		Hawkesbury Sandstone
					SANDSTONE: fine to medium grained, light grey, massive, indistinct occasional grey laminae, indistinctly bedded at 0-5°.		H	1.1, 1.8, 1.7	(7.37m) Be, 0°, P, S, Clay Vn; (8.13m) CS, 0°, 50 mm.t	
		10	8							
		9	9		SANDSTONE: fine to medium grained, light grey, with grey laminae, cross-bedded at 10-20°.			2.1, 1.4, 1.0, 1.3, 0.90, 1.1	(9.07m) XWS, 0°, 10 mm.t; (10.38m) Be, 0°, P, R, Clay Vn	
		8	10							
		7	11							
		6	12		SANDSTONE: fine to medium grained, light grey, massive, with grey brown indistinctly cross-bedded at 10-20°.			1.1, 1.4, 2.3	(11.70m) CS, 0°, 70 mm.t; (12.58m) Be, 0°, P, S, Clay Vn	
		5	13		END OF BOREHOLE AT 12.72 m					
		4								

Point load strength scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH. Spacing (mm): 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
208

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1
Method: HAND AUGER / SPIRAL AUGER
R.L. Surface: ~18.1 m
Date: 31/1/25 TO 10/2/25
Datum: AHD
Plant Type: JK330
Logged/Checked By: J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING	ES					18				FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, plastic fragments, slag and root fibres.	M			GRASS COVER SCREEN: 10.55kg, 0-0.1m, NO FCF APPEARS MODERATELY COMPACTED
				DS	N = 9 6,6,3					FILL: Silty sandy clay, low to medium plasticity, dark grey brown, fine to medium grained sand, trace of plastic fragments and ash.	w<PL M			
				DS		17	1		-	FILL: SIlty sand, fine to medium grained, dark grey brown.				HAND AUGER TO 0.55m
										SANDSTONE: fine to medium grained, orange brown.	DW	M		HAWKESBURY SANDSTONE
						16	2			REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE GROUNDWATER MONITORING WELL INSTALLED TO 9.4m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.4m TO 9.4m. CASING 0.1m TO 3.4m. 2mm SAND FILTER PACK 2.9m TO 9.4m. BENTONITE SEAL 0.1m TO 2.9m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						15	3							
						14	4							
						13	5							
						12	6							

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
208

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.1 m
Date: 31/1/25 TO 10/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK330 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Depth (m)	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Description (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) – Specific	Formation
		START CORING AT 1.32m					
98% RETURN		SANDSTONE: fine to medium grained, orange brown, with light grey bands, bedded at 0-5°.	MW	L - M	0.50, 0.20	(1.57m) Be, 0°, P, R, Fe Vn; (1.62m) Be, 5°, C, R, Fe Vn	
	2	NO CORE 0.55m					
		SANDSTONE: fine to medium grained, red brown, with light grey bands and laminae, bedded at 0-20°.	MW	M - H	0.60, 1.0	(2.47m) Be, 0°, P, S, Clay Vn	Hawkesbury Sandstone
	3	as above, but bedded at 0-10°.	HW	L	0.20	(3.24m) Be, 0°, P, R, Clay Ct; (3.38m) XWS, 5°, 40 mm.t	Hawkesbury Sandstone
				VL	0.080	(3.95m) XWS, 0°, 5 mm.t	Hawkesbury Sandstone
0% RETURN	4	NO CORE 0.05m					
		SANDSTONE: fine to medium grained, red brown and light grey, bedded at 0-10°.	MW	L	0.20		Hawkesbury Sandstone
	5	as above, but light grey, with dark grey laminae.	FR	L	0.20, 0.20	(4.97m) Be, 0°, P, S, Clay Ct	Hawkesbury Sandstone
ON 13/2/25	6–7			M	0.30, 0.50, 0.70, 1.0, 0.60, 0.70	(5.41m) Be, 5°, P, R, Fe Vn; (5.77m) CS, 0°, 1 mm.t; (6.37m) XWS, 0°, 60 mm.t; (7.30m) Be, 0°, P, S, Clay Vn	Hawkesbury Sandstone
		SANDSTONE: as below.	MW	M - H	0.30	(7.73m) Be, 0°, P, R, Fe Ct; (7.78m) XWS, 0°, 30 mm.t; (7.88m) Be, 5°, P, S, Fe Ct	Hawkesbury Sandstone

RL (m AHD): 17, 16, 15, 14, 13, 12, 11

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
208

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.1 m
Date: 31/1/25 TO 10/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK330 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness — Specific / General	Formation
0% RETURN		10			SANDSTONE: fine to medium grained, orange brown, with red brown and light grey bands, bedded at 0-15°.	MW	M - H	1.0			Hawkesbury Sandstone
					as above, but bedded at 0-30°.			2.2			
		9	9		SANDSTONE: fine to medium grained, orange brown and light grey, bedded at 0-15°.			0.20, 0.80		(8.92m) Be, 5°, P, R, Fe Ct	
		8	10		SANDSTONE: fine to medium grained, red brown and orange brown, bedded at 0-10°.		H	1.3, 2.0, 1.6, 1.8, 1.0		(9.40m) Be, 0°, P, R, Fe Ct	
		7	11		as above, but with light grey bands.			2.3		(11.64m) Be, 10°, P, S, Clay Vn	
		6	12		END OF BOREHOLE AT 12.05 m						
		5	13								
		4	14								

Point load scale: VL 0.1, L 0.3, M 1, H 3, VH 10, EH. Spacing scale: 600, 200, 60, 20.

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No. 209

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** HAND AUGER **R.L. Surface:** ~20.0 m
Date: 31/1/25 **Datum:** AHD
Plant Type: - **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES (ES, U50, DB, DS)	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
							FILL: Silty sand, fine to medium grained, dark grey, trace of root fibres.	M			GRASS COVER
							FILL: Sandy silty clay, low plasticity, brown, fine to medium grained sand.	w>PL			SCREEN: 10.25kg, 0-0.1m, NO FCF
ON COMPLETION							FILL: Sandy silty clay, low plasticity, light brown, fine to medium grained sand, trace of fine to medium grained ironstone gravel.				
			19	1			as above, but dark grey.				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
							END OF BOREHOLE AT 0.95 m				
			18	2							
			17	3							
			16	4							
			15	5							
			14	6							

ENVIRONMENTAL LOG

JKEnvironments

Log No. **BH210** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 16/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** V.R./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: Gravel, fine to coarse grained, angular igneous, grey, trace of sand, and slag.	D			ROAD BASE INSUFFICIENT RETURN FOR BULK SCREEN
						FILL: Silty sand, fine to medium grained, grey brown, trace of sandstone gravel.	M			INSUFFICIENT RETURN FOR BULK SCREEN
			0.5			FILL: Silty sandy clay, low to medium plasticity, dark brown.	w≈PL			INSUFFICIENT RETURN FOR BULK SCREEN
						END OF BOREHOLE AT 0.6m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH211** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A
Date: 16/1/25 **Datum:** -
Plant Type: - **Logged/Checked by:** V.R./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: Gravel, fine to coarse grained, angular igneous, trace of sand, and slag.	D			INSUFFICIENT RETURN FOR BULK SCREEN
						FILL: Silty sand, fine to medium grained, dark brown, trace of sandstone gravel and glass fragments.	M			INSUFFICIENT RETURN FOR BULK SCREEN
			0.5			END OF BOREHOLE AT 0.35m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH212**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 16/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** J.T.L./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			ASPHALTIC CONCRETE: 100mm.t				
									-	FILL: Gravel, fine to coarse grained, angular igneous, grey, trace of sand.	M			ROAD BASE
										FILL: Silty sand, fine to medium grained, dark brown, trace of sandstone gravel.	W			INSUFFICIENT RETURN FOR BULK SCREEN
							0.5			END OF BOREHOLE AT 0.45m				SCREEN: 0.85kg (<10L) 0.15-0.45m, NO FCF
														HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKGeotechnics

BOREHOLE LOG

Borehole No.
213
1 / 1

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** HAND AUGER **R.L. Surface:** ~18.4 m
Date: 31/1/25 **Datum:** AHD
Plant Type: - **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION						18				FILL: Silty sand, fine to medium grained, dark grey, trace of fine to medium grained igneous gravel, ash, slag and root fibres.	M			GRASS COVER SCREEN: 11.05kg, 0-0.1m, NO FCF
										as above, but trace of fine to medium grained ironstone gravel.				
										END OF BOREHOLE AT 0.70 m				HAND AUGER REFUSAL ON OBSTRUCTION IN FILL

RL scale: 18, 17, 16, 15, 14, 13, 12. Depth scale: 1, 2, 3, 4, 5, 6.

JK 9.02.4 LIB.GLB Log JK AUGERHOLE - MASTER 32976LT1 KOGARAH - JKE.GPJ <<DrawingFile>> 04/03/2025 14:48 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH214** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 16/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** J.T.L./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			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Gravel, fine to coarse grained, angular igneous, grey, trace of sand and slag.	M			INSUFFICIENT RETURN FOR BULK SCREEN
							M			INSUFFICIENT RETURN FOR BULK SCREEN
▶						FILL: Silty sand, fine to medium grained, grey brown, trace of sandstone and ironstone gravel.	W			INSUFFICIENT RETURN FOR BULK SCREEN
						as above, but dark brown.				
			0.5			END OF BOREHOLE AT 0.4m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH215** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER / HAND TOOLS **R.L. Surface:** N/A

Date: 15/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** V.R./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: Gravelly sand, fine to medium grained, brown, with igneous and sandstone gravel, trace of tile, red brick and plastic fragments.	M			ARTIFICIAL TURF COVER SCREEN: 14.88kg 0-0.1m, NO FCF
						FILL: Silty sand, fine to medium grained, dark brown, with wood material and root fibres, trace of sandstone and ironstone gravel and slag.	M W			INSUFFICIENT RETURN FOR BULK SCREEN SCREEN: 11.65kg 0.2-0.5m, NO FCF GEOFABRIC AT BASE OF BOREHOLE
			0.5			END OF BOREHOLE AT 0.5m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH216** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 16/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** V.R./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 sand, fine to medium grained, brown, with igneous and ironstone gravel.	D			SYNTHETIC GRASS TURF COVER
							M			
						FILL: Silty sand, fine to medium grained, dark brown, trace of plastic fragments and wood materials.	M			SCREEN: 12.65kg 0-0.1m, NO FCF SCREEN: 10.70kg 0.1-0.2m, NO FCF
			0.5			as above, but light brown and orange.				SCREEN: 2.15kg (<10L) 0.4-0.7m, NO FCF
			1			FILL: Sandy clay, medium plasticity, light brown and yellow, trace of igneous gravel, roots and root fibres.	w>PL			SCREEN: 2.25kg (<10L) 0.9-1.3m, NO FCF
						as above, but light grey mottled yellow brown.	w>PL			
			1.5			END OF BOREHOLE AT 1.4m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH217** **1/1**

SDUP201: 0-0.1m

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 15/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** V.R./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 sand, fine to medium grained, brown, with igneous and quartz gravel, trace of twigs.	M			SYNTHETIC GRASS TURF COVER
										FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel and plastic and wire fragments.	M			SCREEN: 13.22kg 0-0.1m, NO FCF SCREEN: 10.14kg 0.1-0.3m, NO FCF
							0.5				W			INSUFFICIENT RETURN FOR BULK SCREEN
										END OF BOREHOLE AT 0.6m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKGeotechnics

BOREHOLE LOG

Borehole No.
218
1 / 1

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** HAND AUGER **R.L. Surface:** ~17.5 m
Date: 31/1/25 **Datum:** AHD
Plant Type: - **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION	■									FILL: Silty sand, fine to medium grained, dark brown, trace of fine to medium grained ironstone gravel, brick and concrete fragments, and slag.	M			SCREEN: 13.3kg, 0-0.1m, NO FCF
						17				END OF BOREHOLE AT 0.45 m				HAND AUGER REFUSAL ON OBSTRUCTION IN FILL
							1							
						16								
							2							
						15								
							3							
						14								
							4							
						13								
							5							
						12								
							6							
						11								

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH219** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: NSW DEPARTMENT OF EDUCATION

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: E32976BT2 **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 15/1/25 **Datum:** -

Plant Type: - **Logged/Checked by:** V.R./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 sand, fine to medium grained, light brown, with igneous and quartz gravel, trace of earthenware and tile fragments.	D			SYNTHETIC GRASS TURF COVER SCREEN: 10.03kg 0-0.1m, NO FCF
						FILL: Silty sand, fine to medium grained, dark brown, trace of igneous and sandstone gravel, glass and plastic fragments, twigs, roots and root fibres.	M			SCREEN: 12.15kg 0.1-0.5m, NO FCF
			0.5			as above, but brown, with medium to coarse grained sandstone gravel at base of borehole.	W			SCREEN: 0.74kg (<10L) 0.7-1.0m, NO FCF
			1			END OF BOREHOLE AT 1.0m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
			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:

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

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:

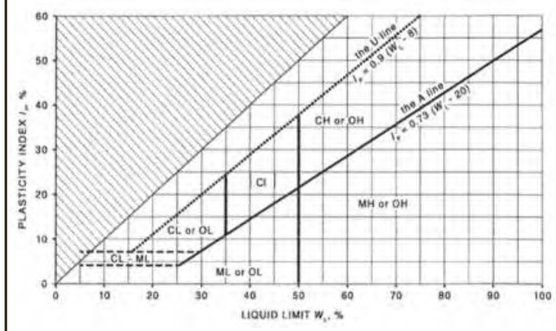
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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



JKEnvironments

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

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

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

Appendix D: Laboratory Report(s) & COC Documents

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

CERTIFICATE OF ANALYSIS 370762

Client Details

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

Sample Details

Your Reference	**E32976BT2 - Kogarah**
Number of Samples	33 Soil
Date samples received	17/01/2025
Date completed instructions received	17/01/2025

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	24/01/2025
Date of Issue	24/01/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Asbestos Approved By
Analysed by Asbestos Approved Analyst: Amanda Lee
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Giovanni Agosti, Group Technical Manager
Jack Wallis, Senior Chemist
Liam Timmins, Organics Supervisor
Lucy Zhu, Asbestos Supervisor
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		370762-1	370762-2	370762-4	370762-6	370762-8
Your Reference	UNITS	BH203	BH203	BH207	BH210	BH210
Depth		0.1-0.2	0.3-0.4	0-0.1	0.05-0.1	0.55-0.6
Date Sampled		15/01/2025	15/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	74	89	92	86	85

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		370762-10	370762-11	370762-14	370762-15	370762-16
Your Reference	UNITS	BH211	BH212	BH214	BH214	BH215
Depth		0.2-0.3	0.1-0.15	0.2-0.3	0.3-0.4	0-0.1
Date Sampled		16/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	74	89	89	71	87

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		370762-17	370762-18	370762-21	370762-23	370762-24
Your Reference	UNITS	BH215	BH216	BH216	BH217	BH217
Depth		0.2-0.3	0-0.1	1-1.3	0-0.1	0.2-0.3
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	85	90	75	86	98

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		370762-26	370762-28	370762-30	370762-31	370762-32
Your Reference	UNITS	BH219	BH219	SDUP201	TS-S201	TB-S201
Depth		0-0.1	0.5-0.6	-	-	-
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
TRH C_6 - C_9	mg/kg	<25	<25	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	[NA]	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	82%	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	82%	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	81%	<1
m+p-xylene	mg/kg	<2	<2	<2	82%	<2
o-Xylene	mg/kg	<1	<1	<1	81%	<1
Naphthalene	mg/kg	<1	<1	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	81	89	89	71	85

svTRH (C10-C40) in Soil						
Our Reference		370762-1	370762-2	370762-4	370762-6	370762-8
Your Reference	UNITS	BH203	BH203	BH207	BH210	BH210
Depth		0.1-0.2	0.3-0.4	0-0.1	0.05-0.1	0.55-0.6
Date Sampled		15/01/2025	15/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	21/01/2025	21/01/2025	22/01/2025	21/01/2025
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	220	<100	<100	120	<100
TRH C_{29} - C_{36}	mg/kg	430	100	<100	390	<100
Total +ve TRH (C10-C36)	mg/kg	650	100	<50	510	<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	460	130	<100	370	<100
TRH >C_{34}-C_{40}	mg/kg	680	140	<100	490	<100
Total +ve TRH (>C10-C40)	mg/kg	1,100	270	<50	870	<50
Surrogate o-Terphenyl	%	98	92	75	76	92

svTRH (C10-C40) in Soil						
Our Reference		370762-10	370762-11	370762-14	370762-15	370762-16
Your Reference	UNITS	BH211	BH212	BH214	BH214	BH215
Depth		0.2-0.3	0.1-0.15	0.2-0.3	0.3-0.4	0-0.1
Date Sampled		16/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	21/01/2025	21/01/2025	22/01/2025	22/01/2025	22/01/2025
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	150	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	150	<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	120	160	<100	140	<100
TRH >C_{34}-C_{40}	mg/kg	<100	200	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	120	360	<50	140	<50
Surrogate o-Terphenyl	%	96	79	82	82	74

svTRH (C10-C40) in Soil						
Our Reference		370762-17	370762-18	370762-21	370762-23	370762-24
Your Reference	UNITS	BH215	BH216	BH216	BH217	BH217
Depth		0.2-0.3	0-0.1	1-1.3	0-0.1	0.2-0.3
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	100	<50	<50	<50	<50
Surrogate o-Terphenyl	%	90	89	87	73	61

svTRH (C10-C40) in Soil					
Our Reference		370762-26	370762-28	370762-30	370762-32
Your Reference	UNITS	BH219	BH219	SDUP201	TB-S201
Depth		0-0.1	0.5-0.6	-	-
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	130	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	230	<50	<50	<50
Surrogate o-Terphenyl	%	78	87	90	91

PAHs in Soil						
Our Reference		370762-1	370762-2	370762-4	370762-6	370762-8
Your Reference	UNITS	BH203	BH203	BH207	BH210	BH210
Depth		0.1-0.2	0.3-0.4	0-0.1	0.05-0.1	0.55-0.6
Date Sampled		15/01/2025	15/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.3	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	1.5	0.5	<0.1	<0.1	0.2
Anthracene	mg/kg	0.3	0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.6	0.8	<0.1	<0.1	0.5
Pyrene	mg/kg	1.6	0.8	<0.1	<0.1	0.5
Benzo(a)anthracene	mg/kg	0.7	0.4	<0.1	<0.1	0.2
Chrysene	mg/kg	0.8	0.4	<0.1	<0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	1	0.7	<0.2	<0.2	0.5
Benzo(a)pyrene	mg/kg	0.74	0.5	0.06	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	0.3	<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	0.5	0.3	<0.1	<0.1	0.3
Total +ve PAH's	mg/kg	9.5	5.0	0.06	<0.05	3.2
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.1	0.6	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.1	0.7	<0.5	<0.5	0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.1	0.7	<0.5	<0.5	0.6
Surrogate p-Terphenyl-d14	%	99	115	104	104	114

PAHs in Soil						
Our Reference		370762-10	370762-11	370762-14	370762-15	370762-16
Your Reference	UNITS	BH211	BH212	BH214	BH214	BH215
Depth		0.2-0.3	0.1-0.15	0.2-0.3	0.3-0.4	0-0.1
Date Sampled		16/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	1.0	<0.1	<0.1	0.5	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.3	<0.1	<0.1	0.2	<0.1
Phenanthrene	mg/kg	4.5	0.4	0.1	3.1	0.5
Anthracene	mg/kg	1.3	0.1	<0.1	0.8	0.1
Fluoranthene	mg/kg	6.0	0.8	0.2	4.1	0.6
Pyrene	mg/kg	6.1	0.8	0.2	4.1	0.6
Benzo(a)anthracene	mg/kg	2.8	0.4	0.1	1.9	0.3
Chrysene	mg/kg	2.9	0.4	0.1	1.7	0.3
Benzo(b,j+k)fluoranthene	mg/kg	4.5	0.7	0.2	2.7	0.5
Benzo(a)pyrene	mg/kg	3.3	0.4	0.2	1.9	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	1.6	0.3	0.1	0.9	0.2
Dibenzo(a,h)anthracene	mg/kg	0.4	<0.1	<0.1	0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	2.0	0.3	0.1	1.1	0.2
Total +ve PAH's	mg/kg	37	4.6	1.4	23	3.6
Benzo(a)pyrene TEQ calc (zero)	mg/kg	4.7	0.6	<0.5	2.7	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	4.7	0.6	<0.5	2.7	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	4.7	0.7	<0.5	2.7	0.5
Surrogate p-Terphenyl-d14	%	102	103	103	63	97

PAHs in Soil						
Our Reference		370762-17	370762-18	370762-21	370762-23	370762-24
Your Reference	UNITS	BH215	BH216	BH216	BH217	BH217
Depth		0.2-0.3	0-0.1	1-1.3	0-0.1	0.2-0.3
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	0.4	<0.1	<0.1	<0.1	0.6
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	0.7	<0.1	<0.1	0.2	0.9
Pyrene	mg/kg	0.7	<0.1	<0.1	0.2	0.8
Benzo(a)anthracene	mg/kg	0.3	<0.1	<0.1	0.1	0.4
Chrysene	mg/kg	0.3	<0.1	<0.1	0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	0.6	<0.2	<0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	0.4	<0.05	<0.05	0.1	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<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	0.3	<0.1	<0.1	0.1	0.3
Total +ve PAH's	mg/kg	4.3	<0.05	<0.05	0.95	5.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.6	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.6	<0.5	<0.5	<0.5	0.7
Surrogate p-Terphenyl-d14	%	113	98	113	98	61

PAHs in Soil					
Our Reference		370762-26	370762-28	370762-30	370762-32
Your Reference	UNITS	BH219	BH219	SDUP201	TB-S201
Depth		0-0.1	0.5-0.6	-	-
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.3	0.1	<0.1
Anthracene	mg/kg	<0.1	0.2	<0.1	<0.1
Fluoranthene	mg/kg	0.2	0.4	0.2	<0.1
Pyrene	mg/kg	0.3	0.4	0.2	<0.1
Benzo(a)anthracene	mg/kg	0.1	0.2	0.1	<0.1
Chrysene	mg/kg	0.1	0.2	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	0.4	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.2	0.2	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	0.2	0.1	<0.1
Total +ve PAH's	mg/kg	1.5	2.7	1.4	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	98	98	98	117

Organochlorine Pesticides in soil						
Our Reference		370762-1	370762-4	370762-6	370762-10	370762-11
Your Reference	UNITS	BH203	BH207	BH210	BH211	BH212
Depth		0.1-0.2	0-0.1	0.05-0.1	0.2-0.3	0.1-0.15
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	117	61	64	107	61

Organochlorine Pesticides in soil						
Our Reference		370762-14	370762-16	370762-18	370762-23	370762-26
Your Reference	UNITS	BH214	BH215	BH216	BH217	BH219
Depth		0.2-0.3	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		16/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	61	61	104	64	62

Organochlorine Pesticides in soil			
Our Reference		370762-28	370762-30
Your Reference	UNITS	BH219	SDUP201
Depth		0.5-0.6	-
Date Sampled		15/01/2025	15/01/2025
Type of sample		Soil	Soil
Date extracted	-	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	106	109

Organophosphorus Pesticides in Soil						
Our Reference		370762-1	370762-4	370762-6	370762-10	370762-11
Your Reference	UNITS	BH203	BH207	BH210	BH211	BH212
Depth		0.1-0.2	0-0.1	0.05-0.1	0.2-0.3	0.1-0.15
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	117	61	64	107	61

Organophosphorus Pesticides in Soil						
Our Reference		370762-14	370762-16	370762-18	370762-23	370762-26
Your Reference	UNITS	BH214	BH215	BH216	BH217	BH219
Depth		0.2-0.3	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		16/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	125	121	104	121	62

Organophosphorus Pesticides in Soil			
Our Reference		370762-28	370762-30
Your Reference	UNITS	BH219	SDUP201
Depth		0.5-0.6	-
Date Sampled		15/01/2025	15/01/2025
Type of sample		Soil	Soil
Date extracted	-	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025
Dichlorvos	mg/kg	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	106	109

PCBs in Soil						
Our Reference		370762-1	370762-4	370762-6	370762-10	370762-11
Your Reference	UNITS	BH203	BH207	BH210	BH211	BH212
Depth		0.1-0.2	0-0.1	0.05-0.1	0.2-0.3	0.1-0.15
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	113	62	64	108	63

PCBs in Soil						
Our Reference		370762-14	370762-16	370762-18	370762-23	370762-26
Your Reference	UNITS	BH214	BH215	BH216	BH217	BH219
Depth		0.2-0.3	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		16/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
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	%	61	63	107	60	64

PCBs in Soil			
Our Reference		370762-28	370762-30
Your Reference	UNITS	BH219	SDUP201
Depth		0.5-0.6	-
Date Sampled		15/01/2025	15/01/2025
Type of sample		Soil	Soil
Date extracted	-	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	106	109

Acid Extractable metals in soil						
Our Reference		370762-1	370762-2	370762-4	370762-6	370762-8
Your Reference	UNITS	BH203	BH203	BH207	BH210	BH210
Depth		0.1-0.2	0.3-0.4	0-0.1	0.05-0.1	0.55-0.6
Date Sampled		15/01/2025	15/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Arsenic	mg/kg	<4	4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	17	12	15	5	10
Copper	mg/kg	89	20	23	50	18
Lead	mg/kg	32	120	11	9	140
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Nickel	mg/kg	26	4	8	29	4
Zinc	mg/kg	54	84	44	25	250

Acid Extractable metals in soil						
Our Reference		370762-10	370762-11	370762-14	370762-15	370762-16
Your Reference	UNITS	BH211	BH212	BH214	BH214	BH215
Depth		0.2-0.3	0.1-0.15	0.2-0.3	0.3-0.4	0-0.1
Date Sampled		16/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Arsenic	mg/kg	4	5	6	<4	<4
Cadmium	mg/kg	0.5	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	12	12	7	12
Copper	mg/kg	32	35	24	260	17
Lead	mg/kg	250	29	92	100	25
Mercury	mg/kg	0.4	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	7	33	3	2	8
Zinc	mg/kg	400	47	73	83	60

Acid Extractable metals in soil						
Our Reference		370762-17	370762-18	370762-21	370762-23	370762-24
Your Reference	UNITS	BH215	BH216	BH216	BH217	BH217
Depth		0.2-0.3	0-0.1	1-1.3	0-0.1	0.2-0.3
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	11	15	15	12
Copper	mg/kg	9	16	<1	21	25
Lead	mg/kg	65	9	4	18	170
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	4	5	1	8	7
Zinc	mg/kg	140	35	16	60	450

Acid Extractable metals in soil						
Our Reference		370762-26	370762-28	370762-30	370762-32	370762-34
Your Reference	UNITS	BH219	BH219	SDUP201	TB-S201	BH203 - [TRIPLICATE]
Depth		0-0.1	0.5-0.6	-	-	0.1-0.2
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	9	13	<1	18
Copper	mg/kg	27	7	23	<1	67
Lead	mg/kg	13	23	20	<1	81
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	2	14	<1	17
Zinc	mg/kg	44	19	50	<1	87

Acid Extractable metals in soil		
Our Reference		370762-35
Your Reference	UNITS	BH211 - [TRIPLICATE]
Depth		0.2-0.3
Date Sampled		16/01/2025
Type of sample		Soil
Date prepared	-	21/01/2025
Date analysed	-	21/01/2025
Arsenic	mg/kg	<4
Cadmium	mg/kg	0.5
Chromium	mg/kg	11
Copper	mg/kg	32
Lead	mg/kg	290
Mercury	mg/kg	0.4
Nickel	mg/kg	6
Zinc	mg/kg	400

Moisture						
Our Reference		370762-1	370762-2	370762-4	370762-6	370762-8
Your Reference	UNITS	BH203	BH203	BH207	BH210	BH210
Depth		0.1-0.2	0.3-0.4	0-0.1	0.05-0.1	0.55-0.6
Date Sampled		15/01/2025	15/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Moisture	%	7.0	15	11	19	22

Moisture						
Our Reference		370762-10	370762-11	370762-14	370762-15	370762-16
Your Reference	UNITS	BH211	BH212	BH214	BH214	BH215
Depth		0.2-0.3	0.1-0.15	0.2-0.3	0.3-0.4	0-0.1
Date Sampled		16/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Moisture	%	16	24	13	15	13

Moisture						
Our Reference		370762-17	370762-18	370762-21	370762-23	370762-24
Your Reference	UNITS	BH215	BH216	BH216	BH217	BH217
Depth		0.2-0.3	0-0.1	1-1.3	0-0.1	0.2-0.3
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Moisture	%	12	11	14	15	18

Moisture					
Our Reference		370762-26	370762-28	370762-30	370762-32
Your Reference	UNITS	BH219	BH219	SDUP201	TB-S201
Depth		0-0.1	0.5-0.6	-	-
Date Sampled		15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	21/01/2025	21/01/2025	21/01/2025	21/01/2025
Date analysed	-	22/01/2025	22/01/2025	22/01/2025	22/01/2025
Moisture	%	12	11	16	<0.1

Asbestos ID - soils NEPM - ASB-001						
Our Reference		370762-1	370762-4	370762-6	370762-10	370762-11
Your Reference	UNITS	BH203	BH207	BH210	BH211	BH212
Depth		0.1-0.2	0-0.1	0.05-0.1	0.2-0.3	0.1-0.15
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	16/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025
Sample mass tested	g	828.21	775.06	237	407.35	717.73
Sample Description	-	Black fine-grained soil & rocks	Brown fine-grained soil & rocks	Black coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Black aggregate
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*	-	Chrysotile	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	0.0001	–	–	–	–
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	-	YES	Nil	Nil	Nil	Nil

Asbestos ID - soils NEPM - ASB-001						
Our Reference		370762-14	370762-16	370762-18	370762-23	370762-26
Your Reference	UNITS	BH214	BH215	BH216	BH217	BH219
Depth		0.2-0.3	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		16/01/2025	15/01/2025	15/01/2025	15/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025
Sample mass tested	g	478.05	926.09	939.21	869.43	920.43
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001
Asbestos comments	-	Nil	Nil	Nil	Nil	Nil

Asbestos ID - soils NEPM - ASB-001		
Our Reference		370762-28
Your Reference	UNITS	BH219
Depth		0.5-0.6
Date Sampled		15/01/2025
Type of sample		Soil
Date analysed	-	23/01/2025
Sample mass tested	g	808.71
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

vTRH(C6-C10)/BTEXN in Water		
Our Reference		370762-33
Your Reference	UNITS	FR-HA-201
Depth		-
Date Sampled		16/01/2025
Type of sample		Soil
Date extracted	-	21/01/2025
Date analysed	-	22/01/2025
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	%	92
Surrogate Toluene-d8	%	88
Surrogate 4-Bromofluorobenzene	%	89

svTRH (C10-C40) in Water		
Our Reference		370762-33
Your Reference	UNITS	FR-HA-201
Depth		-
Date Sampled		16/01/2025
Type of sample		Soil
Date extracted	-	21/01/2025
Date analysed	-	21/01/2025
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	180
TRH C_{29} - C_{36}	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	180
TRH >C_{10} - C_{16}	µg/L	180
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	180
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	180
Surrogate o-Terphenyl	%	76

Metals in Waters - Acid extractable		
Our Reference		370762-33
Your Reference	UNITS	FR-HA-201
Depth		-
Date Sampled		16/01/2025
Type of sample		Soil
Date prepared	-	21/01/2025
Date analysed	-	21/01/2025
Arsenic - Total	mg/L	<0.05
Cadmium - Total	mg/L	<0.01
Chromium - Total	mg/L	<0.01
Copper - Total	mg/L	<0.01
Lead - Total	mg/L	<0.03
Mercury - Total	mg/L	<0.0005
Nickel - Total	mg/L	<0.02
Zinc - Total	mg/L	<0.02

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. NOTE#1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF relative to the sample mass tested) NOTE#2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.

Method ID	Methodology Summary
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			22/01/2025	1	22/01/2025	22/01/2025		22/01/2025	22/01/2025
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	85	81
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	85	81
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	91	87
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	86	83
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	87	81
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	81	76
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	83	78
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	98	1	74	75	1	82	74

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	22/01/2025	22/01/2025		22/01/2025	22/01/2025
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	10	<25	<25	0	104	71
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	10	<25	<25	0	104	71
Benzene	mg/kg	0.2	Org-023	[NT]	10	<0.2	<0.2	0	111	76
Toluene	mg/kg	0.5	Org-023	[NT]	10	<0.5	<0.5	0	106	72
Ethylbenzene	mg/kg	1	Org-023	[NT]	10	<1	<1	0	105	72
m+p-xylene	mg/kg	2	Org-023	[NT]	10	<2	<2	0	99	67
o-Xylene	mg/kg	1	Org-023	[NT]	10	<1	<1	0	102	69
Naphthalene	mg/kg	1	Org-023	[NT]	10	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	10	74	82	10	96	68

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]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	26	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	26	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	26	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	26	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	26	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	26	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	26	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	26	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	26	81	77	5	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			23/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			23/01/2025	1	22/01/2025	22/01/2025		21/01/2025	21/01/2025
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	108	106
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	220	180	20	103	108
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	430	400	7	100	109
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	108	106
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	460	400	14	103	108
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	680	610	11	100	109
Surrogate o-Terphenyl	%		Org-020	77	1	98	93	5	95	93

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	22/01/2025
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	10	<50	<50	0	94	96
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	10	<100	100	0	84	92
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	10	<100	<100	0	100	113
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	10	<50	<50	0	94	96
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	10	120	140	15	84	92
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	10	<100	<100	0	100	113
Surrogate o-Terphenyl	%		Org-020	[NT]	10	96	97	1	87	87

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	26	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	26	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	26	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	26	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	26	100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	26	130	<100	26	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	26	78	72	8	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			22/01/2025	1	22/01/2025	22/01/2025		22/01/2025	22/01/2025
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	74
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	0.3	0.2	40	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	78
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	77
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	1.5	0.7	73	92	81
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	0.3	0.2	40	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	1.6	1.0	46	86	84
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	1.6	1.1	37	92	87
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	0.7	0.5	33	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	0.8	0.5	46	86	84
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	1	0.8	22	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	0.74	0.58	24	84	89
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	0.3	0.3	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	0.5	0.4	22	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	107	1	99	100	1	118	95

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	22/01/2025	22/01/2025		22/01/2025	22/01/2025
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	10	0.1	0.2	67	78	72
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	10	1.0	1.2	18	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	80	76
Fluorene	mg/kg	0.1	Org-022/025	[NT]	10	0.3	0.3	0	80	72
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	10	4.5	4.9	9	80	69
Anthracene	mg/kg	0.1	Org-022/025	[NT]	10	1.3	1.4	7	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	10	6.0	6.5	8	80	66
Pyrene	mg/kg	0.1	Org-022/025	[NT]	10	6.1	6.5	6	78	67
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	10	2.8	3.1	10	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	10	2.9	3.1	7	82	73
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	10	4.5	4.9	9	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	10	3.3	3.5	6	82	72
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	10	1.6	1.7	6	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	10	0.4	0.5	22	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	10	2.0	2.1	5	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	10	102	100	2	97	95

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	26	0.2	<0.1	67	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	26	0.3	<0.1	100	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	26	0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	26	0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	26	0.3	<0.2	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	26	0.2	<0.05	120	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	26	0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	26	0.2	<0.1	67	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	26	98	101	3	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			22/01/2025	1	22/01/2025	22/01/2025		22/01/2025	22/01/2025
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	68
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	72	64
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	68	61
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	74	83
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	96
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	80	89
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	99
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	[NT]
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	78	88
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	[NT]	[NT]
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	77	1	117	115	2	106	95

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	22/01/2025	22/01/2025		22/01/2025	22/01/2025
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	90	66
HCB	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	82	60
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	92	80
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	84	74
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	98	82
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	92	80
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	95	82
Endrin	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	86	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	90	74
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	10	107	104	3	119	99

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	26	62	63	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			22/01/2025	1	22/01/2025	22/01/2025		22/01/2025	22/01/2025
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	61
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	76	84
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	107
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	68	93
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	89
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	88	101
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	90	108
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	77	1	117	115	2	106	95

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	22/01/2025	22/01/2025		22/01/2025	22/01/2025
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	87	70
Mevinphos	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	92	74
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	100	92
Malathion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	94	80
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	96	78
Fenthion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	94	88
Bromophos-ethyl	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	100	90
Phosalone	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	10	107	104	3	119	99

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Fenthion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Phosalone	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	26	62	63	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date extracted	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			22/01/2025	1	22/01/2025	22/01/2025		22/01/2025	22/01/2025
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	78	86
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	105	1	113	112	1	100	95

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	370762-28
Date extracted	-			[NT]	10	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			[NT]	10	22/01/2025	22/01/2025		22/01/2025	22/01/2025
Aroclor 1016	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	90	60
Aroclor 1260	mg/kg	0.1	Org-021/022/025	[NT]	10	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	[NT]	10	108	106	2	112	96

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	22/01/2025	22/01/2025		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021/022/025	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	[NT]	26	64	65	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	370762-4
Date prepared	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Date analysed	-			21/01/2025	1	21/01/2025	21/01/2025		21/01/2025	21/01/2025
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	103	98
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	93	80
Chromium	mg/kg	1	Metals-020	<1	1	17	18	6	99	93
Copper	mg/kg	1	Metals-020	<1	1	89	74	18	99	98
Lead	mg/kg	1	Metals-020	<1	1	32	67	71	98	87
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	125	98
Nickel	mg/kg	1	Metals-020	<1	1	26	22	17	101	89
Zinc	mg/kg	1	Metals-020	<1	1	54	79	38	101	92

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	370762-28
Date prepared	-			[NT]	10	21/01/2025	21/01/2025		[NT]	21/01/2025
Date analysed	-			[NT]	10	21/01/2025	21/01/2025		[NT]	21/01/2025
Arsenic	mg/kg	4	Metals-020	[NT]	10	4	10	86	[NT]	97
Cadmium	mg/kg	0.4	Metals-020	[NT]	10	0.5	0.5	0	[NT]	86
Chromium	mg/kg	1	Metals-020	[NT]	10	12	13	8	[NT]	92
Copper	mg/kg	1	Metals-020	[NT]	10	32	36	12	[NT]	98
Lead	mg/kg	1	Metals-020	[NT]	10	250	240	4	[NT]	92
Mercury	mg/kg	0.1	Metals-021	[NT]	10	0.4	0.3	29	[NT]	100
Nickel	mg/kg	1	Metals-020	[NT]	10	7	15	73	[NT]	94
Zinc	mg/kg	1	Metals-020	[NT]	10	400	400	0	[NT]	92

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Date analysed	-			[NT]	26	21/01/2025	21/01/2025		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	26	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	26	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	26	13	15	14	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	26	27	21	25	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	26	13	12	8	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	26	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	26	9	7	25	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	26	44	45	2	[NT]	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/01/2025	[NT]	[NT]	[NT]	[NT]	21/01/2025	[NT]
Date analysed	-			22/01/2025	[NT]	[NT]	[NT]	[NT]	22/01/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	85	[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]	80	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	84	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	90	[NT]	[NT]	[NT]	[NT]	91	[NT]
Surrogate Toluene-d8	%		Org-023	87	[NT]	[NT]	[NT]	[NT]	87	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	89	[NT]	[NT]	[NT]	[NT]	92	[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	-			21/01/2025	[NT]	[NT]	[NT]	[NT]	21/01/2025	[NT]
Date analysed	-			21/01/2025	[NT]	[NT]	[NT]	[NT]	21/01/2025	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	97	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	95	[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]	97	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	95	[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]	96	[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	-			21/01/2025	[NT]	[NT]	[NT]	[NT]	21/01/2025	[NT]
Date analysed	-			21/01/2025	[NT]	[NT]	[NT]	[NT]	21/01/2025	[NT]
Arsenic - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	99	[NT]
Cadmium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	90	[NT]
Chromium - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper - Total	mg/L	0.01	Metals-020	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Lead - Total	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	92	[NT]
Mercury - Total	mg/L	0.0005	Metals-021	<0.0005	[NT]	[NT]	[NT]	[NT]	118	[NT]
Nickel - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	96	[NT]
Zinc - Total	mg/L	0.02	Metals-020	<0.02	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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 370762-1 for Pb. Therefore a triplicate result has been issued as laboratory sample number 370762-34.
- The laboratory RPD acceptance criteria has been exceeded for 370762-10 for Ni. Therefore a triplicate result has been issued as laboratory sample number 370762-35.

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.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of sample/s 370762-1,1d.

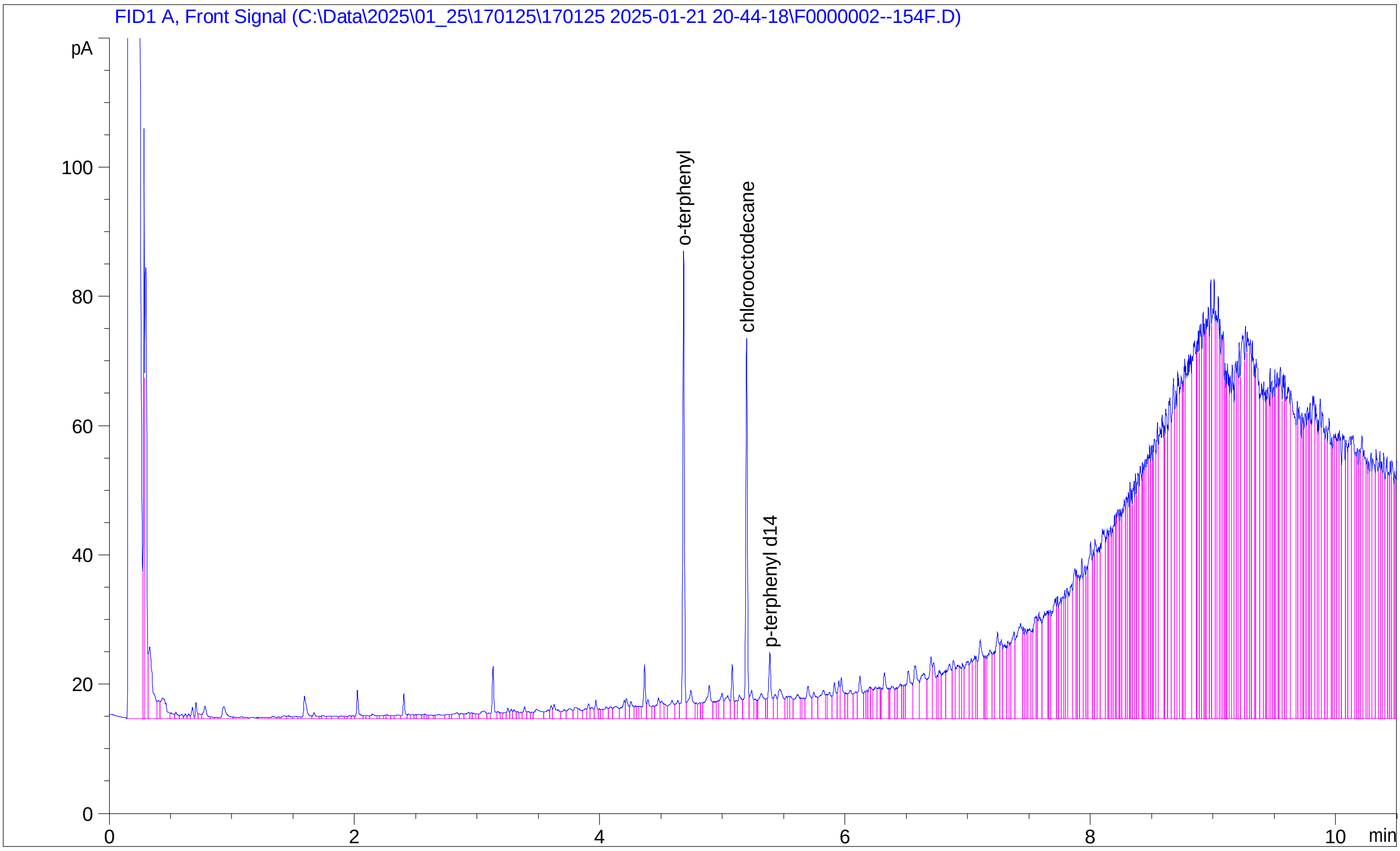
Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Factual description of asbestos identified in the soil samples: NEPM
Sample 370762-1; Chrysotile asbestos identified in 0.0001g of loose fibre bundles

Note: All samples analysed as received. However, samples 370762-6 & 10 are below the minimum recommended 500mL sample volume as per National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

===

Acq. Operator : SYSTEM Seq. Line : 154
Sample Operator : SYSTEM
Acq. Instrument : gc7 Location : 45 (F)
Injection Date : 22/01/2025 9:11:35 AM Inj : 1
Inj Volume : 1 µl
Acq. Method : C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\TRH_FAST LT Broken Racer.M
Last changed : 30/04/2024 5:32:52 PM by SYSTEM
Analysis Method : C:\METHODS\2025\01_25\170125-F-PROCESSING-.M
Last changed : 20/01/2025 10:31:20 AM by SYSTEM
Method Info : FAST TPH WITH 15M HP5 COLUMNS



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : 20/01/2025 10:20:20 AM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type		Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
4.685	VV	I	67.12232	1.46489e-1	9.83270		o-terphenyl
5.199	VV		60.85923	1.84466e-1	11.22647		chlorooctodecane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
5.388	VV I	15.77178	1.58525e-1	2.50023		p-terphenyl d14

Totals : 23.55940

===

===

Summed Peaks Report

===

Signal 1: FID1 A, Front Signal

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	1.100	3.310	81.98607	12.8066
NEPM >C10-C16	1.700	3.940	118.53125	18.5152
TRH C15-C28	3.311	6.740	619.60317	110.9647
NEPM >C16-C34	3.940	7.760	1279.85157	229.2086
TRH C29-C36	6.740	8.075	1134.18287	215.3087
NEPM >C34-C40	7.760	8.680	1790.72739	339.9445

Totals : 926.7484

===

Final Summed Peaks Report

===

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	81.98607	12.8066
NEPM >C10-C16	118.53125	18.5152
TRH C15-C28	619.60317	110.9647
NEPM >C16-C34	1279.85157	229.2086
TRH C29-C36	1134.18287	215.3087
NEPM >C34-C40	1790.72739	339.9445
o-terphenyl	67.12232	9.8327
chlorooctodecan	60.85923	11.2265
p-terphenyl d14	15.77178	2.5002

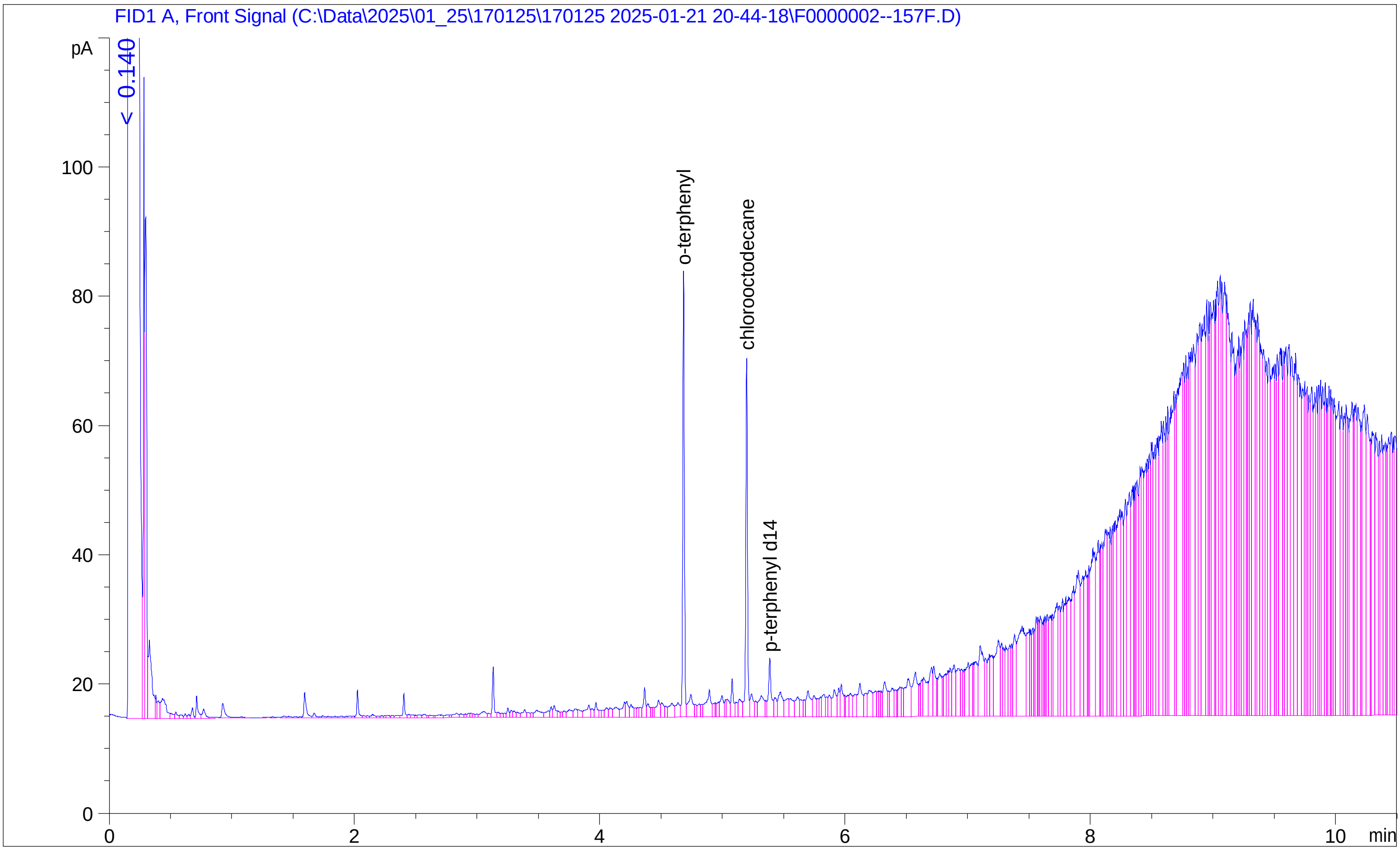
Totals : 950.3078

*** End of Report ***

Data File C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\F0000002--157F.D
Sample Name: s370762-1d

===

Acq. Operator : SYSTEM Seq. Line : 157
Sample Operator : SYSTEM
Acq. Instrument : gc7 Location : 48 (F)
Injection Date : 22/01/2025 10:02:06 AM Inj : 1
Inj Volume : 1 µl
Acq. Method : C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\TRH_FAST LT Broken Racer.M
Last changed : 30/04/2024 5:32:52 PM by SYSTEM
Analysis Method : C:\METHODS\2025\01_25\170125-F-PROCESSING-.M
Last changed : 22/01/2025 2:07:59 PM by SYSTEM
(modified after loading) (Current integration events modified)
Method Info : FAST TPH WITH 15M HP5 COLUMNS



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : 20/01/2025 10:20:20 AM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type		Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
4.685	VV	I	63.55804	1.46489e-1	9.31057		o-terphenyl
5.199	VV		57.00222	1.84466e-1	10.51498		chlorooctodecane
5.388	VV	I	14.58711	1.58525e-1	2.31243		p-terphenyl d14

Totals : 22.13798

===

===

Summed Peaks Report

===

Signal 1: FID1 A, Front Signal

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	1.100	3.310	61.37253	9.5867
NEPM >C10-C16	1.700	3.940	89.43009	13.9694
TRH C15-C28	3.311	6.740	503.22773	90.1231
NEPM >C16-C34	3.940	7.760	1108.02000	198.4353
TRH C29-C36	6.740	8.075	1042.39394	197.8839
NEPM >C34-C40	7.760	8.680	1587.43852	301.3530

Totals : 811.3514

===

Final Summed Peaks Report

===

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	61.37253	9.5867
NEPM >C10-C16	89.43009	13.9694
TRH C15-C28	503.22773	90.1231
NEPM >C16-C34	1108.02000	198.4353
TRH C29-C36	1042.39394	197.8839
NEPM >C34-C40	1587.43852	301.3530
o-terphenyl	63.55804	9.3106
chlorooctodecan	57.00222	10.5150
p-terphenyl d14	14.58711	2.3124

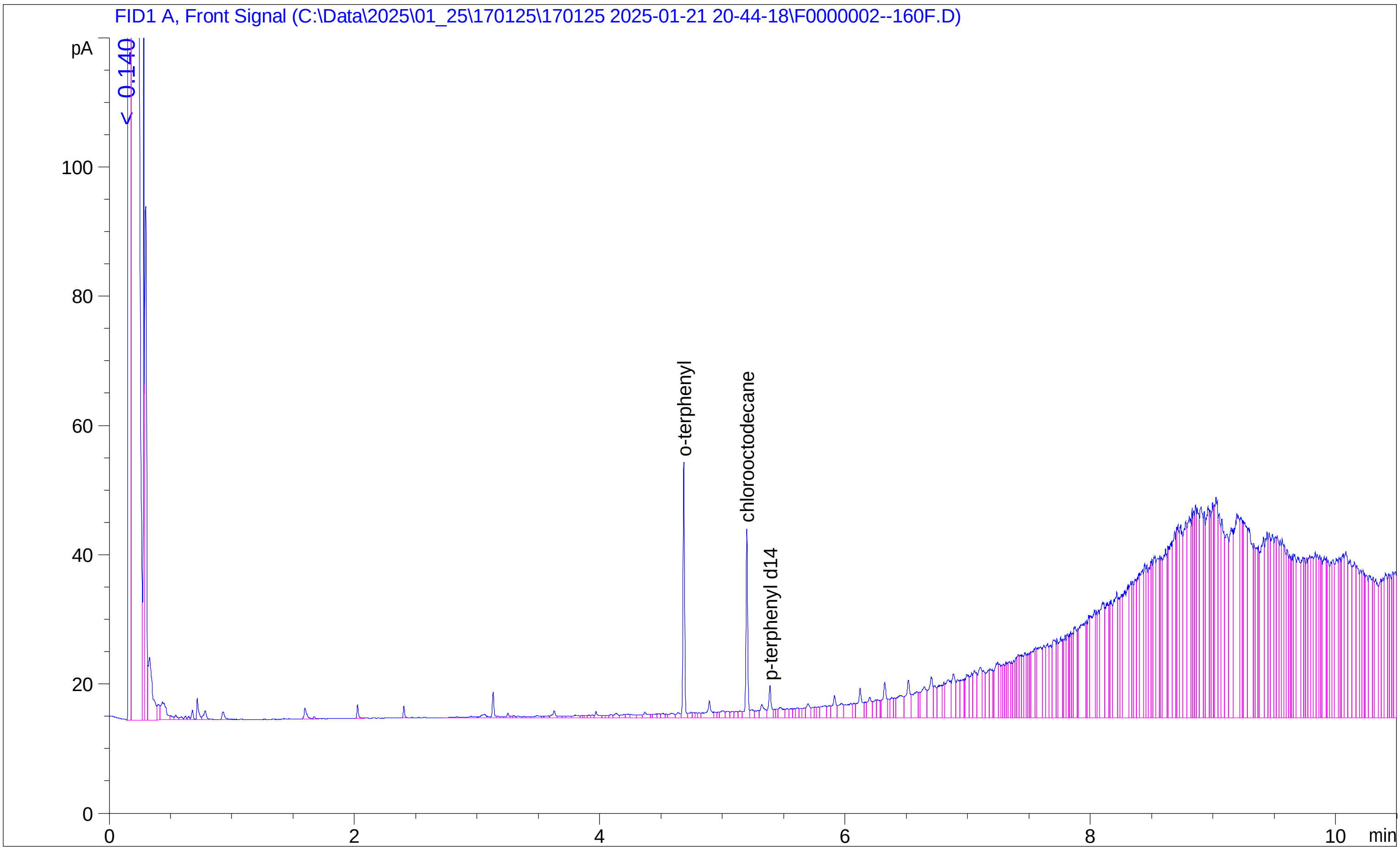
Totals : 833.4893

*** End of Report ***

Data File C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\F0000002--160F.D
Sample Name: s370762-6

===

Acq. Operator : SYSTEM Seq. Line : 160
Sample Operator : SYSTEM
Acq. Instrument : gc7 Location : 51 (F)
Injection Date : 22/01/2025 10:52:39 AM Inj : 1
Inj Volume : 1 µl
Acq. Method : C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\TRH_FAST LT Broken Racer.M
Last changed : 30/04/2024 5:32:52 PM by SYSTEM
Analysis Method : C:\METHODS\2025\01_25\170125-F-PROCESSING-.M
Last changed : 22/01/2025 2:08:26 PM by SYSTEM
(modified after loading) (Current integration events modified)
Method Info : FAST TPH WITH 15M HP5 COLUMNS



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : 20/01/2025 10:20:20 AM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

Data File C:\Data\2025\01_25\170125\170125 2025-01-21 20-44-18\F0000002--160F.D
Sample Name: s370762-6

RetTime [min]	Type		Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
4.686	VV	I	34.87232	1.46489e-1	5.10842		o-terphenyl
5.201	VV		29.51872	1.84466e-1	5.44521		chlorooctodecane
5.389	VV	I	7.70990	1.58525e-1	1.22221		p-terphenyl d14

Totals : 11.77584

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	1.100	3.310	17.04219	2.6621
NEPM >C10-C16	1.700	3.940	25.62096	4.0021
TRH C15-C28	3.311	6.740	284.39640	50.9326
NEPM >C16-C34	3.940	7.760	783.01909	140.2309
TRH C29-C36	6.740	8.075	768.84973	145.9554
NEPM >C34-C40	7.760	8.680	1020.31177	193.6919

Totals : 537.4749

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

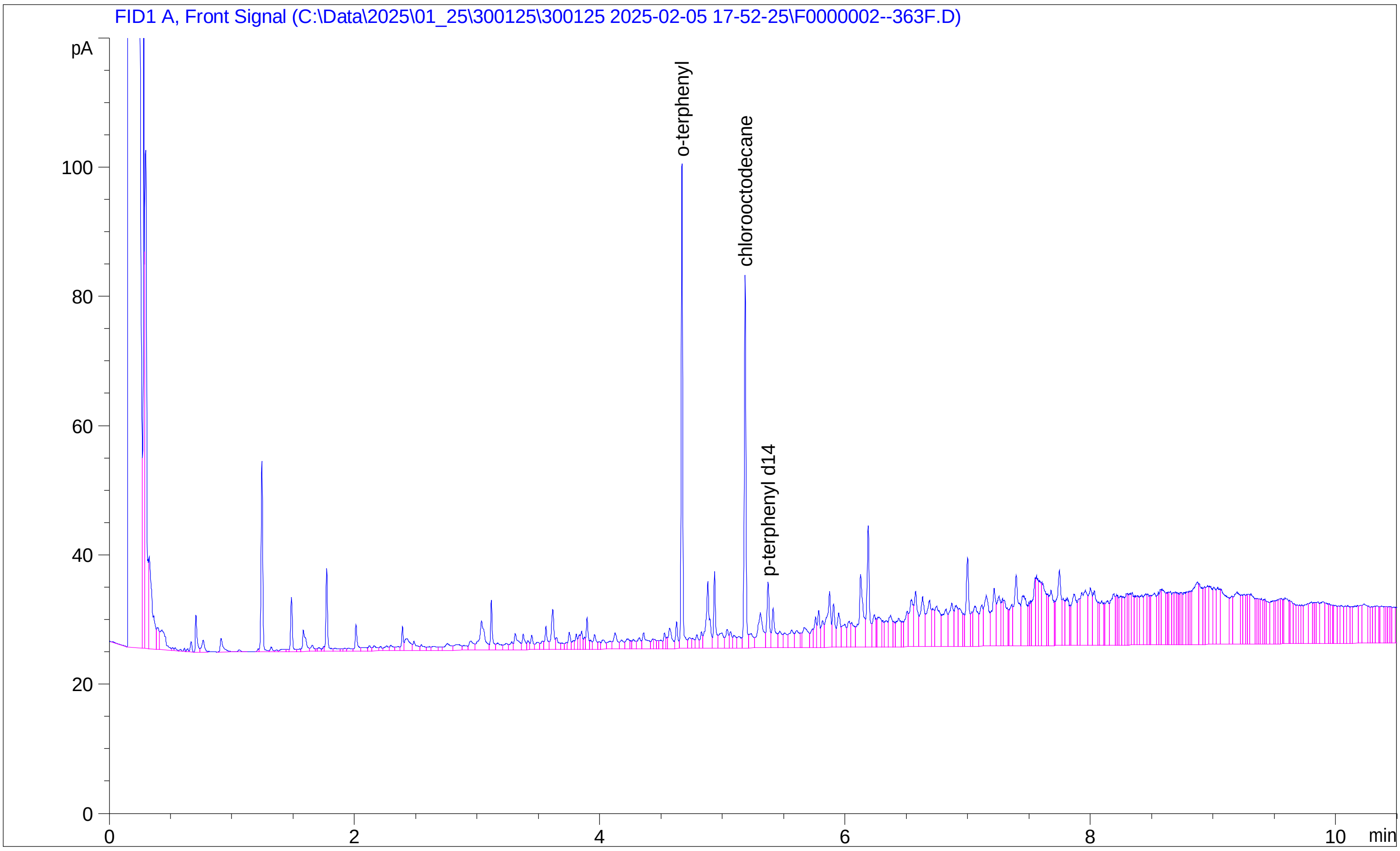
Name	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	17.04219	2.6621
NEPM >C10-C16	25.62096	4.0021
TRH C15-C28	284.39640	50.9326
NEPM >C16-C34	783.01909	140.2309
TRH C29-C36	768.84973	145.9554
NEPM >C34-C40	1020.31177	193.6919
o-terphenyl	34.87232	5.1084
chlorooctodecan	29.51872	5.4452
p-terphenyl d14	7.70990	1.2222

Totals : 549.2507

*** End of Report ***

===

Acq. Operator : SYSTEM Seq. Line : 363
Sample Operator : SYSTEM
Acq. Instrument : gc7 Location : 5 (F)
Injection Date : 5/02/2025 7:16:19 PM Inj : 1
Inj Volume : 1 µl
Acq. Method : C:\Data\2025\01_25\300125\300125 2025-02-05 17-52-25\TRH_FAST LT Broken Racer.M
Last changed : 30/04/2024 5:32:52 PM by SYSTEM
Analysis Method : C:\METHODS\2025\01_25\300125-F - PROCESSING.M
Last changed : 6/02/2025 10:39:54 AM by SYSTEM
Method Info : FAST TPH WITH 15M HP5 COLUMNS



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : 31/01/2025 9:45:33 AM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
4.671	VV I	67.18214	1.55670e-1	10.45823		o-terphenyl
5.186	VV	56.93361	1.94709e-1	11.08551		chlorooctodecane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [mg/L]	Grp	Name
5.373	VV I	14.82840	1.66082e-1	2.46273		p-terphenyl d14

Totals : 24.00646

===

===
Summed Peaks Report
===

Signal 1: FID1 A, Front Signal

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	1.100	3.310	144.53086	23.7266
NEPM >C10-C16	1.700	3.940	158.89057	26.0840
TRH C15-C28	3.311	6.740	563.18162	106.7280
NEPM >C16-C34	3.940	7.760	927.04711	175.6838
TRH C29-C36	6.740	8.075	563.86379	106.5409
NEPM >C34-C40	7.760	8.680	413.19841	78.0730

Totals : 516.8363

===
Final Summed Peaks Report
===

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [mg/L]
TRH C10-C14	144.53086	23.7266
NEPM >C10-C16	158.89057	26.0840
TRH C15-C28	563.18162	106.7280
NEPM >C16-C34	927.04711	175.6838
TRH C29-C36	563.86379	106.5409
NEPM >C34-C40	413.19841	78.0730
o-terphenyl	67.18214	10.4582
chlorooctodecan	56.93361	11.0855
p-terphenyl d14	14.82840	2.4627

Totals : 540.8427

*** End of Report ***

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Katrina Taylor

Sample Login Details	
Your reference	E32976BT2 - Kogarah
Envirolab Reference	370762
Date Sample Received	17/01/2025
Date Instructions Received	17/01/2025
Date Results Expected to be Reported	24/01/2025

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	33 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	Metals in Waters -Acid extractable	On Hold
BH203-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓				
BH203-0.3-0.4	✓	✓	✓				✓					
BH203-0.8-1												✓
BH207-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH207-0.2-0.3												✓
BH210-0.05-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH210-0.2-0.3												✓
BH210-0.55-0.6	✓	✓	✓				✓					
BH211-0.05-0.1												✓
BH211-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓				
BH212-0.1-0.15	✓	✓	✓	✓	✓	✓	✓	✓				
BH212-0.2-0.4												✓
BH214-0.05-0.15												✓
BH214-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓				
BH214-0.3-0.4	✓	✓	✓				✓					
BH215-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH215-0.2-0.3	✓	✓	✓				✓					
BH216-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH216-0.1-0.2												✓
BH216-0.5-0.7												✓
BH216-1-1.3	✓	✓	✓				✓					
BH216-1.3-1.4												✓
BH217-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH217-0.2-0.3	✓	✓	✓				✓					
BH217-0.5-0.6												✓
BH219-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH219-0.2-0.3												✓
BH219-0.5-0.6	✓	✓	✓	✓	✓	✓	✓	✓				
BH219-0.7-1												✓
SDUP201	✓	✓	✓	✓	✓	✓	✓					
TS-S201	✓											
TB-S201	✓	✓	✓				✓					

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 Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	Metals in Waters -Acid extractable	On Hold
FR-HA-201									✓	✓	✓	

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: E32976BT2 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: Katrina Taylor KTaylor@jkenvironments.com.au

Location: Kogarah

Sampler: VR/JTL

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6a NEPM	#3	Asbestos (detection)	#6	BTEX							
15/01/2025	1	BH203	0.1-0.2	G, A	0.2	F: silty sand	X											
15/01/2025	2	BH203	0.3-0.4	G, A	0	F: silty sandy clay		X										
15/01/2025	3	BH203	0.8-1	G, A	0	SANDSTONE												
16/01/2025	4	BH207	0-0.1	G, A	0	F: silty sand	X											
16/01/2025	5	BH207	0.2-0.3	G	0.1	SANDSTONE												
16/01/2025	6	BH210	0.05-0.1	G, A	1	F: gravel	X											
16/01/2025	7	BH210	0.2-0.3	G, A	0.5	F: silty sand												
16/01/2025	8	BH210	0.55-0.6	G, A	1.8	F: silty sandy clay		X										
16/01/2025	9	BH211	0.05-0.1	G, A	0.1	F: gravel												
16/01/2025	10	BH211	0.2-0.3	G, A	0	F: silty sand	X											
16/01/2025	11	BH212	0.1-0.15	G, A	0	F: gravel	X											
16/01/2025	12	BH212	0.2-0.4	G, A	0	F: silty sand												
16/01/2025	13	BH214	0.05-0.15	G, A	0.1	F: gravel												
16/01/2025	14	BH214	0.2-0.3	G, A	0.4	F: silty sand	X											
16/01/2025	15	BH214	0.3-0.4	G, A	0.5	F: silty sand		X										
15/01/2025	16	BH215	0-0.1	G, A	0	F: silty sand	X											
15/01/2025	17	BH215	0.2-0.3	G, A	0	F: silty sand		X										
15/01/2025	18	BH216	0-0.1	G, A	0	F: silty sand	X											
15/01/2025	19	BH216	0.1-0.2	G, A	0	F: silty sand												
15/01/2025	20	BH216	0.5-0.7	G, A	0	F: silty sand												
15/01/2025	21	BH216	1-1.3	G, A	0	F: sandy clay		X										
15/01/2025	22	BH216	1.3-1.4	G	0	F: sandy clay												
15/01/2025	23	BH217	0-0.1	G, A	0	F: silty sand	X											
15/01/2025	24	BH217	0.2-0.3	G, A	0.2	F: silty sand		X										
15/01/2025	25	BH217	0.5-0.6	G, A	0.8	F: silty sand												

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 370762
Date Received: 17/1/25
Time Received: 1655
Received By: OW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
		1655	O. Williak	17/1/25

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: E32976BT2 Date Results Required: STANDARD Page: 2 of 2	**FROM:** JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Katrina Taylor KTaylor@jkenvironments.com.au

Location: Kogarah

Sampler: VR/JTL

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6a NEPM	#3	Asbestos (detection)	#6	BTEX								
15/01/2025	26	BH219	0-0.1	G, A	0	F: silty sand	X												
15/01/2025	27	BH219	0.2-0.3	G, A	0.1	F: silty sand													
15/01/2025	28	BH219	0.5-0.6	G, A	0.3	F: silty sand	X												
15/01/2025	29	BH219	0.7-1	G, A	1.7	F: silty sand													
15/01/2025	30	SDUP201	-	G	NA	DUPLICATE				X									
16/01/2025	S10	SDUP202	-	G	NA	DUPLICATE				X	[redacted]								
15/01/2025	31	TS-S201	-	V	NA	TRIP SPIKE					X								
15/01/2025	32	TB-S201	-	V	NA	TRIP BLANK		X											
16/01/2025	33	FR-HA-201	-	#3	NA	RINSATE		X											
17/01/2025	NL	FR-SPT-201	-	#3	NA	RINSATE		X											

Remarks (comments/detection limits required): [redacted] TS-S201 broke during transit		Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag	370762 17/1/25	
Relinquished By:	Date:	Time:	Received By:	Date: CW

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

CERTIFICATE OF ANALYSIS 370762-A

Client Details

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

Sample Details

Your Reference	**E32976BT2 - Kogarah**
Number of Samples	Additional analysis
Date samples received	17/01/2025
Date completed instructions received	28/01/2025

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	04/02/2025
Date of Issue	04/02/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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
Loren Bardwell, Development Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		370762-A-1	370762-A-8	370762-A-10	370762-A-15	370762-A-24
Your Reference	UNITS	BH203	BH210	BH211	BH214	BH217
Depth		0.1-0.2	0.55-0.6	0.2-0.3	0.3-0.4	0.2-0.3
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
Date analysed	-	30/01/2025	30/01/2025	30/01/2025	30/01/2025	30/01/2025
pH 1:5 soil:water	pH Units	9.1	7.7	7.7	6.9	7.9

CEC						
Our Reference		370762-A-1	370762-A-8	370762-A-10	370762-A-15	370762-A-24
Your Reference	UNITS	BH203	BH210	BH211	BH214	BH217
Depth		0.1-0.2	0.55-0.6	0.2-0.3	0.3-0.4	0.2-0.3
Date Sampled		15/01/2025	16/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Exchangeable Ca	meq/100g	8.7	11	6.6	3.4	12
Exchangeable K	meq/100g	0.3	0.1	<0.1	<0.1	0.2
Exchangeable Mg	meq/100g	0.8	0.3	0.4	0.4	0.8
Exchangeable Na	meq/100g	0.4	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	10	11	7.2	3.9	13

TCLP Preparation - Acid					
Our Reference		370762-A-1	370762-A-10	370762-A-15	370762-A-24
Your Reference	UNITS	BH203	BH211	BH214	BH217
Depth		0.1-0.2	0.2-0.3	0.3-0.4	0.2-0.3
Date Sampled		15/01/2025	16/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil	Soil
pH of soil for fluid# determ.	pH units	8.7	8.3	7.4	7.0
pH of soil TCLP (after HCl)	pH units	1.8	1.8	1.8	1.8
Extraction fluid used		1	1	1	1
pH of final Leachate	pH units	5.0	4.9	4.9	5.0

PAHs in TCLP (USEPA 1311)			
Our Reference		370762-A-10	370762-A-15
Your Reference	UNITS	BH211	BH214
Depth		0.2-0.3	0.3-0.4
Date Sampled		16/01/2025	16/01/2025
Type of sample		Soil	Soil
Date extracted	-	30/01/2025	30/01/2025
Date analysed	-	31/01/2025	31/01/2025
Naphthalene in TCLP	mg/L	<0.0001	<0.0001
Acenaphthylene in TCLP	mg/L	<0.0001	<0.0001
Acenaphthene in TCLP	mg/L	<0.0001	<0.0001
Fluorene in TCLP	mg/L	<0.0001	<0.0001
Phenanthrene in TCLP	mg/L	<0.0001	<0.0001
Anthracene in TCLP	mg/L	<0.0001	<0.0001
Fluoranthene in TCLP	mg/L	<0.0001	<0.0001
Pyrene in TCLP	mg/L	<0.0001	<0.0001
Benzo(a)anthracene in TCLP	mg/L	<0.0001	<0.0001
Chrysene in TCLP	mg/L	<0.0001	<0.0001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.0002	<0.0002
Benzo(a)pyrene in TCLP	mg/L	<0.0001	<0.0001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.0001	<0.0001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.0001	<0.0001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.0001	<0.0001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	89	108

Metals from Leaching Fluid pH 2.9 or 5				
Our Reference		370762-A-1	370762-A-10	370762-A-24
Your Reference	UNITS	BH203	BH211	BH217
Depth		0.1-0.2	0.2-0.3	0.2-0.3
Date Sampled		15/01/2025	16/01/2025	15/01/2025
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2025	30/01/2025	30/01/2025
Date analysed	-	30/01/2025	30/01/2025	30/01/2025
Lead	mg/L	0.06	0.1	0.3

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-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.
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.
Org-022/025	Leachates are extracted with Dichloromethane and analysed by GC-MS/GC-MSMS.

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/01/2025	8	30/01/2025	30/01/2025		30/01/2025	[NT]
Date analysed	-			30/01/2025	8	30/01/2025	30/01/2025		30/01/2025	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	8	7.7	7.7	0	100	[NT]

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			04/02/2025	[NT]	[NT]	[NT]	[NT]	04/02/2025	[NT]
Date analysed	-			04/02/2025	[NT]	[NT]	[NT]	[NT]	04/02/2025	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date extracted	-			30/01/2025	10	30/01/2025	30/01/2025		30/01/2025	[NT]
Date analysed	-			31/01/2025	10	31/01/2025	31/01/2025		31/01/2025	[NT]
Naphthalene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	94	[NT]
Acenaphthylene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	95	[NT]
Fluorene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	95	[NT]
Phenanthrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	90	[NT]
Anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	94	[NT]
Pyrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	93	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	81	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.0002	Org-022/025	<0.0002	10	<0.0002	<0.0002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	131	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	10	<0.0001	<0.0001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	111	10	89	93	4	97	[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	[NT]
Date extracted	-			30/01/2025	[NT]	[NT]	[NT]	[NT]	30/01/2025	[NT]
Date analysed	-			30/01/2025	[NT]	[NT]	[NT]	[NT]	30/01/2025	[NT]
Lead	mg/L	0.03	Metals-020	<0.03	[NT]	[NT]	[NT]	[NT]	101	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Katrina Taylor

Sample Login Details	
Your reference	E32976BT2 - Kogarah
Envirolab Reference	370762-A
Date Sample Received	17/01/2025
Date Instructions Received	28/01/2025
Date Results Expected to be Reported	04/02/2025

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)	10
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:

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	Misc Inorg - Soil	CEC	TCLP Preparation - Acid	PAHs in TCLP (USEPA 1311)	Lead	On Hold
BH203-0.1-0.2	✓	✓	✓		✓	
BH203-0.3-0.4						✓
BH203-0.8-1						✓
BH207-0-0.1						✓
BH207-0.2-0.3						✓
BH210-0.05-0.1						✓
BH210-0.2-0.3						✓
BH210-0.55-0.6	✓	✓				
BH211-0.05-0.1						✓
BH211-0.2-0.3	✓	✓	✓	✓	✓	
BH212-0.1-0.15						✓
BH212-0.2-0.4						✓
BH214-0.05-0.15						✓
BH214-0.2-0.3						✓
BH214-0.3-0.4	✓	✓	✓	✓		
BH215-0-0.1						✓
BH215-0.2-0.3						✓
BH216-0-0.1						✓
BH216-0.1-0.2						✓
BH216-0.5-0.7						✓
BH216-1-1.3						✓
BH216-1.3-1.4						✓
BH217-0-0.1						✓
BH217-0.2-0.3	✓	✓	✓		✓	
BH217-0.5-0.6						✓
BH219-0-0.1						✓
BH219-0.2-0.3						✓
BH219-0.5-0.6						✓
BH219-0.7-1						✓
SDUP201						✓
TS-S201						✓
TB-S201						✓

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	Misc Inorg - Soil	CEC	TCLP Preparation - Acid	PAHs in TCLP (USEPA 1311)	Lead	On Hold
FR-HA-201						✓
BH203 - [TRIPLICATE]-0.1-0.2						✓
BH211 - [TRIPLICATE]-0.2-0.3						✓

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

Additional Info

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: Katrina Taylor <KTaylor@jkenvironments.com.au>
Sent: Tuesday, 28 January 2025 3:27 PM
To: Envirolab Sydney Sample Receipt
Subject: FW: Results for Registration 370762 E32976BT2 - Kogarah
Attachments: 370762-[R00].pdf; 370762-COC.pdf; JK Environment Soil for Envirolab 370762.xlsx; 370762.Excel.xlsx

Afternoon,

Please schedule the following analysis on standard TA:
1 BH203 (0.1-0.2) pH & CEC, and Lead TCLP
8 BH210 (0.55-0.6) pH & CEC
10 BH211 (0.2-0.3) pH & CEC, and Lead & PAH TCLP
15 BH214 (0.3-0.4) pH & CEC, and PAH TCLP
24 BH217 (0.2-0.3) pH & CEC, Lead TCLP

ELS REF: 370762-A
TAT: STANDARD
DUE: 4/2/25
AB

Thank you.

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

T: +61 2 9888 5000
D: +61 418 481 628
E: KTaylor@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Stuart Chen <SChen2@envirolab.com.au>
Sent: Friday, 24 January 2025 4:46 PM
To: Katrina Taylor <KTaylor@jkenvironments.com.au>
Subject: Results for Registration 370762 E32976BT2 - Kogarah

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.

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

CERTIFICATE OF ANALYSIS 371803

Client Details

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

Sample Details

Your Reference	**E32976BT2, Kogarah**
Number of Samples	16 Soil
Date samples received	31/01/2025
Date completed instructions received	31/01/2025

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	07/02/2025
Date of Issue	07/02/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Asbestos Approved By
Analysed by Asbestos Approved Analyst: Amanda Lee
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Giovanni Agosti, Group Technical Manager
Stuart Chen, Asbestos Approved Identifier/Report coordinator
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		371803-2	371803-5	371803-6	371803-8	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
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	%	99	101	104	108	109

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		371803-11	371803-13	371803-15
Your Reference	UNITS	BH209	BH213	BH218
Depth		0.6-0.8	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	04/02/2025	04/02/2025	04/02/2025
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	96	103	105

svTRH (C10-C40) in Soil						
Our Reference		371803-2	371803-5	371803-6	371803-8	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	59
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	180	270
TRH C_{29} - C_{36}	mg/kg	<100	<100	180	110	260
Total +ve TRH (C10-C36)	mg/kg	<50	<50	180	290	590
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50	<50	65
TRH >C_{10}-C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	65
TRH >C_{16}-C_{34}	mg/kg	<100	<100	200	260	440
TRH >C_{34}-C_{40}	mg/kg	<100	<100	100	<100	190
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	310	260	700
Surrogate o-Terphenyl	%	95	100	103	109	105

svTRH (C10-C40) in Soil				
Our Reference		371803-11	371803-13	371803-15
Your Reference	UNITS	BH209	BH213	BH218
Depth		0.6-0.8	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50
TRH >C_{10}-C_{16}	mg/kg	<50	<50	<50
TRH >C_{10}-C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16}-C_{34}	mg/kg	<100	<100	<100
TRH >C_{34}-C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	96	94	94

PAHs in Soil						
Our Reference		371803-2	371803-5	371803-6	371803-8	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
Naphthalene	mg/kg	<0.1	<0.1	0.1	0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.1	0.8	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Phenanthrene	mg/kg	<0.1	0.3	0.9	11	0.1
Anthracene	mg/kg	<0.1	<0.1	0.2	1.6	<0.1
Fluoranthene	mg/kg	<0.1	1.4	1.1	9.0	0.3
Pyrene	mg/kg	<0.1	1.3	1	7.9	0.3
Benzo(a)anthracene	mg/kg	<0.1	0.9	0.5	3.5	0.2
Chrysene	mg/kg	<0.1	1.1	0.6	3.8	0.2
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	1	0.8	5.1	0.3
Benzo(a)pyrene	mg/kg	<0.05	0.79	0.5	3.3	0.2
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.4	0.2	1.4	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.1	<0.1	0.5	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.4	0.3	1.7	0.1
Total +ve PAH's	mg/kg	<0.05	8.1	6.2	50	1.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	1.2	0.6	4.9	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	1.2	0.7	4.9	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	1.2	0.7	4.9	<0.5
Surrogate p-Terphenyl-d14	%	107	106	102	101	106

PAHs in Soil				
Our Reference		371803-11	371803-13	371803-15
Your Reference	UNITS	BH209	BH213	BH218
Depth		0.6-0.8	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	0.7
Anthracene	mg/kg	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	0.1	1.2
Pyrene	mg/kg	<0.1	0.1	1.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.6
Chrysene	mg/kg	<0.1	<0.1	0.6
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.9
Benzo(a)pyrene	mg/kg	0.07	0.07	0.62
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.4
Total +ve PAH's	mg/kg	0.07	0.4	6.6
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	0.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	0.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	0.9
Surrogate p-Terphenyl-d14	%	104	105	103

Organochlorine Pesticides in soil						
Our Reference		371803-2	371803-6	371803-9	371803-13	371803-15
Your Reference	UNITS	BH201	BH208	BH209	BH213	BH218
Depth		0.1-0.2	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	124	132	138	131	128

Organophosphorus Pesticides in Soil						
Our Reference		371803-2	371803-6	371803-9	371803-13	371803-15
Your Reference	UNITS	BH201	BH208	BH209	BH213	BH218
Depth		0.1-0.2	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
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	%	124	132	138	131	128

PCBs in Soil						
Our Reference		371803-2	371803-6	371803-9	371803-13	371803-15
Your Reference	UNITS	BH201	BH208	BH209	BH213	BH218
Depth		0.1-0.2	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
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	%	95	102	102	97	99

Acid Extractable metals in soil						
Our Reference		371803-2	371803-5	371803-6	371803-8	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Arsenic	mg/kg	<4	6	5	7	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	15	12	22	14
Copper	mg/kg	43	38	15	11	24
Lead	mg/kg	6	130	36	84	55
Mercury	mg/kg	<0.1	0.4	<0.1	0.2	0.1
Nickel	mg/kg	7	3	6	10	6
Zinc	mg/kg	29	120	67	78	160

Acid Extractable metals in soil				
Our Reference		371803-11	371803-13	371803-15
Your Reference	UNITS	BH209	BH213	BH218
Depth		0.6-0.8	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	04/02/2025	04/02/2025	04/02/2025
Arsenic	mg/kg	5	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	20	17	9
Copper	mg/kg	<1	15	19
Lead	mg/kg	23	17	160
Mercury	mg/kg	<0.1	<0.1	0.1
Nickel	mg/kg	2	10	6
Zinc	mg/kg	12	42	110

Moisture						
Our Reference		371803-2	371803-5	371803-6	371803-8	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025	05/02/2025	05/02/2025
Moisture	%	10	17	22	12	19

Moisture				
Our Reference		371803-11	371803-13	371803-15
Your Reference	UNITS	BH209	BH213	BH218
Depth		0.6-0.8	0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	04/02/2025	04/02/2025	04/02/2025
Date analysed	-	05/02/2025	05/02/2025	05/02/2025
Moisture	%	18	16	10

Asbestos ID - soils NEPM - ASB-001						
Our Reference		371803-2	371803-5	371803-6	371803-7	371803-9
Your Reference	UNITS	BH201	BH201	BH208	BH208	BH209
Depth		0.1-0.2	0.9-1	0-0.1	0.2-0.5	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	04/02/2025	04/02/2025	04/02/2025	04/02/2025	04/02/2025
Sample mass tested	g	710.96	153.98	715.12	286.88	731.51
Sample Description	-	Grey coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001
Asbestos comments	-	Nil	Nil	Nil	Nil	Nil

Asbestos ID - soils NEPM - ASB-001			
Our Reference		371803-13	371803-15
Your Reference	UNITS	BH213	BH218
Depth		0-0.1	0-0.1
Date Sampled		31/01/2025	31/01/2025
Type of sample		Soil	Soil
Date analysed	-	04/02/2025	04/02/2025
Sample mass tested	g	431.65	670.67
Sample Description	-	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
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	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
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001
Asbestos comments	-	Nil	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-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	<25	2	<25	<25	0	101	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	2	<25	<25	0	101	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	2	<0.2	<0.2	0	106	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	2	<0.5	<0.5	0	99	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	2	<1	<1	0	98	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	2	<2	<2	0	102	[NT]
o-Xylene	mg/kg	1	Org-023	<1	2	<1	<1	0	103	[NT]
Naphthalene	mg/kg	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	111	2	99	108	9	100	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			05/02/2025	2	05/02/2025	05/02/2025		05/02/2025	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	2	<50	<50	0	101	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	2	<100	<100	0	99	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	2	<100	<100	0	129	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	2	<50	<50	0	101	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	2	<100	<100	0	99	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	2	<100	<100	0	129	[NT]
Surrogate o-Terphenyl	%		Org-020	101	2	95	96	1	95	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			05/02/2025	2	05/02/2025	05/02/2025		05/02/2025	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	86	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	82	[NT]
Fluorene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	80	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	82	[NT]
Anthracene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	82	[NT]
Pyrene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	84	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	106	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	2	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	2	<0.05	<0.05	0	94	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	100	2	107	104	3	82	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			05/02/2025	2	05/02/2025	05/02/2025		05/02/2025	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	90	[NT]
HCB	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	84	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	88	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	92	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	84	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	82	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	92	[NT]
Endrin	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	90	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	94	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	88	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	120	2	124	128	3	121	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			05/02/2025	2	05/02/2025	05/02/2025		05/02/2025	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	104	[NT]
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	84	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	122	[NT]
Malathion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	106	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	86	[NT]
Fenthion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	110	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	96	[NT]
Phosalone	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	120	2	124	128	3	121	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			05/02/2025	2	05/02/2025	05/02/2025		05/02/2025	[NT]
Aroclor 1016	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	83	[NT]
Aroclor 1260	mg/kg	0.1	Org-021/022/025	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	92	2	95	98	3	90	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Date analysed	-			04/02/2025	2	04/02/2025	04/02/2025		04/02/2025	[NT]
Arsenic	mg/kg	4	Metals-020	<4	2	<4	<4	0	103	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	2	<0.4	<0.4	0	92	[NT]
Chromium	mg/kg	1	Metals-020	<1	2	15	17	12	96	[NT]
Copper	mg/kg	1	Metals-020	<1	2	43	50	15	96	[NT]
Lead	mg/kg	1	Metals-020	<1	2	6	6	0	92	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	2	<0.1	<0.1	0	110	[NT]
Nickel	mg/kg	1	Metals-020	<1	2	7	9	25	94	[NT]
Zinc	mg/kg	1	Metals-020	<1	2	29	28	4	90	[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

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.

Note: All samples analysed as received. However, samples 371803-5 & 7 are below the minimum recommended 500mL sample volume as per National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Katrina Taylor

Sample Login Details	
Your reference	E32976BT2, Kogarah
Envirolab Reference	371803
Date Sample Received	31/01/2025
Date Instructions Received	31/01/2025
Date Results Expected to be Reported	07/02/2025

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	16 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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 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
BH201-0-0.05									✓
BH201-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH201-0.3-0.5									✓
BH201-0.6-0.8									✓
BH201-0.9-1	✓	✓	✓				✓	✓	
BH208-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH208-0.2-0.5									✓
BH208-0.45-0.55	✓	✓	✓				✓	✓	
BH209-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH209-0.2-0.5									✓
BH209-0.6-0.8	✓	✓	✓				✓		
BH209-0.85-0.95									✓
BH213-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH213-0.3-0.5									✓
BH218-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH218-0.3-0.45									✓

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:
ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067
P: (02) 99106200
F: (02) 99106201

Attention: Aileen

JKE Job Number: E32976BT2

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: Katrina Taylor
KTaylor@jkenvironments.com.au

Location: Kogarah, NSW

Sampler: VR

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6a NEPM	#3	Asbestos NEPM	#6	BTEX							
31/01/2025	1	BH201	0-0.05	G, A	0	F: silty sand												
31/01/2025	2	BH201	0.1-0.2	G, A	0.2	F: silty gravel	X											
31/01/2025	3	BH201	0.3-0.5	G, A	0.1	F: silty clay												
31/01/2025	4	BH201	0.6-0.8	G, A	0	F: silty sandy clay												
31/01/2025	5	BH201	0.9-1	G, A	0	F: silty sandy clay		X	X									
31/01/2025	6	BH208	0-0.1	G, A	0	F: silty sand	X											
31/01/2025	7	BH208	0.2-0.5	G, A	0.5	F: silty sandy clay												
31/01/2025	8	BH208	0.45-0.55	G	0	F: silty sandy clay		X	X									
31/01/2025	9	BH209	0-0.1	G, A	0	F: silty sand	X											
31/01/2025	10	BH209	0.2-0.5	G, A	0	F: sandy clay												
31/01/2025	11	BH209	0.6-0.8	G, A	0	F: sandy clay		X										
31/01/2025	12	BH209	0.85-0.95	G	0	F: sandy clay												
31/01/2025	13	BH213	0-0.1	G, A	0	F: silty sand	X											
31/01/2025	14	BH213	0.3-0.5	G, A	0	F: silty sand												
31/01/2025	15	BH218	0-0.1	G, A	0	F: silty sand	X											
31/01/2025	16	BH218	0.3-0.45	G, A	0	F: silty sand												

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 371803
Date Received: 31/1/25
Time Received: 1640
Received By: OW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

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

Relinquished By:	Date:	Time:	Received By:	Date:
		31/1/25	O. William.	1640.

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

CERTIFICATE OF ANALYSIS 371803-A

Client Details

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

Sample Details

Your Reference	**E32976BT2, Kogarah**
Number of Samples	Additional analysis
Date samples received	31/01/2025
Date completed instructions received	10/02/2025

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	17/02/2025
Date of Issue	17/02/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager

Authorised By
Nancy Zhang, Laboratory Manager

TCLP Preparation - Acid				
Our Reference		371803-A-5	371803-A-8	371803-A-15
Your Reference	UNITS	BH201	BH208	BH218
Depth		0.9-1	0.45-0.55	0-0.1
Date Sampled		31/01/2025	31/01/2025	31/01/2025
Type of sample		Soil	Soil	Soil
pH of soil for fluid# determ.	pH units	7.4	7.5	6.9
pH of soil TCLP (after HCl)	pH units	2.0	1.8	1.9
Extraction fluid used		1	1	1
pH of final Leachate	pH units	5.0	5.0	5.0

PAHs in TCLP (USEPA 1311)		
Our Reference		371803-A-8
Your Reference	UNITS	BH208
Depth		0.45-0.55
Date Sampled		31/01/2025
Type of sample		Soil
Date extracted	-	12/02/2025
Date analysed	-	14/02/2025
Naphthalene in TCLP	mg/L	0.0001
Acenaphthylene in TCLP	mg/L	<0.0001
Acenaphthene in TCLP	mg/L	<0.0001
Fluorene in TCLP	mg/L	0.0001
Phenanthrene in TCLP	mg/L	0.0004
Anthracene in TCLP	mg/L	<0.0001
Fluoranthene in TCLP	mg/L	<0.0001
Pyrene in TCLP	mg/L	<0.0001
Benzo(a)anthracene in TCLP	mg/L	<0.0001
Chrysene in TCLP	mg/L	<0.0001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.0002
Benzo(a)pyrene in TCLP	mg/L	<0.0001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.0001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.0001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.0001
Total +ve PAH's	mg/L	0.0006
Surrogate p-Terphenyl-d14	%	77

Metals from Leaching Fluid pH 2.9 or 5			
Our Reference		371803-A-5	371803-A-15
Your Reference	UNITS	BH201	BH218
Depth		0.9-1	0-0.1
Date Sampled		31/01/2025	31/01/2025
Type of sample		Soil	Soil
Date extracted	-	17/02/2025	17/02/2025
Date analysed	-	17/02/2025	17/02/2025
Lead	mg/L	0.34	0.07

Method ID	Methodology Summary
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.
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.
Org-022/025	Leachates are extracted with Dichloromethane and analysed by GC-MS/GC-MSMS.

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate					Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			12/02/2025	[NT]	[NT]	[NT]	[NT]	12/02/2025	[NT]
Date analysed	-			14/02/2025	[NT]	[NT]	[NT]	[NT]	14/02/2025	[NT]
Naphthalene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	80	[NT]
Acenaphthylene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	73	[NT]
Fluorene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Phenanthrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	88	[NT]
Anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	75	[NT]
Pyrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.0002	Org-022/025	<0.0002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	84	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.0001	Org-022/025	<0.0001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	68	[NT]	[NT]	[NT]	[NT]	80	[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	[NT]
Date extracted	-			17/02/2025	5	17/02/2025	17/02/2025		17/02/2025	[NT]
Date analysed	-			17/02/2025	5	17/02/2025	17/02/2025		17/02/2025	[NT]
Lead	mg/L	0.03	Metals-020	<0.03	5	0.34	0.34	0	103	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Katrina Taylor

Sample Login Details	
Your reference	E32976BT2, Kogarah
Envirolab Reference	371803-A
Date Sample Received	31/01/2025
Date Instructions Received	10/02/2025
Date Results Expected to be Reported	17/02/2025

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	Additional analysis
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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	TCLP Preparation - Acid	PAHs in TCLP (USEPA 1311)	Lead	On Hold
BH201-0-0.05				✓
BH201-0.1-0.2				✓
BH201-0.3-0.5				✓
BH201-0.6-0.8				✓
BH201-0.9-1	✓		✓	
BH208-0-0.1				✓
BH208-0.2-0.5				✓
BH208-0.45-0.55	✓	✓		
BH209-0-0.1				✓
BH209-0.2-0.5				✓
BH209-0.6-0.8				✓
BH209-0.85-0.95				✓
BH213-0-0.1				✓
BH213-0.3-0.5				✓
BH218-0-0.1	✓		✓	
BH218-0.3-0.45				✓

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:	Katrina Taylor <KTaylor@jkenvironments.com.au>
Sent:	Monday, 10 February 2025 10:58 AM
To:	Envirolab Sydney Sample Receipt
Subject:	FW: Results for Registration 371803 E32976BT2, Kogarah
Attachments:	371803-[R00].pdf; 371803-COC.pdf; JK Environment Soil for Envirolab 371803.xlsx; 371803.Excel.xlsx

Morning,

Please schedule the following samples on standard TA:

5 BH201 (0.9-1.0m) - TCLP Pb
8 BH208 (0.45-0.55m) - TCLP PAHs
15 BH218 (0-0.1m) - TCLP Pb

ELS REF: 371803-A
TAT: STANDARD
DUE: 17/2/25
AB-

Thank you.

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

T: +61 2 9888 5000
D: +61 418 481 628
E: KTaylor@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Stuart Chen <SChen2@envirolab.com.au>
Sent: Friday, 7 February 2025 12:24 PM
To: Katrina Taylor <KTaylor@jkenvironments.com.au>
Subject: Results for Registration 371803 E32976BT2, Kogarah

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.

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 MGA0261

Client Details

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

Sample Details

Your Reference	E32976BT2
Number of Samples	1 Soil
Date Samples Received	21/01/2025
Date Instructions Received	21/01/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	28/01/2025
Date of Issue	24/01/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

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

Certificate of Analysis MGA0261

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
MGA0261-01	SDUP202	Soil	16/01/2025	21/01/2025

Certificate of Analysis MGA0261

Volatile TRH and BTEX (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
TRH C6-C9	mg/kg	25	<25
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50
Benzene	mg/kg	0.20	<0.20
Toluene	mg/kg	0.50	<0.50
Ethylbenzene	mg/kg	1.0	<1.0
meta+para Xylene	mg/kg	2.0	<2.0
ortho-Xylene	mg/kg	1.0	<1.0
Total Xylene	mg/kg	3.0	<3.0
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0
Surrogate aaa-Trifluorotoluene	%		*84.1*

Certificate of Analysis MGA0261

Semi-volatile TRH (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
TRH C10-C14	mg/kg	50	<50
TRH C15-C28	mg/kg	100	<100
TRH C29-C36	mg/kg	100	<100
Total +ve TRH C10-C36	mg/kg	50	<50
TRH >C10-C16	mg/kg	50	<50
TRH >C10-C16 less Naphthalene F2	mg/kg	50	<50
TRH >C16-C34 (F3)	mg/kg	100	<100
TRH >C34-C40 (F4)	mg/kg	100	<100
Total +ve TRH >C10-C40	mg/kg	50	<50
Surrogate o-Terphenyl	%		*65.6*

Polycyclic Aromatic Hydrocarbons (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
Naphthalene	mg/kg	0.10	<0.10
Acenaphthylene	mg/kg	0.10	<0.10
Acenaphthene	mg/kg	0.10	<0.10
Fluorene	mg/kg	0.10	<0.10
Phenanthrene	mg/kg	0.10	0.75
Anthracene	mg/kg	0.10	0.23
Fluoranthene	mg/kg	0.10	1.2
Pyrene	mg/kg	0.10	1.3
Benzo(a)anthracene	mg/kg	0.10	0.46
Chrysene	mg/kg	0.10	0.50
Benzo(b,j,k)fluoranthene	mg/kg	0.20	0.81
Benzo(a)pyrene	mg/kg	0.050	0.55
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	0.37
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10
Benzo(g,h,i)perylene	mg/kg	0.10	0.42
Total +ve PAH	mg/kg	0.050	6.6
Benzo(a)pyrene TEQ calc zero	mg/kg	0.50	0.72
Benzo(a)pyrene TEQ calc Half	mg/kg	0.50	0.77
Benzo(a)pyrene TEQ calc PQL	mg/kg	0.50	0.82
Surrogate p-Terphenyl-D14	%		*121*

Organochlorine Pesticides (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
alpha-BHC	mg/kg	0.10	<0.10
Hexachlorobenzene	mg/kg	0.10	<0.10
beta-BHC	mg/kg	0.10	<0.10
gamma-BHC	mg/kg	0.10	<0.10
delta-BHC	mg/kg	0.10	<0.10
Heptachlor	mg/kg	0.10	<0.10
Aldrin	mg/kg	0.10	<0.10
Heptachlor epoxide	mg/kg	0.10	<0.10
trans-Chlordane	mg/kg	0.10	<0.10
cis-Chlordane	mg/kg	0.10	<0.10
Endosulfan I	mg/kg	0.10	<0.10
4,4'-DDE	mg/kg	0.10	<0.10
Dieldrin	mg/kg	0.10	<0.10
Endrin	mg/kg	0.10	<0.10
4,4'-DDD	mg/kg	0.10	<0.10
Endosulfan II	mg/kg	0.10	<0.10
Endrin aldehyde	mg/kg	0.10	<0.10
4,4'-DDT	mg/kg	0.10	<0.10
Endosulfan sulfate	mg/kg	0.10	<0.10
Endrin ketone	mg/kg	0.10	<0.10
Methoxychlor	mg/kg	0.10	<0.10
Mirex	mg/kg	0.10	<0.10
Total +ve DDT+DDD+DDE	mg/kg	0.10	<0.10
Total +ve Aldrin + Dieldrin	mg/kg	0.10	<0.10
Total +ve OCP	mg/kg	0.10	<0.10
Surrogate 4-chloro-3-nitrobenzotrifluoride	%		*81.4*

Certificate of Analysis MGA0261

Organophosphorus Pesticides (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
Dichlorvos	mg/kg	0.10	<0.10
Dimethoate	mg/kg	0.10	<0.10
Diazinon	mg/kg	0.10	<0.10
Chlorpyrifos-methyl	mg/kg	0.10	<0.10
Ronnel	mg/kg	0.10	<0.10
Fenitrothion	mg/kg	0.10	<0.10
Malathion	mg/kg	0.10	<0.10
Chlorpyrifos	mg/kg	0.10	<0.10
Parathion	mg/kg	0.10	<0.10
Bromophos-ethyl	mg/kg	0.10	<0.10
Ethion	mg/kg	0.10	<0.10
Coumaphos	mg/kg	0.10	<0.10
Disulfoton	mg/kg	0.10	<0.10
Fenamiphos	mg/kg	0.10	<0.10
Fenthion	mg/kg	0.10	<0.10
Methidathion	mg/kg	0.10	<0.10
Mevinphos	mg/kg	0.10	<0.10
Parathion-methyl	mg/kg	0.10	<0.10
Phorate	mg/kg	0.10	<0.10
Phosalone	mg/kg	0.10	<0.10
Azinphos-methyl	mg/kg	0.10	<0.10
Surrogate 4-chloro-3-nitrobenzotrifluoride	%		*81.4*

Certificate of Analysis MGA0261

Polychlorinated Biphenyls (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
Aroclor 1016	mg/kg	0.10	<0.10
Aroclor 1221	mg/kg	0.10	<0.10
Aroclor 1232	mg/kg	0.10	<0.10
Aroclor 1242	mg/kg	0.10	<0.10
Aroclor 1248	mg/kg	0.10	<0.10
Aroclor 1254	mg/kg	0.10	<0.10
Aroclor 1260	mg/kg	0.10	<0.10
Total +ve PCB (1016-1260)	mg/kg	0.10	<0.10
Surrogate 2-Fluorobiphenyl	%		*89.7*

Certificate of Analysis MGA0261

Acid Extractable Metals (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
Arsenic	mg/kg	4.0	<4.0
Cadmium	mg/kg	0.40	<0.40
Chromium	mg/kg	1.0	12
Copper	mg/kg	1.0	18
Mercury	mg/kg	0.10	<0.10
Nickel	mg/kg	1.0	5.9
Lead	mg/kg	1.0	17
Zinc	mg/kg	1.0	60

Certificate of Analysis MGA0261

Inorganics - Moisture (Soil)

Envirolab ID	Units	PQL	MGA0261-01
Your Reference			SDUP202
Date Sampled			16/01/2025
Moisture	%	0.10	17

Method Summary

Method ID	Methodology Summary
INORG-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
METALS-020	Determination of various metals by ICP-OES.
METALS-021	Determination of Mercury by Cold Vapour AAS.
ORG-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
ORG-021/022/025_PCB	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS.
ORG-022	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.
ORG-022_OC	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and soils using DCM/Acetone/Methanol.
ORG-022_PAH	Determination of semi-volatile organic compounds (SVOCs) by GC-MS. Water samples are extracted by LLE and solids using DCM/Acetone/Methanol. For PAHs:- Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, for Total +ve calculations, the PQL is reflective of the lowest individual PQL and therefore, for example, "Total +ve PAHs" is simply a sum of the positive individual PAHs.
ORG-023_F1_TOT	Determination of volatile organic compounds (VOCs) by P&T-GC-MS. Water samples are analysed directly by purge and trap GC-MS. Solids are extracted with Methanol, diluted and analysed by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Result Definitions

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

Quality Control Definitions

Blank

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

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

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

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

Miscellaneous Information

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

Data Quality Assessment Summary MGA0261

Client Details

Client	JK Environments
Your Reference	E32976BT2
Date Issued	24/01/2025

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
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

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
vTRH&MBTEXN | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
sTRH | Soil	1	16/01/2025	22/01/2025	23/01/2025	Yes
PAH | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
OCP | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
OPP (21 list) | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
PCB | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
Metals | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
Metals-Hg | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes
Moisture | Soil	1	16/01/2025	22/01/2025	24/01/2025	Yes

Quality Control MGA0261

ORG-023_F1_TOT|Volatile TRH and BTEX (Soil) | Batch BGA2879

Analyte	Units	PQL	Blank	DUP1 BGA2879-DUP1# Samp | QC | RPD %	DUP2 BGA2879-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2879-MS2#
TRH C6-C9	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	99.3	97.1
TRH C6-C10	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	101	101
TRH C6-C10 less BTEX (F1)	mg/kg	25	<25	<25 | <25 | [NA]	<25 | <25 | [NA]	[NA]	[NA]
Methyl tert butyl ether (MTBE)	mg/kg	0.50	<0.50	<0.50 | <0.50 | [NA]	<0.50 | <0.50 | [NA]	[NA]	[NA]
Benzene	mg/kg	0.20	<0.20	<0.20 | <0.20 | [NA]	<0.20 | <0.20 | [NA]	86.5	87.7
Toluene	mg/kg	0.50	<0.50	<0.50 | <0.50 | [NA]	<0.50 | <0.50 | [NA]	92.8	97.0
Ethylbenzene	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	90.9	95.5
meta+para Xylene	mg/kg	2.0	<2.0	<2.0 | <2.0 | [NA]	<2.0 | <2.0 | [NA]	95.1	101
ortho-Xylene	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	88.3	97.9
Total Xylene	mg/kg	3.0	<3.0	<3.0 | <3.0 | [NA]	<3.0 | <3.0 | [NA]	[NA]	[NA]
Naphthalene (value used in F2 calc)	mg/kg	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	[NA]	[NA]
Surrogate aaa-Trifluorotoluene	*%*		*94.3*	*86.8 | 87.6*	*85.8 | 86.8*	*96.1*	*93.3*

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

ORG-020|Semi-volatile TRH (Soil) | Batch BGA2880

Analyte	Units	PQL	Blank	DUP1 BGA2880-DUP1# Samp | QC | RPD %	DUP2 BGA2880-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2880-MS1#
TRH C10-C14	mg/kg	50	<50	<50 | <50 | [NA]		106	102
TRH C15-C28	mg/kg	100	<100	<100 | <100 | [NA]		85.5	86.2
TRH C29-C36	mg/kg	100	<100	<100 | <100 | [NA]		99.0	102
TRH >C10-C16	mg/kg	50	<50	<50 | <50 | [NA]		84.6	82.4
TRH >C16-C34 (F3)	mg/kg	100	<100	<100 | <100 | [NA]		87.8	88.9
TRH >C34-C40 (F4)	mg/kg	100	<100	<100 | <100 | [NA]		95.0	97.7
Surrogate o-Terphenyl	*%*		*70.9*	*70.1 | 69.9*		*134*	*132*

Analyte	Units	PQL	Blank	DUP3 BGA2880-DUP3# Samp | QC | RPD %	DUP4 BGA2880-DUP4# Samp | QC | RPD %	LCS %
TRH C10-C14	mg/kg	50		<50 | <50 | [NA]		[NA]
TRH C15-C28	mg/kg	100		<100 | <100 | [NA]		[NA]
TRH C29-C36	mg/kg	100		102 | 139 | [NA]		[NA]
TRH >C10-C16	mg/kg	50		<50 | <50 | [NA]		[NA]
TRH >C16-C34 (F3)	mg/kg	100		<100 | 122 | [NA]		[NA]
TRH >C34-C40 (F4)	mg/kg	100		<100 | <100 | [NA]		[NA]
Surrogate o-Terphenyl	*%*			*64.9 | 67.4*		*[NA]*

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

Quality Control MGA0261

ORG-022_PAH | Polycyclic Aromatic Hydrocarbons (Soil) | Batch BGA2880

Analyte	Units	PQL	Blank	DUP1 BGA2880-DUP1# Samp | QC | RPD %	DUP2 BGA2880-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2880-MS2#
Naphthalene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		104	106
Acenaphthylene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Acenaphthene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		112	114
Fluorene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		107	110
Phenanthrene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		106	109
Anthracene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Fluoranthene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		107	112
Pyrene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		112	116
Benzo(a)anthracene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Chrysene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		103	107
Benzo(b,j,k)fluoranthene	mg/kg	0.20	<0.20	<0.20 | <0.20 | [NA]		[NA]	[NA]
Benzo(a)pyrene	mg/kg	0.050	<0.050	<0.050 | <0.050 | [NA]		97.4	107
Indeno(1,2,3-c,d)pyrene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Dibenzo(a,h)anthracene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Benzo(g,h,i)perylene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Surrogate p-Terphenyl-D14	*%*		*114*	*111 | 111*		*116*	*114*

Analyte	Units	PQL	Blank	DUP3 BGA2880-DUP3# Samp | QC | RPD %	DUP4 BGA2880-DUP4# Samp | QC | RPD %	LCS %
Naphthalene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Acenaphthylene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Acenaphthene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fluorene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phenanthrene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Anthracene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fluoranthene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Pyrene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Benzo(a)anthracene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Chrysene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Benzo(b,j,k)fluoranthene	mg/kg	0.2		<0.20 | <0.20 | [NA]		[NA]
Benzo(a)pyrene	mg/kg	0.05		<0.050 | <0.050 | [NA]		[NA]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Dibenzo(a,h)anthracene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Benzo(g,h,i)perylene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Surrogate p-Terphenyl-D14	*%*			*120 | 123*		*[NA]*

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

Quality Control MGA0261

ORG-022_OC | Organochlorine Pesticides (Soil) | Batch BGA2880

Analyte	Units	PQL	Blank	DUP1 BGA2880-DUP1# Samp | QC | RPD %	DUP2 BGA2880-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2880-MS2#
alpha-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		98.1	104
Hexachlorobenzene	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
beta-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		93.3	98.0
gamma-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
delta-BHC	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Heptachlor	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		110	113
Aldrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		106	109
Heptachlor epoxide	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		113	115
trans-Chlordane	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
cis-Chlordane	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endosulfan I	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
4,4'-DDE	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		117	120
Dieldrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		103	107
Endrin	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		92.4	99.5
4,4'-DDD	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		111	117
Endosulfan II	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endrin aldehyde	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
4,4'-DDT	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Endosulfan sulfate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		113	117
Endrin ketone	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Methoxychlor	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Mirex	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*		*84.1*	*81.2 | 83.1*		*84.2*	*85.3*

Analyte	Units	PQL	Blank	DUP3 BGA2880-DUP3# Samp | QC | RPD %	DUP4 BGA2880-DUP4# Samp | QC | RPD %	LCS %
alpha-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Hexachlorobenzene	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
beta-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
gamma-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
delta-BHC	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Heptachlor	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aldrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Heptachlor epoxide	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
trans-Chlordane	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
cis-Chlordane	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan I	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDE	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Dieldrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDD	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan II	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin aldehyde	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
4,4'-DDT	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endosulfan sulfate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Endrin ketone	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Methoxychlor	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Mirex	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*			*81.4 | 84.6*		*[NA]*

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

Quality Control MGA0261

ORG-022 | Organophosphorus Pesticides (Soil) | Batch BGA2880

Analyte	Units	PQL	Blank	DUP1 BGA2880-DUP1# Samp | QC | RPD %	DUP2 BGA2880-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2880-MS2#
Dichlorvos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		103	102
Dimethoate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Diazinon	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Chlorpyrifos-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		105	106
Ronnel	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		113	114
Fenitrothion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		86.8	93.9
Malathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		98.4	104
Chlorpyrifos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		103	105
Parathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		83.9	89.9
Bromophos-ethyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Ethion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		86.4	92.1
Coumaphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Disulfoton	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Fenamiphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Fenthion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Methidathion	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Mevinphos	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Parathion-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Phorate	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Phosalone	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Azinphos-methyl	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*		*84.1*	*81.2 | 83.1*		*84.2*	*85.3*

Analyte	Units	PQL	Blank	DUP3 BGA2880-DUP3# Samp | QC | RPD %	DUP4 BGA2880-DUP4# Samp | QC | RPD %	LCS %
Dichlorvos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Dimethoate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Diazinon	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Chlorpyrifos-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Ronnel	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenitrothion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Malathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Chlorpyrifos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Parathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Bromophos-ethyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Ethion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Coumaphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Disulfoton	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenamiphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Fenthion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Methidathion	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Mevinphos	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Parathion-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phorate	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Phosalone	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Azinphos-methyl	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Surrogate 4-chloro-3-nitrobenzotrifluoride	*%*			*81.4 | 84.6*		*[NA]*

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

Quality Control MGA0261

ORG-021/022/025_PCB | Polychlorinated Biphenyls (Soil) | Batch BGA2880

Analyte	Units	PQL	Blank	DUP1 BGA2880-DUP1# Samp | QC | RPD %	DUP2 BGA2880-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2880-MS2#
Aroclor 1016	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1221	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1232	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1242	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1248	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1254	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
Aroclor 1260	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		[NA]	[NA]
PCB C103	mg/kg			0.00 | 0.00 | [NA]		138	137
Surrogate 2-Fluorobiphenyl	*%*		*96.3*	*88.9 | 90.9*		*96.1*	*95.0*

Analyte	Units	PQL	Blank	DUP3 BGA2880-DUP3# Samp | QC | RPD %	DUP4 BGA2880-DUP4# Samp | QC | RPD %	LCS %
Aroclor 1016	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1221	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1232	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1242	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1248	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1254	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Aroclor 1260	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
PCB C103	mg/kg			0.00 | 0.00 | [NA]		[NA]
Surrogate 2-Fluorobiphenyl	*%*			*89.2 | 91.8*		*[NA]*

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

METALS-020 | Acid Extractable Metals (Soil) | Batch BGA2878

Analyte	Units	PQL	Blank	DUP1 BGA2878-DUP1# Samp | QC | RPD %	DUP2 BGA2878-DUP2# Samp | QC | RPD %	LCS %	Spike % BGA2878-MS1#
Arsenic	mg/kg	4.0	<4.0	<4.0 | <4.0 | [NA]		107	100
Cadmium	mg/kg	0.40	<0.40	<0.40 | <0.40 | [NA]		96.2	82.4
Chromium	mg/kg	1.0	<1.0	33.3 | 33.4 | 0.215		97.6	91.9
Copper	mg/kg	1.0	<1.0	14.0 | 14.6 | 4.59		100	114
Lead	mg/kg	1.0	<1.0	13.2 | 13.6 | 3.00		101	84.0
Mercury	mg/kg	0.10	<0.10	<0.10 | <0.10 | [NA]		102	99.4
Nickel	mg/kg	1.0	<1.0	13.8 | 15.5 | 11.4		96.5	96.0
Zinc	mg/kg	1.0	<1.0	19.8 | 20.9 | 5.28		96.4	85.8

Analyte	Units	PQL	Blank	DUP3 BGA2878-DUP3# Samp | QC | RPD %	DUP4 BGA2878-DUP4# Samp | QC | RPD %	LCS %
Arsenic	mg/kg	4		5.71 | 5.79 | [NA]		[NA]
Cadmium	mg/kg	0.4		<0.40 | <0.40 | [NA]		[NA]
Chromium	mg/kg	1		23.4 | 25.0 | 6.94		[NA]
Copper	mg/kg	1		16.8 | 15.2 | 10.4		[NA]
Lead	mg/kg	1		26.2 | 27.7 | 5.36		[NA]
Mercury	mg/kg	0.1		<0.10 | <0.10 | [NA]		[NA]
Nickel	mg/kg	1		16.3 | 17.6 | 7.44		[NA]
Zinc	mg/kg	1		37.1 | 36.2 | 2.43		[NA]

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

INORG-008 | Inorganics - Moisture (Soil) | Batch BGA2874

Analyte	Units	PQL	Blank	DUP1 BGA2874-DUP1# Samp | QC | RPD %	DUP2 BGA2874-DUP2# Samp | QC | RPD %	LCS %
Moisture	%	0.1		12.6 | 10.1 | 21.4	11.4 | 11.1 | 2.49	[NA]

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

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

Sample Receipt Advice MGA0261

Client Details

Client	JK Environments
Attention	Katrina Taylor

Sample Login Details

Your Reference	E32976BT2
Envirolab Reference	MGA0261
Date Sample Received	21/01/2025
Date Instructions Received	21/01/2025
Date Final Results Expected	28/01/2025

Sample Condition

Samples received in appropriate condition for analysis	Yes
Number of Samples	1 Soil
Turnaround Time	4 Days
Temperatures / Cooling Methods	19.8°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:

Chris De Luca

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

Tianna Milburn

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

Analysis underway, details on the following page

Sample Receipt Advice MGA0261

Analysis Grid

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

	Combination 6	Moisture
MGA0261-01 Soil | 16/01/2025 SDUP202	•	•

Suite Details

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

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E32976BT2 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: Katrina Taylor KTaylor@jkenvironments.com.au

Location: Kogarah
Sampler: VR/JTL

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6a NEPM	#3	Asbestos (detection)	#6	BTEX
15/01/2025	1	BH203	0.1-0.2	G, A	0.2	F: silty sand	X				
15/01/2025	2	BH203	0.3-0.4	G, A	0	F: silty sandy clay		X			
15/01/2025	3	BH203	0.8-1	G, A	0	SANDSTONE					
16/01/2025	4	BH207	0-0.1	G, A	0	F: silty sand	X				
16/01/2025	5	BH207	0.2-0.3	G	0.1	SANDSTONE					
16/01/2025	6	BH210	0.05-0.1	G, A	1	F: gravel	X				
16/01/2025	7	BH210	0.2-0.3	G, A	0.5	F: silty sand					
16/01/2025	8	BH210	0.55-0.6	G, A	1.8	F: silty sandy clay		X			
16/01/2025	9	BH211	0.05-0.1	G, A	0.1	F: gravel					
16/01/2025	10	BH211	0.2-0.3	G, A	0	F: silty sand	X				
16/01/2025	11	BH212	0.1-0.15	G, A	0	F: gravel	X				
16/01/2025	12	BH212	0.2-0.4	G, A	0	F: silty sand					
16/01/2025	13	BH214	0.05-0.15	G, A	0.1	F: gravel					
16/01/2025	14	BH214	0.2-0.3	G, A	0.4	F: silty sand	X				
16/01/2025	15	BH214	0.3-0.4	G, A	0.5	F: silty sand		X			
15/01/2025	16	BH215	0-0.1	G, A	0	F: silty sand	X				
15/01/2025	17	BH215	0.2-0.3	G, A	0	F: silty sand		X			
15/01/2025	18	BH216	0-0.1	G, A	0	F: silty sand	X				
15/01/2025	19	BH216	0.1-0.2	G, A	0	F: silty sand					
15/01/2025	20	BH216	0.5-0.7	G, A	0	F: silty sand					
15/01/2025	21	BH216	1-1.3	G, A	0	F: sandy clay		X			
15/01/2025	22	BH216	1.3-1.4	G	0	F: sandy clay					
15/01/2025	23	BH217	0-0.1	G, A	0	F: silty sand	X				
15/01/2025	24	BH217	0.2-0.3	G, A	0.2	F: silty sand		X			
15/01/2025	25	BH217	0.5-0.6	G, A	0.8	F: silty sand					

Envirolab Services
25 Research Drive
Croydon South VIC 3136
Ph: (03) 9763 2500
Job No: MGA0261
Date Received: 21/1/25
Time Received: 12:58pm
Received By: AG
Temp: Cool/Ambient 19.8°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 370762
Date Received: 17/1/25
Time Received: 1655
Received By: DW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

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

Relinquished By:	Date:	Time:	Received By:	Date:
O.Williak ELS SYD	20/1/25 1130.	1655	O.Williak	17/1/25

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: **E32976BT2** 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: **Katrina Taylor** KTaylor@jkenvironments.com.au

Location:	**Kogarah**	Sample Preserved in Esky on Ice
Sampler:	**VR/JTL**	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	#6a NEPM	#3	Asbestos (detection)	#6	BTEX							
15/01/2025	26	BH219	0-0.1	G, A	0	F: silty sand	X											
15/01/2025	27	BH219	0.2-0.3	G, A	0.1	F: silty sand												
15/01/2025	28	BH219	0.5-0.6	G, A	0.3	F: silty sand	X											
15/01/2025	29	BH219	0.7-1	G, A	1.7	F: silty sand												
15/01/2025	30	SDUP201	-	G	NA	DUPLICATE				X								
16/01/2025	SIO	SDUP202	-	G	NA	DUPLICATE				X	Please send to Envirolab VIC							
15/01/2025	31	TS-S201	-	V	NA	TRIP SPIKE					X							
15/01/2025	32	TB-S201	-	V	NA	TRIP BLANK		X										
16/01/2025	33	FR-HA-201	-	#3	NA	RINSATE		X										
17/01/2025	NR	FR-SPT-201	-	#3	NA	RINSATE		X										

Remarks (comments/detection limits required):		Sample Containers:	
Please send to Envirolab VIC TS-S201 broke during transit		G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag	370762 17/1/25
Relinquished By: O-WIICIQU ELIQIO	Date: 20/1/23 1130-	Time:	Received By:	Date: CW

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

CERTIFICATE OF ANALYSIS 372949

Client Details

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

Sample Details

Your Reference	**E32976BT2, Kogarah**
Number of Samples	6 Water
Date samples received	13/02/2025
Date completed instructions received	13/02/2025

Analysis Details

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

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

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

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

Report Details

Date results requested by	20/02/2025
Date of Issue	27/02/2025
Reissue Details	This report replaces R00 created on 20/02/2025 due to: Sample ID Amended (Client Request)
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***	

Results Approved By
Giovanni Agosti, Group Technical Manager
Liam Timmins, Organics Supervisor
Nancy Zhang, Laboratory Manager, Sydney
Sean McAlary, Senior Chemist
Tabitha Roberts, Senior Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

VOCs in water					
Our Reference		372949-1	372949-2	372949-3	372949-4
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water
Date Extracted	-	14/02/2025	14/02/2025	14/02/2025	14/02/2025
Date Analysed	-	15/02/2025	15/02/2025	15/02/2025	15/02/2025
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	4	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Benzene	µg/L	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1

VOCs in water					
Our Reference		372949-1	372949-2	372949-3	372949-4
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water
Bromoform	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
Styrene	µg/L	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1
o-xylene	µg/L	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1
Isopropylbenzene	µg/L	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	113	107	107	105
Surrogate Toluene-d8	%	96	96	96	96
Surrogate 4-Bromofluorobenzene	%	103	103	107	106

vTRH(C6-C10)/BTEXN in Water						
Our Reference		372949-1	372949-2	372949-3	372949-4	372949-5
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201	TB-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	14/02/2025	14/02/2025	14/02/2025	14/02/2025	14/02/2025
Date analysed	-	15/02/2025	15/02/2025	15/02/2025	15/02/2025	15/02/2025
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	113	107	107	105	94
Surrogate Toluene-d8	%	96	96	96	96	95
Surrogate 4-Bromofluorobenzene	%	103	103	107	106	102

vTRH(C6-C10)/BTEXN in Water		
Our Reference		372949-6
Your Reference	UNITS	TS-201
Date Sampled		13/02/2025
Type of sample		Water
Date extracted	-	14/02/2025
Date analysed	-	15/02/2025
Benzene	µg/L	111%
Toluene	µg/L	111%
Ethylbenzene	µg/L	106%
m+p-xylene	µg/L	106%
o-xylene	µg/L	107%
Surrogate Dibromofluoromethane	%	104
Surrogate Toluene-d8	%	104
Surrogate 4-Bromofluorobenzene	%	100

svTRH (C10-C40) in Water						
Our Reference		372949-1	372949-2	372949-3	372949-4	372949-5
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201	TB-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	18/02/2025	18/02/2025	18/02/2025	18/02/2025	18/02/2025
Date analysed	-	19/02/2025	19/02/2025	19/02/2025	19/02/2025	19/02/2025
TRH C_{10} - C_{14}	µg/L	<50	<50	55	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	60	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	62	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	62	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	120	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	180	<50	<50
Surrogate o-Terphenyl	%	87	103	104	107	100

PAHs in Water						
Our Reference		372949-1	372949-2	372949-3	372949-4	372949-5
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201	TB-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	18/02/2025	18/02/2025	18/02/2025	18/02/2025	18/02/2025
Date analysed	-	19/02/2025	19/02/2025	19/02/2025	19/02/2025	19/02/2025
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	0.9	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	0.2	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	1.2	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	1.2	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	0.5	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	0.6	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	0.7	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	0.4	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	0.2	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	0.3	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	0.6	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	6.4	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	73	83	74	83	87

HM in water - dissolved					
Our Reference		372949-1	372949-2	372949-3	372949-4
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water
Date prepared	-	17/02/2025	17/02/2025	17/02/2025	17/02/2025
Date analysed	-	17/02/2025	17/02/2025	17/02/2025	17/02/2025
Arsenic-Dissolved	μg/L	1	5	<1	5
Cadmium-Dissolved	μg/L	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	μg/L	2	2	1	2
Copper-Dissolved	μg/L	<1	<1	2	<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	3	7	3
Zinc-Dissolved	μg/L	4	4	71	6

HM in water - total		
Our Reference		372949-5
Your Reference	UNITS	TB-201
Date Sampled		13/02/2025
Type of sample		Water
Date prepared	-	17/02/2025
Date analysed	-	17/02/2025
Arsenic-Total	µg/L	<1
Cadmium-Total	µg/L	<0.1
Chromium-Total	µg/L	<1
Copper-Total	µg/L	<1
Lead-Total	µg/L	<1
Mercury-Total	µg/L	<0.05
Nickel-Total	µg/L	<1
Zinc-Total	µg/L	<1

PFAS in Waters Trace Extended						
Our Reference		372949-1	372949-2	372949-3	372949-4	372949-5
Your Reference	UNITS	MW203	MW207	MW208	GWDUP-201	TB-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	17/02/2025	17/02/2025	18/02/2025	18/02/2025	18/02/2025
Date analysed	-	17/02/2025	17/02/2025	18/02/2025	18/02/2025	18/02/2025
Perfluorobutanesulfonic acid	µg/L	0.002	0.001	0.002	0.001	<0.0004
Perfluoropentanesulfonic acid	µg/L	<0.001	<0.001	0.001	<0.001	<0.001
Perfluorohexanesulfonic acid - PFHxS	µg/L	<0.0002	<0.0002	0.0037	0.001	<0.0002
Perfluoroheptanesulfonic acid	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorooctanesulfonic acid PFOS	µg/L	0.0029	<0.0002	0.0044	<0.0002	<0.0002
Perfluorodecanesulfonic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorobutanoic acid	µg/L	<0.02	<0.02	<0.02	<0.02	<0.002
Perfluoropentanoic acid	µg/L	<0.01	<0.01	0.005	<0.01	<0.002
Perfluorohexanoic acid	µg/L	0.003	0.002	0.0096	0.004	<0.0004
Perfluoroheptanoic acid	µg/L	0.002	0.002	0.0049	0.001	<0.0004
Perfluorooctanoic acid PFOA	µg/L	0.0022	0.002	0.0048	0.002	<0.0002
Perfluorononanoic acid	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluorodecanoic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoroundecanoic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorododecanoic acid	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Perfluorotridecanoic acid	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
4:2 FTS	µg/L	<0.001	<0.001	<0.002	<0.002	<0.001
6:2 FTS	µg/L	0.003	0.001	<0.0004	0.002	<0.0004
8:2 FTS	µg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
10:2 FTS	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluorooctane sulfonamide	µg/L	<0.01	<0.01	<0.02	<0.02	<0.01
N-Methyl perfluorooctane sulfonamide	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctanesulfon amide	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
N-Me perfluorooctanesulfonamid oethanol	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Et perfluorooctanesulfonamid oethanol	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
MePerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
EtPerfluorooctanesulf- amid oacetic acid	µg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Surrogate $^{13}C_8$ PFOS	%	96	107	116	119	100
Surrogate $^{13}C_2$ PFOA	%	97	92	90	86	89
Extracted ISTD $^{13}C_3$ PFBS	%	88	89	75	69	69
Extracted ISTD $^{18}O_2$ PFHxS	%	103	103	80	74	81
Extracted ISTD $^{13}C_4$ PFOS	%	75	69	100	97	92
Extracted ISTD $^{13}C_4$ PFBA	%	#	#	#	#	88

PFAS in Waters Trace Extended						
Our Reference	UNITS	372949-1	372949-2	372949-3	372949-4	372949-5
Your Reference		MW203	MW207	MW208	GWDUP-201	TB-201
Date Sampled		13/02/2025	13/02/2025	13/02/2025	13/02/2025	13/02/2025
Type of sample		Water	Water	Water	Water	Water
Extracted ISTD $^{13}C_3$ *PFPeA*	%	31	36	65	31	86
Extracted ISTD $^{13}C_2$ *PFHxA*	%	52	58	56	47	84
Extracted ISTD $^{13}C_4$ *PFHpA*	%	64	75	77	70	86
Extracted ISTD $^{13}C_4$ *PFOA*	%	84	91	91	86	88
Extracted ISTD $^{13}C_5$ *PFNA*	%	89	93	89	84	77
Extracted ISTD $^{13}C_2$ *PFDA*	%	103	102	119	115	92
Extracted ISTD $^{13}C_2$ *PFUnDA*	%	96	85	103	101	85
Extracted ISTD $^{13}C_2$ *PFDoDA*	%	77	71	93	93	88
Extracted ISTD $^{13}C_2$ *PFTeDA*	%	94	87	84	103	58
Extracted ISTD $^{13}C_2$ *4:2FTS*	%	67	70	48	44	75
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	120	129	78	72	75
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	133	125	115	107	97
Extracted ISTD $^{13}C_8$ *FOSA*	%	95	103	37	39	57
Extracted ISTD d_3 *N MeFOSA*	%	118	113	113	118	114
Extracted ISTD d_5 *N EtFOSA*	%	119	114	115	114	113
Extracted ISTD d_7 *N MeFOSE*	%	115	113	117	119	116
Extracted ISTD d_9 *N EtFOSE*	%	112	115	112	110	107
Extracted ISTD d_3 *N MeFOSAA*	%	90	81	#	139	106
Extracted ISTD d_5 *N EtFOSAA*	%	145	130	155	129	113
Total Positive PFHxS & PFOS	µg/L	0.0029	<0.0002	0.0081	0.001	<0.0002
Total Positive PFOS & PFOA	µg/L	0.0051	0.002	0.0092	0.002	<0.0002
Total Positive PFAS	µg/L	0.014	0.0081	0.036	0.010	<0.0002

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. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
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.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date Extracted	-			14/02/2025	[NT]	[NT]	[NT]	[NT]	14/02/2025	[NT]
Date Analysed	-			15/02/2025	[NT]	[NT]	[NT]	[NT]	15/02/2025	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Dibromomethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	78	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Bromoform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	80	[NT]
Styrene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate Toluene-d8	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	104	[NT]	[NT]	[NT]	[NT]	101	[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	-			14/02/2025	[NT]	[NT]	[NT]	[NT]	14/02/2025	[NT]
Date analysed	-			15/02/2025	[NT]	[NT]	[NT]	[NT]	15/02/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	78	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	78	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	76	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	80	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate Toluene-d8	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	104	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	372949-2
Date extracted	-			18/02/2025	1	18/02/2025	18/02/2025		18/02/2025	18/02/2025
Date analysed	-			19/02/2025	1	19/02/2025	19/02/2025		19/02/2025	19/02/2025
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	113	121
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	109	128
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	114	102
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	113	121
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	109	128
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	114	102
Surrogate o-Terphenyl	%		Org-020	95	1	87	101	15	124	106

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	372949-2
Date extracted	-			18/02/2025	1	18/02/2025	18/02/2025		18/02/2025	18/02/2025
Date analysed	-			19/02/2025	1	19/02/2025	19/02/2025		19/02/2025	19/02/2025
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	79
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	86	85
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	82
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	77
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	85	84
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	84
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	96	94
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	69	69
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	80	1	73	74	1	61	66

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			17/02/2025	1	17/02/2025	17/02/2025		17/02/2025	[NT]
Date analysed	-			17/02/2025	1	17/02/2025	17/02/2025		17/02/2025	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	84	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	87	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	95	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	86	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	116	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	92	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	94	[NT]

QUALITY CONTROL: HM in water - total					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			17/02/2025	[NT]	[NT]	[NT]	[NT]	17/02/2025	[NT]
Date analysed	-			17/02/2025	[NT]	[NT]	[NT]	[NT]	17/02/2025	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Copper-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Lead-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	113	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			17/02/2025	[NT]	[NT]	[NT]	[NT]	17/02/2025	[NT]
Date analysed	-			17/02/2025	[NT]	[NT]	[NT]	[NT]	17/02/2025	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	98	[NT]
Perfluoropentanesulfonic acid	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	99	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	88	[NT]
Perfluoroheptanesulfonic acid	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	98	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	95	[NT]
Perfluorodecanesulfonic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	88	[NT]
Perfluorobutanoic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	93	[NT]
Perfluoropentanoic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	87	[NT]
Perfluorohexanoic acid	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	83	[NT]
Perfluoroheptanoic acid	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	85	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	97	[NT]
Perfluorononanoic acid	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	86	[NT]
Perfluorodecanoic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	91	[NT]
Perfluoroundecanoic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	85	[NT]
Perfluorododecanoic acid	µg/L	0.005	Org-029	<0.005	[NT]	[NT]	[NT]	[NT]	98	[NT]
Perfluorotridecanoic acid	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	106	[NT]
Perfluorotetradecanoic acid	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	91	[NT]
4:2 FTS	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	80	[NT]
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	98	[NT]
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	80	[NT]
10:2 FTS	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	102	[NT]
Perfluorooctane sulfonamide	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	89	[NT]
N-Methyl perfluorooctane sulfonamide	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	95	[NT]
N-Ethyl perfluorooctanesulfon amide	µg/L	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
N-Me perfluorooctanesulfonamid oethanol	µg/L	0.05	Org-029	<0.05	[NT]	[NT]	[NT]	[NT]	86	[NT]
N-Et perfluorooctanesulfonamid oethanol	µg/L	0.5	Org-029	<0.5	[NT]	[NT]	[NT]	[NT]	91	[NT]
MePerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	109	[NT]
EtPerfluorooctanesulf- amid oacetic acid	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	90	[NT]
Surrogate $^{13}C_8$ PFOS	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	97	[NT]
Surrogate $^{13}C_2$ PFOA	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Extracted ISTD $^{13}C_3$ *PFBS*	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	90	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	112	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	97	[NT]	[NT]	[NT]	[NT]	97	[NT]
Extracted ISTD $^{13}C_4$ *PFBA*	%		Org-029	114	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD $^{13}C_3$ *PFPeA*	%		Org-029	115	[NT]	[NT]	[NT]	[NT]	103	[NT]
Extracted ISTD $^{13}C_2$ *PFHxA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_4$ *PFHpA*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	105	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	97	[NT]	[NT]	[NT]	[NT]	95	[NT]
Extracted ISTD $^{13}C_5$ *PFNA*	%		Org-029	95	[NT]	[NT]	[NT]	[NT]	101	[NT]
Extracted ISTD $^{13}C_2$ *PFDA*	%		Org-029	110	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_2$ *PFUnDA*	%		Org-029	112	[NT]	[NT]	[NT]	[NT]	104	[NT]
Extracted ISTD $^{13}C_2$ *PFDoDA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD $^{13}C_2$ *PFTeDA*	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	84	[NT]
Extracted ISTD $^{13}C_2$ *4:2FTS*	%		Org-029	142	[NT]	[NT]	[NT]	[NT]	137	[NT]
Extracted ISTD$^{13}C_2$ *6:2FTS*	%		Org-029	141	[NT]	[NT]	[NT]	[NT]	120	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	152	[NT]	[NT]	[NT]	[NT]	139	[NT]
Extracted ISTD $^{13}C_8$ *FOSA*	%		Org-029	113	[NT]	[NT]	[NT]	[NT]	100	[NT]
Extracted ISTD d_3 *N MeFOSA*	%		Org-029	109	[NT]	[NT]	[NT]	[NT]	109	[NT]
Extracted ISTD d_5 *N EtFOSA*	%		Org-029	115	[NT]	[NT]	[NT]	[NT]	110	[NT]
Extracted ISTD d_7 *N MeFOSE*	%		Org-029	116	[NT]	[NT]	[NT]	[NT]	114	[NT]

QUALITY CONTROL: PFAS in Waters Trace Extended					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Extracted ISTD d_9 *N EtFOSE*	%		Org-029	110	[NT]	[NT]	[NT]	[NT]	111	[NT]
Extracted ISTD d_3 *N MeFOSAA*	%		Org-029	108	[NT]	[NT]	[NT]	[NT]	99	[NT]
Extracted ISTD d_5 *N EtFOSAA*	%		Org-029	173	[NT]	[NT]	[NT]	[NT]	134	[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

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Katrina Taylor

Sample Login Details	
Your reference	E32976BT2, Kogarah
Envirolab Reference	372949
Date Sample Received	13/02/2025
Date Instructions Received	13/02/2025
Date Results Expected to be Reported	20/02/2025

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	3
Cooling Method	Ice
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	HM in water - dissolved	HM in water - total	PFAS in Waters Trace Extended
BH203	✓	✓	✓	✓	✓		✓
BH207	✓	✓	✓	✓	✓		✓
BH208	✓	✓	✓	✓	✓		✓
GWDUP-201	✓	✓	✓	✓	✓		✓
TB-201		✓	✓	✓		✓	✓
TS-201		✓					

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: E32976BT2 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: Katrina Taylor ktaylor@jkenvironments.com.au

Location: Kogarah, NSW

Sampler: VR

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 3	VOCs	PFAS	BTEX
13/02/2025	1	BH203	## & 2x PFAS	0	Groundwater	X	X	X	
13/02/2025	2	BH207	## & 2x PFAS	0	Groundwater	X	X	X	
13/02/2025	3	BH208	## & 2x PFAS	0.7	Groundwater	X	X	X	
13/02/2025	4	GWDUP-201	## & 2x PFAS	*	Duplicate	X	X	X	
13/02/2025	5	TB-201	## & 2x PFAS	-	Trip Blank	X		X	
13/02/2025	6	TS-201	1x Vial	-	Trip Spike				X

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 372949
Date Received: 13/2/25
Time Received: 1540
Received By: KW
Temp: Cool/Ambient 3°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Sample Containers:
= 2x 100mL Amber Glass Bottle, 4x Vials, 2x HNO3, 1x Plastic

Relinquished By:	Date:	Time:	Received By:	Date:
V.Neason	13/2/25 / 1.05pm	13/2/25	Katy Wayne	1540

Appendix E: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[22] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[23]. 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;

---

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

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

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix F: Data (QA/QC) Evaluation

Data (QA/QC) Evaluation

A. INTRODUCTION

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

1. Field and Laboratory Considerations

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

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

2. Field QA/QC Samples and Analysis

The results for the field QA/QC samples are detailed in the laboratory summary tables (Table Q1 to Table Q3 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 Groundwater	 1 1	 Approximately 4% of primary samples Approximately 33% of primary samples
Inter-laboratory duplicate Soil	 1	 Approximately 4% of primary samples
Trip spikes Soil Water	 1 1	One for each media for the investigation to demonstrate adequacy of preservation, storage and transport methods
Trip blanks Soil Water	 1 1	One for each media for the investigation to demonstrate adequacy of 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.

An inter-laboratory duplicate groundwater sample was not obtained due to mis-communication with the field staff. JKE is of the opinion that this is not significant when considering data precision overall, and it does not affect the quality of the dataset as a whole or the outcome of the 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, with the exception of some PAH and VOC PQLs for groundwater analysis. JKE is of the opinion that this is not significant, and it does not affect the quality of the dataset as a whole or the outcome of the investigation. However, due to the detections of PAHs in one groundwater sample (including anthracene), an additional round of sampling has been recommended to confirm this.

3. Field QA/QC Sample Results

Field Duplicates

The results indicated that field precision was acceptable. RPD non-conformances were reported for some analytes as discussed below:
- Elevated RPDs were reported for several PAH compounds and nickel in SDUP101/BH217 (0-0.1m);
- Elevated RPDs were reported for several PAH compounds, lead, nickel and zinc in SDUP202/BH207 (0-0.1m); and
- Elevated RPDs were reported for zinc and several PFAS compounds in GW-DUP201/MW207.

Values outside the acceptable limits have predominantly been attributed to concentrations close to the PQL which amplifies RPD exceedances. Some results have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogeneous matrices. Where applicable, the higher duplicate value has been adopted as a conservative measure (see attached report tables), so there have been no adverse effects on the risk assessment process.

Field/Trip Blanks

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

Rinsates

The detectable concentration of light fraction TRH is attributed the use of plastic containers as noted in the Envirolab report 370762.

Trip Spikes

The soil trip spike results ranged from 81% to 82% and indicated that field preservation methods were appropriate.

The water trip spike results ranged from 106% to 111% 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.

Envirolab report 370762

- The RPD for PAHs duplicate results was accepted due to the non-homogenous nature of samples;
- The laboratory RPD acceptance criteria were exceeded for lead in one sample. Therefore, a triplicate result was issued;
- The laboratory RPD acceptance criteria were exceeded for nickel in one sample. Therefore, a triplicate result was issued;
- Percent recovery for metals was not applicable due to the high concentration of the elements in the samples. However, an acceptable recovery was obtained for the LCS; and
- Percent recovery was not possible to report for metals due to the inhomogeneous nature of the elements in the sample/s. However, an acceptable recovery was obtained for the LCS.

Envirolab report 372949

- For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

Overall, the laboratory QA/QC identified some relatively minor non-conformances that occurred in a relatively small portion of the dataset. In our opinion the non-conformances do not compromise the precision and accuracy of the data to the extent that they are unacceptable.

A. 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 was 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. This has been considered in the discussion of the report and the need for an additional round of groundwater sampling has been noted.

Appendix G: Field Work Documents

JKE SAQP

APPENDIX G - SAQP

REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

SAMPLING ANALYSIS AND QUALITY PLAN FOR DETAILED SITE INVESTIGATION

FOR

PROPOSED ALTERATIONS AND ADDITIONS

AT

KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Date: 6 January 2025

Ref: E32976PTrpt3-SAQP

JKEnvironments

www.jkenvironments.com.au

T: +61 2 9888 5000

JK Environments Pty Ltd

ABN 90 633 911 403

ISO 9001 certified ISO 45001 certified ISO 14001 certified

Report prepared by:

Katrina Taylor
Senior Associate | Environmental Scientist

Report reviewed by:

Brendan Page
Principal | Environmental Scientist
CEnvP SC

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

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E32976PTrpt3-SAQP	Final Report	6 January 2025

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.

Table of Contents

List of Tables

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**
Before You Dig Australia	**BYDA**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Cis-1,2-dichloroethene	**cis-DCE**
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**
Environment Protection Authority	**EPA**
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**
Polychlorinated Biphenyls	**PCB**
Per-and Polyfluoroalkyl Substances	**PFAS**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**

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**
Volatile Organic Compounds	**VOC**
Vinyl Chloride	**VC**
World Health Organisation	**WHO**

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**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

NSW Department of Education ('the client') commissioned JK Environments (JKE) to prepare a Sampling Analysis and Quality Plan (SAQP) for the Detailed Site Investigation (DSI) to be undertaken by JKE for the proposed alterations and additions at Kogarah Public School, 24B Gladstone Street, Kogarah, 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 2a attached in the appendices.

JKE has previously undertaken a Phase 1 Desktop Assessment (desktop) and a Phase 2 Preliminary Intrusive Investigation (intrusive investigation) at the site. WSP has also previously prepared a Preliminary Desktop Site Investigation at the site. A summary of relevant information from these reports is included in Section 2.

1.1 Proposed Development Details

It is understood that the proposed development includes removal of all existing demountable teaching spaces across the site (refer to Figure 2a), and construction of a three-storey building and a new hall structure. A basement level is not proposed.

1.2 Aims and Objectives

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

The DSI objectives are to:

- Assess the current site conditions and use(s) via a site walkover inspection;
- 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 was prepared generally in accordance with a JK proposal (Ref: 32976LTrev1prop) of 13 December 2024 and written acceptance from the client.

The scope of work included review of the existing project information 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

JKE undertook previous investigations at the site and wider school property in 2020, and WSP undertook a previous investigation in 2023. The western portion of the wider school property does not form part of the site for the purpose of the DSI (see Figures 1 and 2a in Appendix A). A summary of relevant information from the previous investigations is outlined in the table below:

Table 2-1: Previous information summary

Report	Summary of relevant information
Phase 1 Desktop Assessment, 2020[3]	The desktop included review of site information, including: background and historical information; a walkover site inspection; and preparation of a report presenting the results of the assessment, including a CSM. Site history information indicated that residential style structures had been present on the site, and one of the lots within the site had been utilised as a bus depot. The site and wider school property was progressively developed into the primary school site from 1956. During this time, demolition of the original site structures occurred, along with potential filling of the site. The age of the former and existing buildings indicated the potential for hazardous building materials to be present. During the JKE site inspection, a fibre cement fragment (FCF) of suspected asbestos containing material (ACM) was identified on the site, and fill material (i.e. imported/disturbed soils) was also observed at the site surface in several areas. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/areas of environmental concern (AEC): • Fill material - It was considered possible that minor historical filling had occurred to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It was also considered possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment; • Historical use as a bus depot - Historical title records indicated that the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Fuels, oils and solvents (e.g. toluene/mineral spirit/thinners) may have been used during this site use; • Use of pesticides - Pesticides may have been used beneath the buildings and/or around the site; • Hazardous building materials (i.e. asbestos containing material - ACM) - 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. Hazardous building materials can also occur in fill due to historical demolition activities; and • Up-gradient off-site historical dry cleaners and motor garage/service stations – historical business directories indicated that several of these businesses were located upgradient of the site and may pose a risk to the site via migration of contaminated groundwater. The desktop recommended undertaking a preliminary intrusive investigation to make an initial assessment of contamination-related risks and to inform the design of a detailed (Stage 2) site investigation (DSI).

[3] JKE, (2020a). *Report to School Infrastructure NSW on Phase 1 Desktop Assessment for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt-KPS, dated 28 February 2020) (referred to as desktop)

Report	Summary of relevant information
Phase 2 Preliminary Intrusive Investigation, 2020[4]	The intrusive investigation included a review of existing project information, a site inspection, and soil sampling from 10 boreholes, of which four were located on the current site, including BH107 to BH110 inclusive (refer to Figure 2a). Fill material was encountered to depths of between approximately 0.2m below ground level (BGL) and 1.7m BGL, underlain by natural residual sandy soils. The fill contained inclusions of igneous and ironstone gravel, glass fragments, sand and root fibres. A selection of soil samples was analysed for the contaminants of potential concern (CoPC) identified in the CSM. A surficial fibre cement fragment (FCF) was identified in the south of the site as shown on Figure 2a. The surficial FCF was removed from the site (as sample FCF-1) by JKE during the desktop was also analysed and was found to contain asbestos. Based on the data from the intrusive investigation, JKE was of the opinion that the potential risk of widespread subsurface contamination in the intrusive investigation area was low as the soil samples analysed did not identify contamination that was assessed to pose an unacceptable risk. FCF-1 was non-friable ACM. The source of the asbestos appeared to be a fibre cement board at the base of the neighbouring fence and was considered unlikely to be associated with on-site soils in that vicinity. The ACM was removed and no further fragments were identified in the area. The intrusive investigation report recommended that the investigation data obtained should be supplemented via a detailed investigation in order to fully characterise the contamination conditions at the site and establish whether remediation is required.
Site Contamination Services – Preliminary Desktop Site Investigation, 2023[5]	The PSI comprised a desktop study to review general site details, site environmental setting and history, regulatory databases and client provided reports and information. The site history review was limited to historical aerial photographs and publicly available information on online databases. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/areas of environmental concern (AEC): • Uncontrolled fill materials potentially used historically to raise or level portions of the site; • Historical or recent waste dumping; • Potential ACM or hazardous building materials associated with imported materials or demolished structures; and • Pesticides used historically and recently to maintain the site. The report concluded that the site presented a low to moderate risk of inground contamination due to the potential for uncontrolled fill and poor demolition practices associated with historic development and demolition of residential buildings on the site. It is noted that the investigation did not include a site inspection.

[4] JKE, (2020b). *Report to School Infrastructure NSW on Phase 2 Preliminary Intrusive Investigation for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt2-KPS, dated 8 May 2020) (referred to as intrusive investigation)

[5] WSP, (2023). *Report to School Infrastructure NSW on Site Contamination Services – Preliminary Desktop Site Investigation, Kogarah Public School.* (Project Ref: PS206292, report dated 7 December 2023) (referred to as WSP PSI)

2.2 Site Identification

Table 2-2: Site Identification

Site Address:	24B Gladstone Street, Kogarah, NSW
Lot & Deposited Plan:	Lot 1 in DP179779, Lot A in DP391026, and part of Lot 1 in DP667959.
Current Land Use:	Primary School (Kindergarten to year 6)
Proposed Land Use:	Continued use as a primary school
Local Government Area:	Georges River Council
Current Zoning:	SP2: Infrastructure
Site Area (m^2) (approx.):	4,375
Geographical Location (decimal degrees) (approx.):	Latitude: -33.9618430 Longitude: 151.1370970
Site Location Plans:	Appendix A

2.3 Site Location and Regional Setting

The site is located in the eastern portion of the existing Kogarah Public School property, which itself is in a mixed-use area of Kogarah and is bound by the Princes Highway to the east and Gladstone Street to the west. The site is located approximately 535m to the south-west of Muddy Creek and 1.7km to the west of Botany Bay.

2.4 Topography

The site is situated in gently undulating regional topography, with the site itself gently sloping towards the east at approximately 1° to 2°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.5 Site Inspection

The most recent walkover inspection of the site was undertaken by JKE on 23 March 202 as part of the intrusive investigation. A summary of the inspection findings is outlined below:

- At the time of the inspection, the site was occupied by the eastern portion of Kogarah Public School and included single storey buildings (demountable classrooms), a cover outdoor learning area, paved, soft-fall, and grass covered playground areas, and garden and landscaped areas;
- Several of the original school buildings on the wider school property, were constructed in the 1950s and are of an age indicative of housing hazardous building materials such as fibre cement/ACM and lead paint systems
- A single FCF was identified on the ground surface during the inspection (discussed in Section 2.1);

- Historical filling was suspected to have occurred. There were no other visible or olfactory indicators of contamination were observed during the inspection;
- Fill was observed at the ground surface in areas of exposed soils across the site. Imported material/fill was considered likely to be present in garden beds and as a result of general (minor) levelling works across the site; and
- Medium to large trees were observed around the site and a number of grass-covered sections of the site were also observed. Grass coverage was generally good in the unpaved areas, with the exception of some areas beneath large trees and isolated areas of the playground (generally around the interface with pavements).

2.6 Surrounding Land Use

During the 2020 site inspection, JKE observed the following land uses in the immediate surrounds of the school:

- North – low density residential properties, a construction site (at least two basement levels being excavated) and several retail commercial properties;
- South – low and medium density residential properties and Caltex Woolworths approximately 70m to the south and up-gradient;
- East – St Paul's Anglican Church (heritage), children's centre (church run), low density residential and beyond the Princes Highway medium density residential; and
- West – Medium to high density residential properties.

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 in preparation of this SAQP in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

2.8 Summary of Regional Geology and Hydrogeology

2.8.1 Regional Geology

Regional geological information reviewed for the previous investigations indicated that the site is underlain by underlain by Triassic aged deposits of medium to coarse-grained quartz sandstone, and very minor shale and laminate lenses (Hawksbury Sandstone).

A summary of the subsurface conditions encountered during the intrusive investigation is present in the table below:

Table 2-3: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic Concrete (AC) pavement was encountered at the surface in BH109 and was approximately 20mm in thickness.
Fill	Fill was encountered at the surface or beneath the pavement in all boreholes and extended to depths of between approximately 0.2mBGL to 1.7mBGL. The fill typically comprised silty sandy clay, sandy silt, clayey sandy gravel or silty sand with inclusions of igneous and ironstone gravel, glass fragments, sand and root fibres. Neither staining nor odours were encountered in the fill material during the fieldwork. No FCF/ACM was encountered in the fill material during the fieldwork.
Natural Soil	Natural clayey or sandy residual soil was encountered beneath the fill in BH107 and BH108 and extended to depths of between approximately 1.6mBGL and 3.2mBGL. BH107 was terminated in the natural soils at a depth of 3.2mBGL. Neither staining nor odours were encountered in the natural soils during the fieldwork.
Bedrock	Sandstone bedrock was encountered beneath the fill material or natural soils in BH108, BH109 and BH110 from depths of 0.2m to 1.6mBGL.
Groundwater	Groundwater seepage was encountered in boreholes BH107 and BH110 at depths of approximately 1.0mBGL and 3.5mBGL during drilling. All other boreholes remained dry during and on completion of drilling.

2.8.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation. (1997)[6].

The site is not mapped as being within an ASS risk area in the Georges River Local Environmental Plan 2021.

2.8.3 Hydrogeology

Hydrogeological information reviewed for the previous investigations indicated that the regional aquifer on-site and in the area immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There was a total of 521 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 397m from the site. This was utilised for domestic purposes;
- The majority of the bores were registered for domestic purposes;
- The drillers log information from the closest (within 500m) registered bores typically identified fill and/or sand and clay soil to depths of 3.65m-6.50m. Standing water levels (SWLs) in the bores ranged from 1.5m below ground level (BGL) to 3.0mBGL; and
- Groundwater is likely to be encountered at depths ranging from 3m to 5m below existing surface levels based on previous JKG investigations of nearby properties.

[6] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)*

Based on the above subsurface conditions at the site are expected to consist of relatively low permeability (residual) soils overlying relatively shallow bedrock. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable as indicated by the number of registered monitoring bores, 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 would generally expect groundwater to flow towards the north-east.

2.9 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Muddy Creek, a tributary of the Cooks River located approximately 535m to the north-east of the site. This is down-gradient from the site, and 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 – It is possible that minor historical filling has occurred to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It is also possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment. Fill material was encountered to depths of between 0.2m to 1.7mBGL across the site during the intrusive investigation.	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 bus depot land use – Historical title records indicated that the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Fuels, oils and solvents may have been used during this site use.	Heavy metals, TRH, and BTEX (solvents such as toluene and mineral spirits would be detectable via the TRH and BTEX analysis).
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.	Asbestos, lead and PCBs.
Off-site Area 1 (Dry Cleaners) – Historical business directories indicated that at least eight dry cleaner businesses were located upgradient of the site. These properties are considered to be potential sources of site contamination associated with groundwater migration.	Per-and polyfluoroalkyl substances (PFAS), TRHs and VOCs, including tetrachloroethene (also known as perchloroethylene - PCE) and the breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC).
Off-site Area 2 (Mechanics/Service Stations) – Historical business directories indicated that at least two motor mechanics/service station businesses were located up-gradient (south/south-west) of the site. These properties are considered to be potential sources of site contamination associated with groundwater migration.	Heavy metals (lead), TRH and BTEX.

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

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

Table 3-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination. The mechanisms for contamination from off-site sources could have occurred via 'top down' impacts and spills, or sub-surface release. Impacts to the site could occur via the migration of contaminated groundwater.
Affected media	Soil and groundwater have been identified as potentially affected media. At this stage, soil vapour is not being investigated. This is to be considered further in the event that potential vapour risks are identified via the soil and groundwater analysis.
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, and groundwater users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and ecology in down-gradient water bodies.
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, VOCs 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 direct/primary 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. Exposure to groundwater may occur in Muddy Creek and/or the Cooks River through direct migration.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed 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; • Contact with groundwater during construction; • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation; and • Migration of groundwater off-site into areas where groundwater is being utilised as a resource (i.e. for domestic or irrigation).

Presence of preferential pathways for contaminant movement	None

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 previous investigations identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the project team in the design and delivery of the project as well as by the consent authority in exercising its planning functions in relation to the approval of the development proposal under Chapter 4, Clause 4.6 of SEPP Resilience and Hazards 2021.

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

4.1.2 Step 2 - Identify the Decisions of the Study

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

- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is further investigation/remediation required and what is this likely to involve?
- What is the preliminary waste classification of the in-situ fill material and natural soils/bedrock sampled and is further sampling/analysis required to confirm the waste classification(s)?
- 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 (if identified) and groundwater samples for the CoPC identified in the CSM; and

- Field and laboratory QA/QC data.

4.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 and will be limited vertically to a maximum nominated sampling depth of 8mBGL for groundwater (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 January and February 2025 (temporal boundary). Areas not accessible for sampling will be noted in the DSI as data gaps.

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

4.1.5.1 Tier 1 Screening Criteria

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

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

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

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

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 this investigation, the null hypothesis (H_0) is that the 95% UCL for the CoPC is greater than the SAC. The alternative hypothesis (H_A) is that the 95% UCL for the CoPC is less than the SAC. Alternative considerations are made regarding asbestos based on an assessment of multiple lines of evidence.

Potential outcomes include Type I and Type II errors as follows:

- Type I error of determining that the soil is acceptable for the proposed land use when it is not (wrongly rejects true H_0), includes an alpha (α) risk of 0.05; and
- Type II error of determining that the soil is unacceptable for the proposed land use when it is (wrongly accepts false H_0), includes beta (β) risk of 0.2.

UCLs will be considered acceptable where the UCL is below the SAC, the standard deviation of the data is less than 50% of the SAC and none of the individual concentrations are more than 250% of the SAC. However, where statistical analysis is applied in accordance with Step 5 via the calculation of UCL values, the potential for decision errors to occur will also be evaluated using the Combined Risk Value (CRV) method as outlined in Appendix E of the NSW EPA Sampling Design Part 1 – Application (2022)[7] contaminated land guidelines.

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

The CRV method will be used retrospectively to establish whether there is sufficient statistical power in the UCL.

Statistical analysis will not apply to asbestos or groundwater data, therefore these data will be assessed based on a multiple lines of evidence and risk-based approach.

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. The investigation has been designed considering available information however, adjustment of the investigation design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data will be collected. The sampling plan and methodology are outlined in the following sub-sections.

4.2 Soil Sampling Plan and Methodology

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

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

Aspect	Input
Sampling Density	Samples for the DSI will be collected from 15 grid-based locations (BH101, BH103, and BH107 to BH119) 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)[8] contaminated land guidelines.
Sampling Plan	The sampling locations will be placed on a systematic plan with a grid spacing of approximately 15m between sampling location. A systematic plan is considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations (UCLs will only be applied where appropriate and in accordance with the DQOs).
Set-out and Sampling Equipment	Sampling locations will be set out using a tape measure and/or hand-held GPS unit (with an accuracy of approximately ±0.01m). 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 a hand auger and drill rig equipped with spiral flight augers (150mm diameter). Soil samples will be obtained from a Standard Penetration Test (SPT) split-spoon sampler, and/or directly from the auger.
Sample Collection and Field QA/QC	Soil samples will be obtained in accordance with our standard field procedures. Soil samples will be collected from the fill and natural profiles based on field observations. The sample depths will be shown on the logs included in the DSI report. Soil samples for contamination testing will be placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for asbestos analysis will placed in zip-lock plastic bags.

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

Aspect	Input
	Where Sampling for PFAS occurs, JKE will complete a pre-fieldwork checklist to document that additional checks occur so that the potential for any interference or cross contamination of PFAS samples is minimised. 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, then each distinct fill profile thereafter, with a minimum of one sample per 1m depth of each fill profile.
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 will be installed in BH203 (MW203), BH207 (MW207) and BH208 (MW208). The wells will be positioned to establish background groundwater conditions at the site. Considering the topography and the location of the nearest down-gradient water body, MW203 is considered to be in the up-gradient area of the site and expected to provide an indication of groundwater flowing onto (beneath) the site from the south to south-west. MW207 and MW208 are considered to be in the intermediate to 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 boundary.
Monitoring Well Installation Procedure	The monitoring well construction details will be documented on the appropriate borehole logs. The monitoring wells will be installed to depths of approximately 8mBGL. The wells will generally be constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing installed in the upper section of the well (screw fixed); • 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.
Monitoring Well Development	The monitoring wells will be developed after installation using a submersible electrical pump/dedicated disposable plastic bailer. During development, the following parameters will be monitored using calibrated field instruments: • Standing water level (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 no less than 48 hours 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.

Aspect	Input
	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 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. Detergents (such as Decon 90) will not be utilised during the decontamination process as they may result in interference during PFAS analysis. 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 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 15 selected soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; BTEX; OCPs and OPPs; PCBs; and asbestos (500ml);
- Up to six selected deeper soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; and BTEX;
- Up to two representative fibre cement fragments, if found on or in soil, will be analysed for asbestos;
- Up to six selected soil samples for TCLP leachability analysis for PAHs and selected metals has been included to provide a preliminary waste classification for the off-site disposal of soil in accordance with

NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014). In the event this budget is not utilised for TCLP analysis, it may be utilised for additional soil analysis, where deemed appropriate; and

- Up to three groundwater samples (allowance of one per well per site) will be analysed for the following: heavy metals; TRH/BTEX; PAHs; volatile organic compounds (VOCs); per-and polyfluoroalkyl substances (PFAS); pH; and electrical conductivity (EC).

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 accessible soils' exposure scenario (HIL-A). These SAC also apply to primary schools;
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B), which also apply to primary schools. HSLs will be calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[9]; and
- Asbestos will be assessed against the HSL-A 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-A 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)[10]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.01% 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): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (g)}}{\text{Soil weight (g)}}$

[9] 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*

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

5.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. The EILs will only be applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene will be increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[11];
- ESLs will be adopted based on the soil type; and
- EILs for selected metals will be calculated based on the most conservative added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[12]. 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)[13] 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.

11 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)

12 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

13 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)[14]. Environmental values for the DSI include aquatic ecosystems, human uses (consumption, incidental contact and recreational water use), and human-health risks in non-use scenarios (vapour intrusion).

5.2.1 Human Health

- HSLs for a 'low-high density residential' exposure scenario (HSL-A/HSL-B). HSLs will be calculated based on the soil type and the observed depth to groundwater;
- Should groundwater be recorded at depths shallower than 2m, a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater will be undertaken. The assessment will include a 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)[15] for BTEX compounds and selected VOCs;
  - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[16] 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/recreational-type exposure to groundwater (e.g. within down-gradient water bodies, with bore water used for irrigation, or with seepage water during construction). These have been deemed as 'recreational' SAC;
- The recreational water quality guideline value will be adopted for PFAS assessment based on Table 1 in NEMP 2020[17]; and
- ADWG 2011 criteria will be adopted as screening criteria for consumption of groundwater.

5.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species will be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[18]. The 99% trigger values will be adopted where required to account for bioaccumulation. Low

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

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

[16] 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)

[17] Heads of EPAs Australia and New Zealand (HEPA). PFAS National Environmental Management Plan Version 2.0 - January 2020 (referred to as NEMP 2020)

[18] 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.

The ecological (interim freshwater) water quality guidelines will be adopted for PFAS assessment based on NEMP 2020, based on 95% protection (slightly to moderately disturbed systems).

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)[19].

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

7 LIMITATIONS

The report limitations are outlined below:

- This SAQP was developed based on the information available, as documented in this plan. There is always a potential that the proposed investigation will identify contamination impacts (actual or potential) that trigger a need for further investigation;
- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The plan is based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The preparation of this report has been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

Important Information About This Report

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

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

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

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

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

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

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

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

Misinterpretation of Site Investigations by Design Professionals

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

Logs Should not be Separated from the Investigation Report

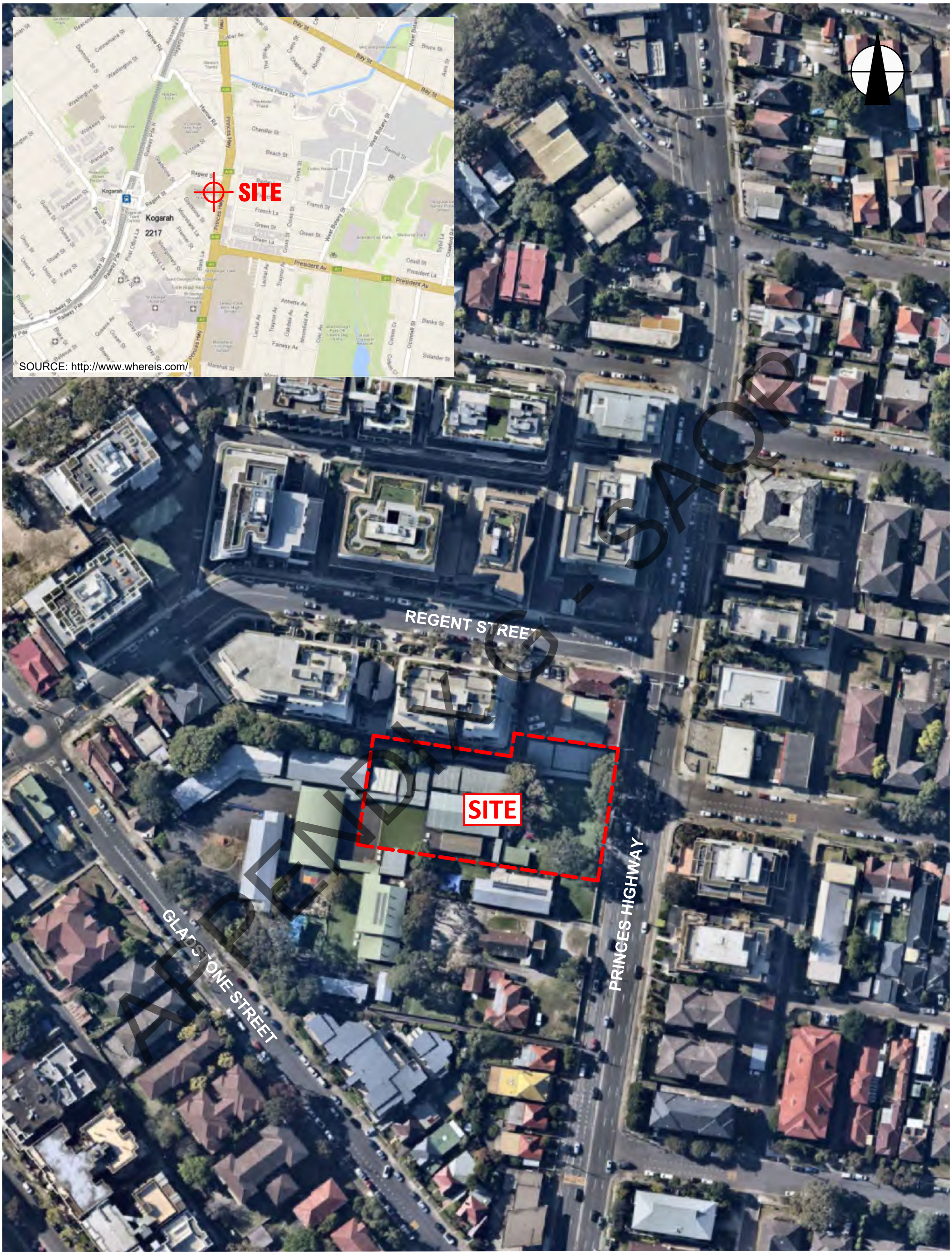
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

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

Read Responsibility Clauses Closely

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

Appendix A: Report Figures



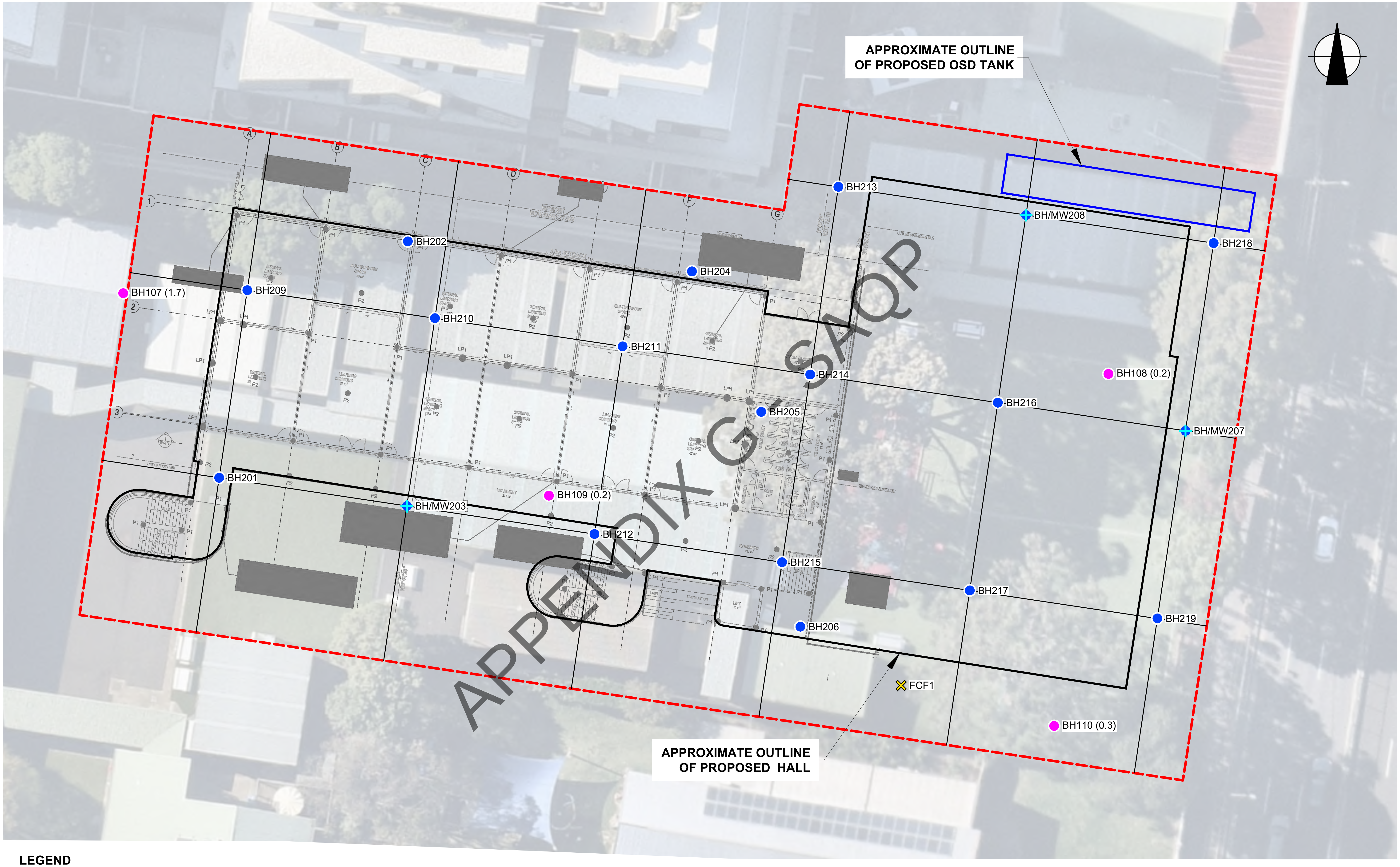
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	24B GLADSTONE STREET, KOGARAH, NSW
Project No: E32976PT2	Figure No: 1

JKEnvironments

PLOT DATE: 20/12/2024 2:52:12 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CAD\E32976PT2.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	PROPOSED BOREHOLE LOCATION AND NUMBER
BH/MW203	PROPOSED BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION AND NUMBER
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: PROPOSED DSI SAMPLE LOCATION PLAN

Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976PT2

Figure No: 2a

JKEnvironments

PLOT DATE: 6/01/2025 1:06:00 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CADE\E32976PT2.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)[20] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[21]. The NEPM (2013) is consistent with these documents.

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

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

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

B. Precision

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

C. Accuracy

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

D. Representativeness

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

E. Completeness

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

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

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

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

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix 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

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)

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

Calibration and Groundwater Field Sheets

JKEnvironments

Client:	School Infrastructure NSW	**Job No.:**	E32976BT2
Project:	Proposed Alterations and Additions	**Well No.:**	mw203
Location:	Kogarah Public School, 24B Gladstone Street, Kogarah, NSW	**Depth (m):** -	12m

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Development Pump	**SWL – Before (m):**	3.20m
Date:	16/1/25	**Time – Before:**	8.32am
Undertaken By:	VR	**SWL – After (m):**	10.32
Total Vol. Removed:	~100L	**Time – After:**	9.45am
PID Reading (ppm):	0.9		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1L		21.9	31.0	472	5.96	36.2
5L		20.9	13.2	918	5.67	40.7
10L		20.9	9.9	945	5.65	21.0
15L		20.8	9.4	947	5.64	7.0
20L	5.77m	20.9	9.5	949	5.64	3.7
25		20.8	10.2	969	5.57	41.6
30		20.9	9.3	1007	5.52	40.3
35		20.9	7.3	1055	5.49	33.9
40	8.07m	21.0	5.4	1097	5.42	27.3
45		20.8	33.7	858	5.42	46.3
50		20.8	18.0	835	5.49	38.3
55		20.7	13.3	575	5.58	38.0
60	10.94m	20.4	15.0	689	6.20	12.1
65		20.5	40.0	1212	5.54	48.2
70 * Started Bailing		20.6	45.5	1183	5.67	51.0
75	10.27m	20.3	34.6	1240	5.49	40.3
80	9.41m	20.4	21.6	1266	5.41	14.8
85		20.2	30.4	1248	5.45	16.3
used development pump again → 90	10.57m	20.3	27.0	1250	5.42	15.3
95		20.3	22.2	1261	5.42	39.6
100	10.32	20.4	15.0	1256	5.38	53.7

3.20m
−12m
=8.8m
~~8.8×3=~~ 26.4
×3
=79.2

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

YSI Used: YSI 1 Sulfur Smell

Tested By:	VR	**Remarks:**
Date Tested:	16/1/25	- 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:	KT	
Date:	12-02-25	

JKEnvironments

Client:	School Infrastructure NSW	**Job No.:**	E32976BT2
Project:	Proposed Alterations and Additions	**Well No.:**	MW207
Location:	Kogarah Public School, 24B Gladstone Street, Kogarah, NSW	**Depth (m):**	12.70m

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Development Pump	**SWL – Before (m):**	3.66m
Date:	16/1/25	**Time – Before:**	2.18pm
Undertaken By:	VR	**SWL – After (m):**	4.95m
Total Vol. Removed:		**Time – After:**	2.44pm
PID Reading (ppm):	0.0		

12.70
− 3.66
9.04
×3
= 27.12
×3 =
81.36

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1L	3.77m	22.1	53.2	519	6.53	100.5
5		21.2	19.7	953	5.86	63.9
10		21.4	30.7	921	5.91	62.7
15		21.5	15.1	933	5.95	60.3
20	4.24m	21.5	18.7	947	5.95	59.9
25		21.3	40.1	1012	5.85	58.6
30		21.4	36.7	985	5.87	60.7
35		21.4	35.1	979	5.87	60.7
40	4.51m	21.4	32.1	968	5.87	60.6
45		21.3	19.7	937	5.82	62.6
50		21.3	6.0	730	5.84	54.3
55		21.3	5.7	524	5.94	56.7
60	4.70m	21.3	5.3	522	5.96	58.1
65		21.2	22.1	841	5.81	57.2
70		21.2	14.9	890	5.81	58.8
75		21.3	24.8	795	5.81	59.9
80	4.93m	21.3	13.1	850	5.82	60.1
85		21.2	5.0	1032	5.77	59.1
90		21.2	4.6	1011	5.78	6.71
95		21.2	4.2	968	5.80	63.8
100	4.95m	21.2	4.3	960	5.80	63.7

3x well volumes = 81.36L

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

YSI Used: YSI 1

* fast recharge, ~100L removed during development with little changes to the SWL.

Tested By:	VR	**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:	16/1/25	
Checked By:	KF	
Date:	12-02-25	

JKEnvironments

Client:	School Infrastructure NSW	**Job No.:**	E32976BT2
Project:	Proposed Alterations and Additions	**Well No.:**	MW208
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW	**Depth (m):**	9.4

WELL FINISH DETAILS

Gatic Cover ☒ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev. Pump	**SWL – Before (m):**	1.48 m
Date:	11/2/25	**Time – Before:**	10.20 AM
Undertaken By:	VR	**SWL – After (m):**	8.10 m
Total Vol. Removed:	~30L	**Time – After:**	10.46 am
PID Reading (ppm):	0.0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
0.5L / Bailer	1.60m	25.9	78.9	247.7	6.76	307.0
5L		23.0	83.1	207.7	6.47	171.1
10L		23.1	83.2	199.7	6.16	114.3
15L		23.2	76.1	211.3	6.00	109.1
20L	7.33	22.7	70.4	204.4	5.89	109.4
25L		22.3	70.1	206.1	5.79	99.2
30L	8.10	22.5	64.5	187.1	5.83	105.6
		Developed	until effectively	dry		

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

YSI Used: YSI 1

High silt load

Tested By:	VR	**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:	11/2/25	
Checked By:	KT	
Date:	11.02.25	

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	School Infrastructure NSW
Project:	Proposed Alterations and Additions
Location:	Kogarah Public School, 24B Gladstone Street, Kogarah, NSW
Job Number:	E32976BT2

PID

Make: MiniRAE Lite+	Model: PGM7300	Unit: PID 4	Date of last factory calibration:
Date of calibration: 15/1/25		Name of Calibrator: JTL	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100.6 ppm		Error in measured reading: ± 0.6	ppm
Measured reading Acceptable (Yes/No):			

PID

Make: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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:	School Infrastructure NSW		
Project:	Proposed Alterations and Additions		
Location:	Kogarah Public School, 24B Gladstone Street, Kogarah, NSW		
Job Number:	E32976BT2		
DISSOLVED OXYGEN			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 15/1/25		Name of Calibrator: JTL	
Span value: 70% to 130%			
Measured value: 104.6			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 15/1/25		Name of Calibrator: JTL	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 05/25	Lot No: EB040624
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 05/25	Lot No: CD250624
Measured reading of Buffer 1: 7.00			
Measured reading of Buffer 2: 4.00			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date:	15/1/25	Name of Calibrator: JTL	Temperature: 25.7 °C
Calibration solution: AR - Conductivity Solution		Expiry date: 07/25	Lot No: CW230524
Theoretical conductivity at temperature (see solution container): 1413 - 1440 µS/cm			
Measured conductivity: 1434 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 15/1/25		Name of Calibrator: JTL	
Calibration solution: HANNA INSTRUMENTS INC HI7021L		Expiry date: 1/25	Lot No: 9920
Theoretical redox value: 240mV			
Measured redox reading: 240 mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Alterations and Additions		
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW		
Job Number:	E32976BT2		
DISSOLVED OXYGEN			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 11/2/25		Name of Calibrator: VR	
Span value: 70% to 130%			
Measured value: 94.7			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 11/2/25		Name of Calibrator: VR	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 6/25	Lot No: EB040624
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 3/25	Lot No: DU030124
Measured reading of Buffer 1: 7.0			
Measured reading of Buffer 2: 3.99			
Slope: NA		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date: 11/2/25	Name of Calibrator: VR		Temperature: 23 °C
Calibration solution: AR - Conductivity Solution		Expiry date: 4/25	Lot No: CZ071223
Theoretical conductivity at temperature (see solution container): 1359 µS/cm			
Measured conductivity: 1361 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 11/2/25		Name of Calibrator: VR	
Calibration solution: HANNA INSTRUMENTS INC HI7021L		Expiry date: 7/25	Lot No: 9759
Theoretical redox value: 240mV			
Measured redox reading: 241.3mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	School Infrastructure NSW
Project:	Proposed Alterations and Additions
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW
Job Number:	E32976BT2

PID

Make: MiniRAE Lite+	Model: PGM7300	Unit: PID3	Date of last factory calibration:
Date of calibration: 10/2/25		Name of Calibrator: VR	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 101.2 ppm		Error in measured reading: ±	1~~0~~.2 ppm
Measured reading Acceptable (Yes/No): Yes			

PID

Make: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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: MiniRAE Lite+	Model: PGM7300	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

Client:	School Infrastructure NSW	**Job No.:**	E32976BT2
Project:	Proposed Alterations and Additions	**Well No.:**	mw203
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW	**Depth (m):**	9m

WELL FINISH

X	Gatic Cover	Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	**SWL – Before:**	4.97m
Date:	13/2/25	**Time – Before:**	9.45am
Undertaken By:	VK	**Total Vol Removed:**	~6.5Litres
Pump Program No:	low flow	**PID (ppm):**	0.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
—	5.05m	0.5L	Bailer	22.4	29.0	420.0	4.57	237.3
10.01am/3mins	5.19m	1.5L		23.2	9.5	1434	4.93	72.5
10.04am/6mins	5.24m	2.5L	flow rate reduced	23.0	6.5	1230	4.75	65.1
10.07am/9mins	5.29m	3.5L		23.1	6.0	1248	4.95	61.1
10.10am/12mins	5.32m	4.5L	flow rate reduced	23.3	5.8	1238	4.96	60.1
10.13am/15mins	5.33m	4L		23.7	5.8	1226	4.93	60.5
10.16am/18mins	5.37m	4.5L	flow rate reduced	23.8	6.0	1215	4.94	61.0
10.19am/21mins	5.36m	5L		23.9	5.4	1215	4.94	60.9
10.22am/24mins	5.36m	5.5L		23.9	5.5	1209	4.94	62.7
10.25am/27mins	5.36m	6L		24.6	5.7	1199	4.93	63.5
10.28am/30mins	5.36m	6.5L		24.8	5.7	1192	4.92	64.9
			→ Steady State Achieved					
			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 (100mL), 4 x BTEX vials (40mL), 1 x HNO3 plastic (125mL), 0 x H2SO4 plastic (125mL), 1 x unpreserved plastic (250mL), 0 x sterile plastic (500mL), 2 x No teflon plastic (60mL)

YSI used: YSI 1 Slight sulphuric smell.

Tested By: VK	**Remarks:**
Date Tested: 13/2/25	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% and SWL stable/not in drawdown
Checked By: KT	
Date: 17-02-25	

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E32976BT2
Project:	Proposed Alterations and Additions	Well No.:	MW207
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW	Depth (m):	9m

WELL FINISH

✓	Gatic Cover	under astro turf.	Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	3.84m
Date:	13/2/25	Time – Before:	7.49am
Undertaken By:	VR	Total Vol Removed:	~ 12 Litres
Pump Program No:	low flow	PID (ppm):	0.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
—	3.86m	0.75L	Bailer	22.3	84.0	418.5	4.56	236.7
8.02am / 3mins	3.88m	2L	high speed and	21.8	5.7	1284	5.15	104.3
8.05am / 6mins	3.88m	4L	high recharge	21.7	2.7	1359	5.20	91.9
8.08 / 9mins	3.88m	6L		21.7	2.1	1389	5.22	88.6
8.11 / 12mins	3.88m	8L		21.7	1.5	1390	5.22	87.3
8.14 / 15mins	3.88m	10L		21.7	1.3	1385	5.22	87.1
8.17am / 18mins	3.88m	12L		21.6	1.0	1385	5.22	87.5
			Steady State Achieved					
			→ Started sampling					

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

Sampling Containers Used: 4x glass amber (100mL), 8x BTEX vials (40mL), 2x HNO3 plastic (125mL), 0x H2SO4 plastic (125mL), 2 x unpreserved plastic (250mL), 0x sterile plastic (500mL), 4x No teflon plastic (60mL) GWDUP201

YSI used: YSI 1   high recharge on high speed setting

Tested By: VR	**Remarks:**
Date Tested: 13/2/25	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% and SWL stable/not in drawdown
Checked By: KT	
Date: 17.02.25	

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E32976BT2
Project:	Proposed Alterations and Additions	Well No.:	mw208
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW	Depth (m):	9m

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic Pump	SWL – Before:	6.34m
Date:	13/2/25	Time – Before:	8.47am
Undertaken By:	VR	Total Vol Removed:	~10 Litres
Pump Program No:	low flow	PID (ppm):	1.0

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
/	6.59m	0.75L	Bailer	22.0	6.1	888	4.71	206.4
8.56am/3mins	6.75m	2L		21.5	4.0	877	4.71	208.9
8.59am/6mins	6.91m	4L	Flow rate reduced	21.1	2.6	875	4.75	208.6
9.02am/9mins	7.00m	5L		21.6	3.1	885	4.78	202.9
9.05am/12mins	7.07m	6L	Flow rate reduced	21.8	2.9	895	4.80	198.4
9.08am/15mins	7.09m	6.5L		22.4	3.4	904	4.83	195.7
9.11am/18mins	7.09m	7L		22.6	3.6	912	4.82	194.7
9.14am/21mins	7.10m	7.5L		22.6	3.8	913	4.82	194.4
9.17am/24mins	7.12m	8L	Flow rate reduced	22.8	3.8	918	4.85	188.5
9.20am/27mins	7.12m	8.5L		23.2	4.4	933	4.88	183.0
	7.12m	9L		23.3	4.4	941	4.90	180.7
			Steady State achieved					
			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 (100mL), 4 x BTEX vials (40mL), 1 x HNO3 plastic (125mL), 0 x H2SO4 plastic (125mL), 1 x unpreserved plastic (250mL), 0 x sterile plastic (500mL), 2 x No teflon plastic (60mL)

YSI used: YSI 1

low-medium silt load.

Tested By: VR	**Remarks:**
Date Tested: 13/2/25	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% and SWL stable/not in drawdown
Checked By: KT	
Date: 17.02.25	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Alterations and Additions		
Location:	KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW		
Job Number:	E32976BT2		
DISSOLVED OXYGEN			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 13/2/25		Name of Calibrator: VR	
Span value: 70% to 130%			
Measured value: 91.4%			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 13/2/25		Name of Calibrator: VR	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 6/25	Lot No: EB040624
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 8/25	Lot No: DU030124
Measured reading of Buffer 1: 7.00			
Measured reading of Buffer 2: 3.99			
Slope:		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date: 13/2/25	Name of Calibrator: VR		Temperature: 26 °C
Calibration solution: AR - Conductivity Solution		Expiry date: 4/25	Lot No: C207/1223
Theoretical conductivity at temperature (see solution container): 1440 µS/cm			
Measured conductivity: 1440 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI Proffessional Plus (Pro Plus)		Model: YSI 1	
Date of calibration: 13/2/25		Name of Calibrator: VR	
Calibration solution: HANNA INSTRUMENTS INC HI7021L		Expiry date: 7/25	Lot No: 9759
Theoretical redox value: 240mV			
Measured redox reading: 240.4 mV		Measured reading Acceptable (Yes/No):	

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Alterations and Additions		
Location:	Kogarah Public School, 24B Gladstone Street, Kogarah, NSW		
Job Number: E32976BT2			
PID			
Make: Honeywell	Model: PGM 7300	Unit: PID 3	Date of last factory calibration:
Date of calibration: 12/2/25		Name of Calibrator: VR	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100.3 ppm		Error in measured reading: ± 0.3 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):			
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):			

Appendix H: UCL Calculation Sheets

FILL SOIL DATA USED FOR CALCULATION OF 95% UCL
All data in mg/kg unless stated otherwise

			Lead	PAHs	
				Carcinogenic PAHs	B(a)P
PQL - Envirolab Services			1	0.5	0.05
Sample Reference	**Sample Depth**	**Sample Description**			
BH201	0.1-0.2	Fill: Silty Gravel	6	<0.5	<0.05
BH201	0.9-1	Fill: Silty Sandy Clay	130	1.2	0.79
BH203	0.1-0.2	Fill: Silty Sand	290	1.1	0.74
BH203	0.3-0.4	Fill: Silty Sandy Clay	120	0.7	0.5
BH207 / SDUP202	0-0.1	Fill: Silty Sand	17	0.82	0.55
BH208	0-0.1	Fill: Silty Sand	36	0.7	0.5
BH208	0.45-0.55	Fill: Silty Sandy Clay	84	4.9	3.3
BH209	0-0.1	Fill: Silty Sand	55	<0.5	0.2
BH209	0.6-0.8	Fill: Sandy Clay	23	<0.5	0.07
BH210	0.05-0.1	Fill: Gravel	9	<0.5	<0.05
BH210	0.55-0.6	Fill: Silty Sandy Clay	140	0.6	0.4
BH211	0.2-0.3	Fill: Silty Sand	250	5	3.5
BH212	0.1-0.15	Fill: Gravel	29	0.7	0.4
BH213	0-0.1	Fill: Silty Sand	17	<0.5	0.07
BH214	0.2-0.3	Fill: Silty Sand	92	<0.5	0.2
BH214	0.3-0.4	Fill: Silty Sand	100	2.7	1.9
BH215	0-0.1	Fill: Silty Sand	25	0.5	0.3
BH215	0.2-0.3	Fill: Silty Sand	65	0.6	0.4
BH216	0-0.1	Fill: Silty Sand	9	<0.5	<0.05
BH216	1-1.3	Fill: Sandy Clay	4	<0.5	<0.05
BH217 / SDUP201	0-0.1	Fill: Silty Sand	20	<0.5	0.2
BH217	0.2-0.3	Fill: Silty Sand	170	0.7	0.4
BH218	0-0.1	Fill: Silty Sand	160	0.9	0.62
BH219	0-0.1	Fill: Silty Sand	13	<0.5	0.2
BH219	0.5-0.6	Fill Silty Sand	23	<0.5	0.2
Total Number of Samples			25	25	25
Maximum Value			290	5	3.5

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.125/02/2025 8:56:58 AM								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Lead											
12												
13	General Statistics											
14	Total Number of Observations					25	Number of Distinct Observations					22
15							Number of Missing Observations					0
16	Minimum					4	Mean					75.48
17	Maximum					290	Median					36
18	SD					78.4	Std. Error of Mean					15.68
19	Coefficient of Variation					1.039	Skewness					1.361
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.826	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.918	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.213	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.173	Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL					102.3	95% Adjusted-CLT UCL (Chen-1995)					105.8
31							95% Modified-t UCL (Johnson-1978)					103
32												
33	Gamma GOF Test											
34	A-D Test Statistic					0.474	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.775	Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.152	Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value					0.18	Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					0.959	k star (bias corrected MLE)					0.871
42	Theta hat (MLE)					78.69	Theta star (bias corrected MLE)					86.68
43	nu hat (MLE)					47.96	nu star (bias corrected)					43.54
44	MLE Mean (bias corrected)					75.48	MLE Sd (bias corrected)					80.89
45							Approximate Chi Square Value (0.05)					29.41
46	Adjusted Level of Significance					0.0395	Adjusted Chi Square Value					28.62
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)					111.7	95% Adjusted Gamma UCL (use when n<50)					114.8
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value					0.918	Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.121	Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value					0.173	Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											

	A–E	F	G–K	L
57				
58	**Lognormal Statistics**			
59	Minimum of Logged Data	1.386	Mean of logged Data	3.719
60	Maximum of Logged Data	5.67	SD of logged Data	1.214
61				
62	**Assuming Lognormal Distribution**			
63	95% H-UCL	171.5	90% Chebyshev (MVUE) UCL	152.8
64	95% Chebyshev (MVUE) UCL	184.8	97.5% Chebyshev (MVUE) UCL	229.2
65	99% Chebyshev (MVUE) UCL	316.4		
66				
67	**Nonparametric Distribution Free UCL Statistics**			
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**			
69				
70	**Nonparametric Distribution Free UCLs**			
71	95% CLT UCL	101.3	95% Jackknife UCL	102.3
72	95% Standard Bootstrap UCL	100.2	95% Bootstrap-t UCL	108.6
73	95% Hall's Bootstrap UCL	105.9	95% Percentile Bootstrap UCL	102.2
74	95% BCA Bootstrap UCL	106.4		
75	90% Chebyshev(Mean, Sd) UCL	122.5	95% Chebyshev(Mean, Sd) UCL	143.8
76	97.5% Chebyshev(Mean, Sd) UCL	173.4	99% Chebyshev(Mean, Sd) UCL	231.5
77				
78	**Suggested UCL to Use**			
79	95% Adjusted Gamma UCL	114.8		
80				
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
82	Recommendations are based upon data size, data distribution, and skewness.			
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
85				
86				
87	CPAH			
88				
89	**General Statistics**			
90	Total Number of Observations	25	Number of Distinct Observations	10
91			Number of Missing Observations	0
92	Minimum	0.5	Mean	1.065
93	Maximum	5	Median	0.6
94	SD	1.254	Std. Error of Mean	0.251
95	Coefficient of Variation	1.178	Skewness	2.734
96				
97	**Normal GOF Test**			
98	Shapiro Wilk Test Statistic	0.497	**Shapiro Wilk GOF Test**	
99	5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
100	Lilliefors Test Statistic	0.352	**Lilliefors GOF Test**	
101	5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
102	**Data Not Normal at 5% Significance Level**			
103				
104	**Assuming Normal Distribution**			
105	**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**	
106	95% Student's-t UCL	1.494	95% Adjusted-CLT UCL (Chen-1995)	1.624
107			95% Modified-t UCL (Johnson-1978)	1.517
108				
109	**Gamma GOF Test**			
110	A-D Test Statistic	4.081	**Anderson-Darling Gamma GOF Test**	
111	5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level	
112	K-S Test Statistic	0.315	**Kolmogorov-Smirnov Gamma GOF Test**	
113	5% K-S Critical Value	0.177	Data Not Gamma Distributed at 5% Significance Level	
114	**Data Not Gamma Distributed at 5% Significance Level**			

Gamma Statistics			
k hat (MLE)	1.677	k star (bias corrected MLE)	1.503
Theta hat (MLE)	0.635	Theta star (bias corrected MLE)	0.709
nu hat (MLE)	83.86	nu star (bias corrected)	75.13
MLE Mean (bias corrected)	1.065	MLE Sd (bias corrected)	0.869
		Approximate Chi Square Value (0.05)	56.17
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	55.05
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	1.424	95% Adjusted Gamma UCL (use when n<50)	1.453
Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.668	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.274	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.173	Data Not Lognormal at 5% Significance Level	
Data Not Lognormal at 5% Significance Level			
Lognormal Statistics			
Minimum of Logged Data	-0.693	Mean of logged Data	-0.264
Maximum of Logged Data	1.609	SD of logged Data	0.685
Assuming Lognormal Distribution			
95% H-UCL	1.307	90% Chebyshev (MVUE) UCL	1.383
95% Chebyshev (MVUE) UCL	1.574	97.5% Chebyshev (MVUE) UCL	1.84
99% Chebyshev (MVUE) UCL	2.363		
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution (0.05)			
Nonparametric Distribution Free UCLs			
95% CLT UCL	1.477	95% Jackknife UCL	1.494
95% Standard Bootstrap UCL	1.483	95% Bootstrap-t UCL	2.081
95% Hall's Bootstrap UCL	1.642	95% Percentile Bootstrap UCL	1.529
95% BCA Bootstrap UCL	1.665		
90% Chebyshev(Mean, Sd) UCL	1.817	95% Chebyshev(Mean, Sd) UCL	2.158
97.5% Chebyshev(Mean, Sd) UCL	2.632	99% Chebyshev(Mean, Sd) UCL	3.561
Suggested UCL to Use			
95% Chebyshev (Mean, Sd) UCL	2.158		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BaP

General Statistics			
Total Number of Observations	25	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.05	Mean	0.626
Maximum	3.5	Median	0.4
SD	0.919	Std. Error of Mean	0.184
Coefficient of Variation	1.469	Skewness	2.53

173	Normal GOF Test			
174	Shapiro Wilk Test Statistic	0.601	**Shapiro Wilk GOF Test**	
175	5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level	
176	Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**	
177	5% Lilliefors Critical Value	0.173	Data Not Normal at 5% Significance Level	
178	Data Not Normal at 5% Significance Level			
179				
180	Assuming Normal Distribution			
181	**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**	
182	95% Student's-t UCL	0.94	95% Adjusted-CLT UCL (Chen-1995)	1.027
183			95% Modified-t UCL (Johnson-1978)	0.956
184				
185	Gamma GOF Test			
186	A-D Test Statistic	1.039	**Anderson-Darling Gamma GOF Test**	
187	5% A-D Critical Value	0.781	Data Not Gamma Distributed at 5% Significance Level	
188	K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**	
189	5% K-S Critical Value	0.181	Detected data appear Gamma Distributed at 5% Significance Level	
190	Detected data follow Appr. Gamma Distribution at 5% Significance Level			
191				
192	Gamma Statistics			
193	k hat (MLE)	0.806	k star (bias corrected MLE)	0.736
194	Theta hat (MLE)	0.777	Theta star (bias corrected MLE)	0.851
195	nu hat (MLE)	40.28	nu star (bias corrected)	36.78
196	MLE Mean (bias corrected)	0.626	MLE Sd (bias corrected)	0.729
197			Approximate Chi Square Value (0.05)	23.9
198	Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	23.19
199				
200	Assuming Gamma Distribution			
201	95% Approximate Gamma UCL (use when n>=50)	0.963	95% Adjusted Gamma UCL (use when n<50)	0.992
202				
203	Lognormal GOF Test			
204	Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**	
205	5% Shapiro Wilk Critical Value	0.918	Data appear Lognormal at 5% Significance Level	
206	Lilliefors Test Statistic	0.132	**Lilliefors Lognormal GOF Test**	
207	5% Lilliefors Critical Value	0.173	Data appear Lognormal at 5% Significance Level	
208	Data appear Lognormal at 5% Significance Level			
209				
210	Lognormal Statistics			
211	Minimum of Logged Data	-2.996	Mean of logged Data	-1.205
212	Maximum of Logged Data	1.253	SD of logged Data	1.235
213				
214	Assuming Lognormal Distribution			
215	95% H-UCL	1.304	90% Chebyshev (MVUE) UCL	1.147
216	95% Chebyshev (MVUE) UCL	1.39	97.5% Chebyshev (MVUE) UCL	1.727
217	99% Chebyshev (MVUE) UCL	2.39		
218				
219	Nonparametric Distribution Free UCL Statistics			
220	Data appear to follow a Discernible Distribution at 5% Significance Level			
221				
222	Nonparametric Distribution Free UCLs			
223	95% CLT UCL	0.928	95% Jackknife UCL	0.94
224	95% Standard Bootstrap UCL	0.917	95% Bootstrap-t UCL	1.557
225	95% Hall's Bootstrap UCL	1.171	95% Percentile Bootstrap UCL	0.944
226	95% BCA Bootstrap UCL	1.038		
227	90% Chebyshev(Mean, Sd) UCL	1.177	95% Chebyshev(Mean, Sd) UCL	1.427
228	97.5% Chebyshev(Mean, Sd) UCL	1.774	99% Chebyshev(Mean, Sd) UCL	2.455
229				
230	Suggested UCL to Use			
231	95% Adjusted Gamma UCL	0.992		

	A	B	C	D	E	F	G	H	I	J	K	L
232												
233	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
234	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
235												
236	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
237	Recommendations are based upon data size, data distribution, and skewness.											
238	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
239	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
240												

Appendix I: SAQP for Supplementary Investigation

REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

SAMPLING, ANALYSIS AND QUALITY PLAN FOR SUPPLEMENTARY ENVIRONMENTAL INVESTIGATION

FOR

PROPOSED ALTERATIONS AND ADDITIONS

AT

KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Date: 19 March 2025

Ref: E32976BT2rpt6-SAQP

JKEnvironments

www.jkenvironments.com.au

T: +61 2 9888 5000

JK Environments Pty Ltd

ABN 90 633 911 403

Report prepared by:

Katrina Taylor
Senior Associate | Environmental Scientist

Report reviewed by:

Brendan Page
Principal | Environmental Scientist
CEnvP SC

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

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E32976BT2rpt6-SAQP	Final Report	19 March 2025

Table of Contents

List of Tables

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

Trip Spike	**TS**
Upper Confidence Limit	**UCL**
Volatile Organic Compounds	**VOC**

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**
Parts Per Million	**ppm**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

NSW Department of Education ('the client') commissioned JK Environments (JKE) to prepare a Sampling, Analysis and Quality Plan (SAQP) for the Supplementary Environmental Investigation to be undertaken by JKE for the proposed alterations and additions at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW. The site location is shown on Figure 1 and the proposed investigation will be confined to 'the site' boundaries (defined by the proposed development area) as shown on Figure 2 attached in the appendices.

JKE has previously undertaken a Phase 1 Desktop Assessment (desktop), a Phase 2 Preliminary Intrusive Investigation (intrusive investigation), and a Detailed Site Investigation (DSI) at the site. WSP has also previously prepared a Preliminary Desktop Site Investigation at the site. A summary of relevant information from these reports is included in Section 2.

1.1 Proposed Development Details

It is understood that the proposed Kogarah Public School upgrade works include the following:

- Demolition of existing playground facilities and Covered Outdoor Learning Area (COLA) in addition to footings and services associated with former demountable buildings;
- Tree removal;
- Construction of a new three storey Classroom building and attached amenities facilities;
- Construction of a single storey Hall with attached COLA;
- New pedestrian pathway connections providing access throughout the site;
- Service upgrades; and
- Site landscaping works.

A basement level is not proposed.

1.2 Aims and Objectives

The primary aim of the investigation is to provide additional data in relation to the occurrence and concentrations of asbestos in soil, provide an increased soil sampling density for asbestos, and to provide additional groundwater data in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim of the investigation is to provide additional waste classification data for off-site disposal of soil waste which may be generated during the proposed development works.

The investigation 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);
- Update the existing 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 remediation is required.

1.3 Scope of Work

The SAQP was prepared generally in accordance with a JK proposal (Ref: EP71307PT) of 3 March 2025 and written acceptance from the client.

The scope of work included review of the existing project information 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

JKE undertook previous investigations at the site and wider school property in 2020 and early 2025, and WSP undertook a previous investigation in 2023. The western portion of the wider school property does not form part of the site for the purpose of the DSI (see Figures 1 and 2 in Appendix A). A summary of relevant information from the previous investigations is outlined in the table below:

Table 2-1: Previous information summary

Report	Summary of relevant information
Phase 1 Desktop Assessment, 2020[3]	The desktop included review of site information, including: background and historical information; a walkover site inspection; and preparation of a report presenting the results of the assessment, including a CSM. Site history information indicated that residential style structures had been present on the site, and one of the lots within the site had been utilised as a bus depot. The site and wider school property was progressively developed into the primary school site from 1956. During this time, demolition of the original site structures occurred, along with potential filling of the site. The age of the former and existing buildings indicated the potential for hazardous building materials to be present. During the JKE site inspection, a fibre cement fragment (FCF) of suspected asbestos containing material (ACM) was identified on the site, and fill material (i.e. imported/disturbed soils) was also observed at the site surface in several areas. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/areas of environmental concern (AEC): • Fill material - It was considered possible that minor historical filling had occurred to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It was also considered possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment; • Historical use as a bus depot - Historical title records indicated that the site was owned by a company providing bus service operations and aerial photographs confirmed buses were being stored on this section of the site. Fuels, oils and solvents (e.g. toluene/mineral spirit/thinners) may have been used during this site use; • Use of pesticides - Pesticides may have been used beneath the buildings and/or around the site; • Hazardous building materials (i.e. ACM) - 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. Hazardous building materials can also occur in fill due to historical demolition activities; and • Up-gradient off-site historical dry cleaners and motor garage/service stations – historical business directories indicated that several of these businesses were located upgradient of the site and may pose a risk to the site via migration of contaminated groundwater. The desktop recommended undertaking a preliminary intrusive investigation to make an initial assessment of contamination-related risks and to inform the design of a detailed (Stage 2) site investigation (DSI).

[3] JKE, (2020a). *Report to School Infrastructure NSW on Phase 1 Desktop Assessment for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt-KPS, dated 28 February 2020) (referred to as desktop)

Report	Summary of relevant information
Phase 2 Preliminary Intrusive Investigation, 2020[4]	The intrusive investigation included a review of existing project information, a site inspection, and soil sampling from 10 boreholes, of which four were located on the current site, including BH107 to BH110 inclusive (refer to Figure 2). Fill material was encountered to depths of between approximately 0.2m below ground level (BGL) and 1.7m BGL, underlain by natural residual sandy soils. The fill contained inclusions of igneous and ironstone gravel, glass fragments, sand and root fibres. A selection of soil samples was analysed for the contaminants of potential concern (CoPC) identified in the CSM. A surficial FCF was identified in the south of the site as shown on Figure 2. The surficial FCF was removed from the site (as sample FCF1) by JKE during the desktop was also analysed and was found to contain asbestos. Based on the data from the intrusive investigation, JKE was of the opinion that the potential risk of widespread subsurface contamination in the intrusive investigation area was low as the soil samples analysed did not identify contamination that was assessed to pose an unacceptable risk. FCF1 was non-friable ACM. The source of the asbestos appeared to be a fibre cement board at the base of the neighbouring fence and was considered unlikely to be associated with on-site soils in that vicinity. The ACM was removed and no further fragments were identified in the area. The intrusive investigation report recommended that the investigation data obtained should be supplemented via a detailed investigation in order to fully characterise the contamination conditions at the site and establish whether remediation is required.
Site Contamination Services – Preliminary Desktop Site Investigation, 2023[5]	The PSI comprised a desktop study to review general site details, site environmental setting and history, regulatory databases and client provided reports and information. The site history review was limited to historical aerial photographs and publicly available information on online databases. Based on the scope of work undertaken for desktop, the CSM identified the following potential contamination sources/ AEC: • Uncontrolled fill materials potentially used historically to raise or level portions of the site; • Historical or recent waste dumping; • Potential ACM or hazardous building materials associated with imported materials or demolished structures; and • Pesticides used historically and recently to maintain the site. The report concluded that the site presented a low to moderate risk of inground contamination due to the potential for uncontrolled fill and poor demolition practices associated with historic development and demolition of residential buildings on the site. It is noted that the investigation did not include a site inspection.
Detailed Site Investigation, 2025[6]	The DSI included a review of existing site information, soil sampling from 12 boreholes/test pits and groundwater sampling from three monitoring wells (see Figure 2 in Appendix A). The boreholes/test pits encountered fill materials to depths of approximately 0.2mBGL to 1.4mBGL in all locations and was generally underlain by sandstone bedrock. No FCFACM was encountered in the fill material during the fieldwork.

[4] JKE, (2020b). *Report to School Infrastructure NSW on Phase 2 Preliminary Intrusive Investigation for Proposed School Redevelopment (SINSW00330/19) at Kogarah Public School, 24B Gladstone Street, Kogarah, NSW.* (Ref: E32976PTrpt2-KPS, dated 8 May 2020) (referred to as intrusive investigation)

[5] WSP, (2023). *Report to School Infrastructure NSW on Site Contamination Services – Preliminary Desktop Site Investigation, Kogarah Public School.* (Project Ref: PS206292, report dated 7 December 2023) (referred to as WSP PSI)

[6]

Report	Summary of relevant information
	A selection of soil and groundwater samples were analysed for the CoPC identified in the CSM. In fill soil, carcinogenic polycyclic aromatic hydrocarbons (PAHs) were reported at concentrations above the health-based SAC. Asbestos (as AF/FA) was also detected in fill soils at one location, although the concentration of asbestos was below the health-based SAC. In groundwater, copper, zinc and PAHs (phenanthrene, anthracene, fluoranthene, and benzo(a)pyrene) were reported above the freshwater ecological SAC, and the benzo(a)pyrene concentration also exceeded the drinking water and recreational SAC. Despite the SAC exceedances, the Tier 1 risk assessment did not identify a trigger for remediation as risks were assessed to be low. However, further investigation of the site was noted to be required due to the occurrence of asbestos in fill and to better understand the potential impacts from PAHs in the groundwater. The DSI concluded that further investigation of the site is required to provide a conclusive outcome regarding whether the land is suitable in its current state, or whether remediation is required (relating to Clause 4.6 of the State Environmental Planning Policy [Resilience and Hazards] 2021[7] [formerly known as SEPP55]). The following as recommended: 1. Preparation of an interim asbestos management plan (AMP) to manage potential risks from asbestos in/on soil until the activity occurs; 2. Preparation and implementation of a Remediation Action Plan (RAP). The RAP is to include requirements for a pre-remediation investigation to adequately address the data gaps identified and outline a contingency for remediation if the investigation confirms remediation is necessary; 3. Preparation and implementation of a construction-phase AMP; and 4. Preparation of a validation assessment report, as required, for the remediation works undertaken at the site. Based on the results of the preliminary waste classification assessment, and at the time of reporting, the fill material at the site is assigned a preliminary classification of General Solid Waste (non-putrescible) containing Special Waste (asbestos). At the time of reporting, it was also considered possible that some of the natural soils and bedrock at the site could classifiable as virgin excavated natural material (VENM) for off-site disposal or re-use purposes. Confirmatory waste classification assessment is required.

2.2 Site Identification

Table 2-2: Site Identification

Site Address:	24B Gladstone Street, Kogarah, NSW
Lot & Deposited Plan:	Lot 1 in DP179779, Lot A in DP391026, and part of Lot 1 in DP667959.
Current Land Use:	Primary School (Kindergarten to year 6)
Proposed Land Use:	Continued use as a primary school
Local Government Area:	Georges River Council

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

Current Zoning:	SP2: Infrastructure
Site Area (m^2) (approx.):	4,375
Geographical Location (decimal degrees) (approx.):	Latitude: -33.9618430 Longitude: 151.1370970
Site Location Plans:	Appendix A

2.3 Site Location and Regional Setting

The site is located in the eastern portion of the existing Kogarah Public School property, which itself is in a mixed-use area of Kogarah and is bound by the Princes Highway to the east and Gladstone Street to the west. The site is located approximately 535m to the south-west of Muddy Creek and 1.7km to the west of Botany Bay.

2.4 Topography

The site is situated in gently undulating regional topography, with the site itself gently sloping towards the east at approximately 1° to 2°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

2.5 Site Inspection

The most recent walkover inspection of the site was undertaken by JKE on 15 January 2025 as part of the DSI. A summary of the inspection findings is outlined below:

- At the time of the inspection, the site comprised a COLA, over asphaltic concrete paved playground in the west of the site. The east of the site comprised soft-fall and artificial grass covered playground areas with garden and landscaped areas around the boundaries of the site. A small toilet block and goods store was also positioned along the southern boundary, and construction fencing was positioned along the central north of the site in an east-west alignment, due to recent demolition activities (removal of demountable classrooms) in this section of the site;
- Where the demolition/removal had taken place in the north of the site, exposed soils and debris from demolition/removal activities were observed at the site surface;
- During the inspection, an unsealed bag of FCF/suspected ACM was identified in the central north of the site. The bag was assumed to be associated with an emu-pick following demolition removal works. JKE sealed the bag and informed the client of this find at the time of the fieldwork;
- Fill was observed at the ground surface in areas of exposed soils across the site. Imported material/fill was considered likely to be present in garden beds and as a result of general (minor) levelling works across the site;
- Aside from fill, there were no other visible or olfactory indicators of contamination observed during the inspection; and
- Medium to large trees were observed around the site and a number of grass-covered sections of the site were also observed. Grass coverage was generally good in the unpaved areas, with the exception

of some areas beneath large trees and isolated areas of the playground (generally around the interface with pavements).

2.6 Surrounding Land Use

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

- North – high-density high-rise residential apartment buildings, a construction site and Regent Street;
- South – St Paul's Anglican Church (heritage), children's centre (church run);
- East – Princes Highway and low-density residential houses; and
- West – Kogarah Public School (main buildings).

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 in preparation of this SAQP in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

2.8 Summary of Regional Geology and Hydrogeology

2.8.1 Regional Geology

Regional geological information reviewed for the previous investigations indicated that the site is underlain by underlain by Triassic aged deposits of medium to coarse-grained quartz sandstone, and very minor shale and laminate lenses (Hawksbury Sandstone).

A summary of the subsurface conditions encountered during the DSI is present in the table below:

Table 7.1: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic concrete pavement was encountered at the surface in BH203, BH210, BH211, BH212, and BH214, between approximately 50mm to 100mm in thickness.
Fill	Fill was encountered at the surface or immediately beneath the pavement in all locations and extended to depths of approximately 0.2mBGL to 1.4mBGL. BH209 to BH217 and BH219 were terminated in the fill soil as a maximum depth of 1.4mBGL. The fill typically comprised of silty sand, silty sandy clay, gravel, gravelly sand, sandy clay, and silty sandy gravel with inclusions of igneous, ironstone, and sandstone gravel, plastic, glass, tile, metal and brick fragments, slag, ash, wood and root fibres. Neither staining nor odours were encountered in the fill material during fieldwork. No FCF or ACM was encountered in the fill material during the fieldwork.

Profile	Description
Bedrock	Sandstone bedrock was encountered beneath the fill material in BH201, BH203, BH207, BH208 and BH218. Neither staining nor odours were recorded in the bedrock during fieldwork.
Groundwater	Groundwater seepage was encountered in boreholes BH201, BH209, BH212, BH214, BH216 and BH219 at depths of approximately 0.4mBGL to 0.8mBGL. All other boreholes remained dry during and on completion of drilling.

2.8.2 Acid Sulfate Soil (ASS) Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation. (1997)[8].

The site is not mapped as being within an ASS risk area in the Georges River Local Environmental Plan 2021.

2.8.3 Hydrogeology

Hydrogeological information reviewed for the previous investigations 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 521 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 400m from the site. This was utilised for domestic purposes. The nearest downgradient bore registered for domestic uses was located over 1,500m to the north of the site;
- The majority of the bores were registered for domestic purposes;
- The drillers log information from the closest (within 500m) registered bores typically identified fill and/or sand and clay soil to depths of 3.65m-6.50m. Standing water levels (SWLs) in the bores ranged from 1.5m below ground level (BGL) to 3.0mBGL; and
- Groundwater is likely to be encountered at depths ranging from 3m to 5m below existing surface levels based on previous JKG investigations of nearby properties.

A summary of the groundwater field screening conditions encountered during the DSI is presented in the following table:

Table 2-3: Summary of Field Screening

Aspect	Details
Groundwater Depth & Flow	The relative heights of the ground surface at each monitoring well location were recorded using a GPS and the relative levels (RLs) of groundwater in each well were calculated based of the SWLs during the DSI. A contour plot was prepared for the groundwater flow direction using Surfer v8.08 (Surface Mapping Program). The contour plot indicated that groundwater generally flow towards the north, which is generally consistent with expectations based on the topography, and down-gradient water bodies.

[8] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)*

Aspect	Details
Groundwater Field Parameters	Field measurements recorded during the DSI sampling were as follows: - pH ranged from 4.90 to 5.22; - EC ranged from 941µS/cm to 1,385µS/cm; - Eh ranged from 64.9mV to 180.7mV; and - DO ranged from 1.0mg/L to 5.7mg/L. The PID readings in the monitoring well headspace recorded during sampling ranged from 0ppm in MW203 and MW207, and 1ppm in MW208.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling.

2.9 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Muddy Creek, a tributary of the Cooks River located approximately 535m to the north-east of the site. This is down-gradient from the site, and 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 Contamination Sources/AEC and CoPC

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

Table 3-1: Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – It is possible that minor historical filling has occurred to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. It is also possible that fill was generated from the native (on-site soils) and was mixed with debris during various phases of redevelopment. Fill material was encountered to depths of between 0.1m to 1.4mBGL across the site during the DSI. Asbestos was identified as a surficial FCF/ACM during previous investigations, in a bag of FCF/ACM during the site inspection for the DSI and in fill/soil during the DSI, and it is possible the asbestos is associated with this AEC and/or with hazardous building materials from poor demolition practices. Exceedances of carcinogenic PAHs in fill soil and PAHs in groundwater were reported at the site during the DSI.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site. Risks associated with this AEC are considered to be low. However, sampling has not been completed adjacent to or beneath the existing buildings yet to be demolished (toilet block on southern side of 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. Asbestos was identified as a surficial FCF/ACM during previous investigations, in a bag of FCF/ACM during the site inspection for the DSI and in fill/soil during the DSI, and it is possible the asbestos is associated with this AEC and/or with imported fill.	Asbestos and lead.

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

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

Table 3-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination.
Affected media	Soil and groundwater have been identified as potentially affected media.
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, and groundwater users. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and ecology in down-gradient water bodies.
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 direct/primary 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. Exposure to groundwater may occur in Muddy Creek and/or the Cooks River through direct migration.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed 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; • Contact with groundwater during construction; • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation; and • Migration of groundwater off-site into areas where groundwater is being utilised as a resource (i.e. for domestic or irrigation).
Presence of preferential pathways for contaminant movement	None

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 previous investigations identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Supplementary investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the project team in the design and delivery of the project as well as by the determining authority in exercising its planning functions in relation to the approval of the development proposal under Chapter 4, Clause 4.6 of SEPP Resilience and Hazards 2021.

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 supplementary environmental investigation are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required and what is this likely to involve?
- What is the waste classification of the in-situ fill material and natural soils/bedrock sampled and is further sampling/analysis required to confirm the waste classification(s)?
- 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 (if identified) and groundwater samples for the CoPC identified in the CSM; and

- Field and laboratory QA/QC data.

4.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 and will be limited vertically to the base of the fill material for asbestos characterisation, approximately 0.5m into the natural soils/bedrock for all other AEC/CoPC in soil (where practicable) and a maximum nominated sampling depth of 12.7mBGL for groundwater (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 on 22 and 23 March 2025 (temporal boundary). Areas not accessible for sampling will be noted in the report 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.

For this investigation, the individual results will be assessed as either above or below the SAC. Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values will not be undertaken due to the spatial distribution of the data and the number of samples submitted for analysis.

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.

Quantitative limits on decision errors are not proposed to be established as the sample plan is not probabilistic. Data will be assessed based on a multiple lines of evidence and risk-based approach.

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

Acceptable targets for field blank 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. The investigation has been designed considering available information however, adjustment of the investigation design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data will be collected. The sampling plan and methodology are outlined in the following sub-sections.

4.2 Soil Sampling Plan and Methodology

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

Table 4-1: Proposed Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples for the supplementary environmental investigation will be collected from 17 locations (TP301 to TP317) as shown on the attached Figure 2. This number of locations meets the requirement for an increased sampling density for asbestos when it is confirmed/known to exist in soil, as outlined in the NSW EPA Sampling Design Part 1 – Application (2022)[9] contaminated land guidelines and the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[10]. Soil samples will be collected from TP302, TP307, TP308, TP309 and TP310 for additional waste classification purposes and all AEC and CoPC. Soil samples will be obtained from TP314 and TP315 for the CoPC associated with the AEC use of pesticides.

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

[10] 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)

Aspect	Input
Sampling Plan	The sampling locations will be placed on a judgemental sampling plan and will be broadly positioned for site coverage in areas outside of the proposed building/structure footprint. This sampling plan is considered suitable to further characterise the fill/soil for asbestos contamination and to make an assessment of potential risks associated with the AEC and CoPC identified in the CSM, and assess whether remediation is required. Fieldwork will occur with regards to the activity specific asbestos management plan (AMP) (report ref: E32976BT2rpt5, dated 19 March 2025). The AMP is attached in the appendices.
Set-out and Sampling Equipment	Sampling locations will be set out using a tape measure. In-situ sampling locations will be checked for underground services by an external contractor prior to sampling. Samples will be collected using an excavator with a mud bucket (flat edged bucket). Samples were obtained from the test pit walls or directly from the bucket by hand. Where sampling occurred from the bucket, JKE collected samples from the central portion of large soil clods, or from material that was unlikely to have come into contact with the 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 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 (chemical contaminants only). 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

Aspect	Input
	• If observed, any fragments of fibre cement in the bulk sample will be collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content will be undertaken based on the requirements outlined in Schedule B1 of NEPM (2013), as summarised in Section 5.1. Bulk samples in unpaved areas will be taken from the top 100mm, then each distinct fill profile thereafter, with a minimum of one sample per 1m depth of each fill profile.
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 for chemical contaminants will be preserved by immediate storage in an insulated sample container with ice. On completion of the fieldwork, these 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. Soil samples and/or FCF for asbestos analysis will be stored in zip-lock bags and placed in a suitable container for transport. On completion of the fieldwork, these samples will be delivered in the 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	It is proposed to sample from the three groundwater monitoring wells that were installed for the DSI. These include: MW203, MW207 and MW208 (refer to Figure 2 attached).
Monitoring Well Installation	The monitoring well construction details are documented on the appropriate borehole logs attached in Appendix B. The monitoring wells were installed to depths of approximately 9.4mBGL to 12.7mBGL.
Groundwater Sampling	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 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 was not in drawdown.

Aspect	Input
	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 report.
Decontaminant and Sample Preservation	The 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 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 10 selected soil samples will be analysed for: asbestos (500ml);
- Up to two representative fibre cement fragments, if found on or in soil, will be analysed for asbestos;
- Up to four selected soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH; BTEX; OCPs and OPPs; and PCBs;
- Up to two selected soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and, OCPs and OPPs;
- Up to two selected soil samples for TCLP leachability analysis for PAHs and selected metals has been included to provide a preliminary waste classification for the off-site disposal of soil in accordance with NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014). In the event this budget is not utilised for TCLP analysis, it may be utilised for additional soil analysis, where deemed appropriate; and

- Up to three groundwater samples (allowance of one per well) will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and PAHs.

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 accessible soils' exposure scenario (HIL-A). These SAC also apply to primary schools;
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B), which also apply to primary schools. HSLs will be calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[11]; and
- Asbestos will be assessed against the HSL-A 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-A 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)[12]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.01% 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): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (g)}}{\text{Soil weight (g)}}$

[11] 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*

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

5.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. The EILs will only be applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene will be increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[13];
- ESLs will be adopted based on the soil type; and
- EILs for selected metals will be calculated based on the most conservative added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[14]. 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)[15] 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.

[13] 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)

[14] 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

[15] 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)[16]. Environmental values for the supplementary environmental investigation include aquatic ecosystems, human uses (consumption, incidental contact and recreational water use), and human-health risks in non-use scenarios (vapour intrusion).

5.2.1 Human Health

- During the DSI, bedrock was encountered at depths shallower than 2mBGL and groundwater was encountered at depths of 3.84mBGL to 6.34mBGL. On this basis, a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater will be undertaken. The assessment will include a 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 will be based on the USEPA Region 9 screening levels for naphthalene (threshold value for tap water);
- The Australian Drinking Water Guidelines 2011 (updated 2021)[17] will be multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater (e.g. within down-gradient water bodies, with bore water used for irrigation, or with seepage water during construction). These have been deemed as 'recreational' SAC; and
- ADWG 2011 criteria will be adopted as screening criteria for consumption of groundwater.

5.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species will be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[18]. 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.

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

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

[18] 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 REPORTING REQUIREMENTS

A supplementary environmental investigation 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)[19].

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

7 LIMITATIONS

The report limitations are outlined below:

- This SAQP was developed based on the information available, as documented in this plan. There is always a potential that the proposed investigation will identify contamination impacts (actual or potential) that trigger a need for further investigation;
- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The plan is based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The preparation of this report has been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

Important Information About This Report

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

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the JKE proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

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

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

Changes in Subsurface Conditions

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

This Report is based on Professional Interpretations of Factual Data

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

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

Investigation Limitations

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

Misinterpretation of Site Investigations by Design Professionals

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

Logs Should not be Separated from the Investigation Report

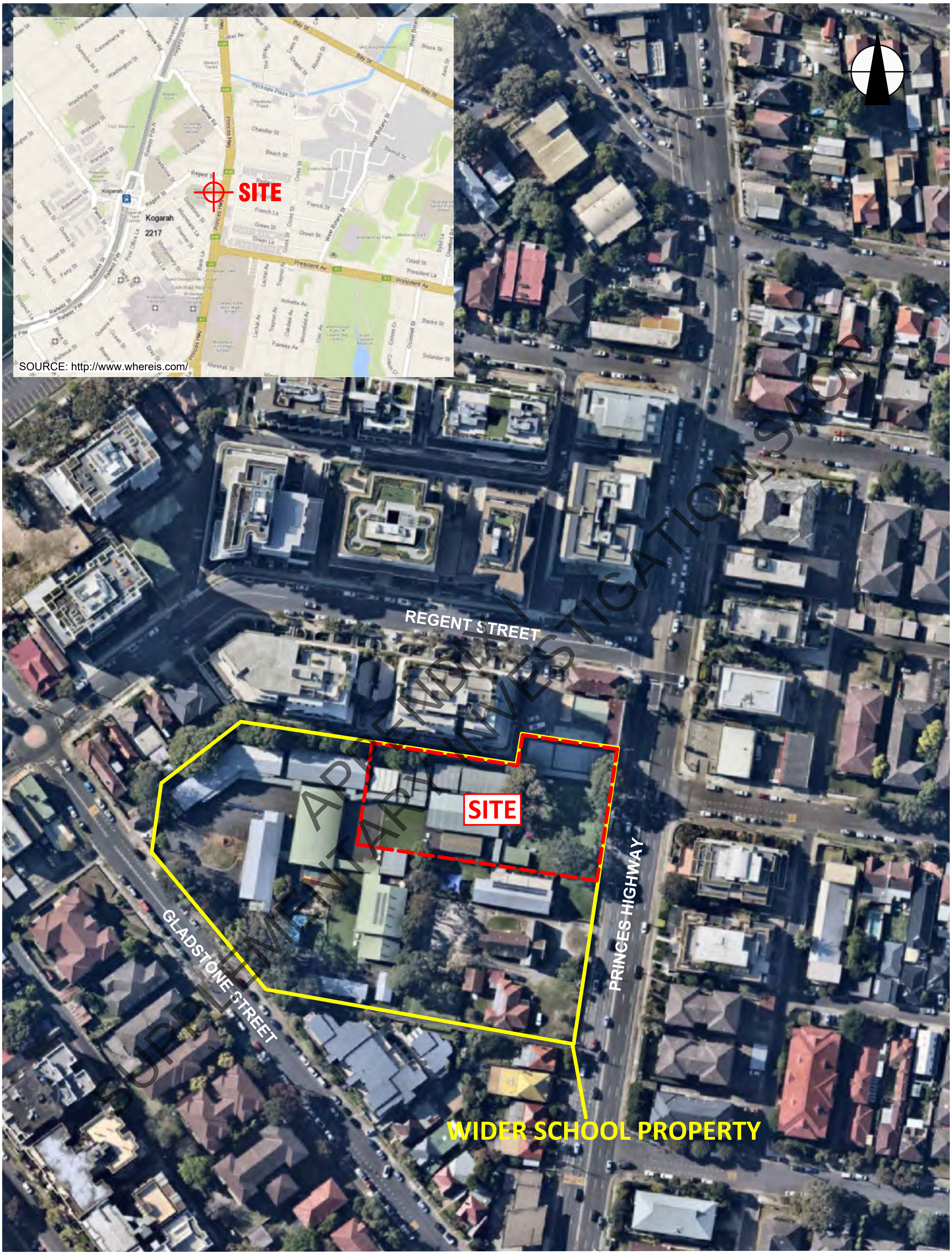
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

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

Read Responsibility Clauses Closely

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

Appendix A: Report Figures



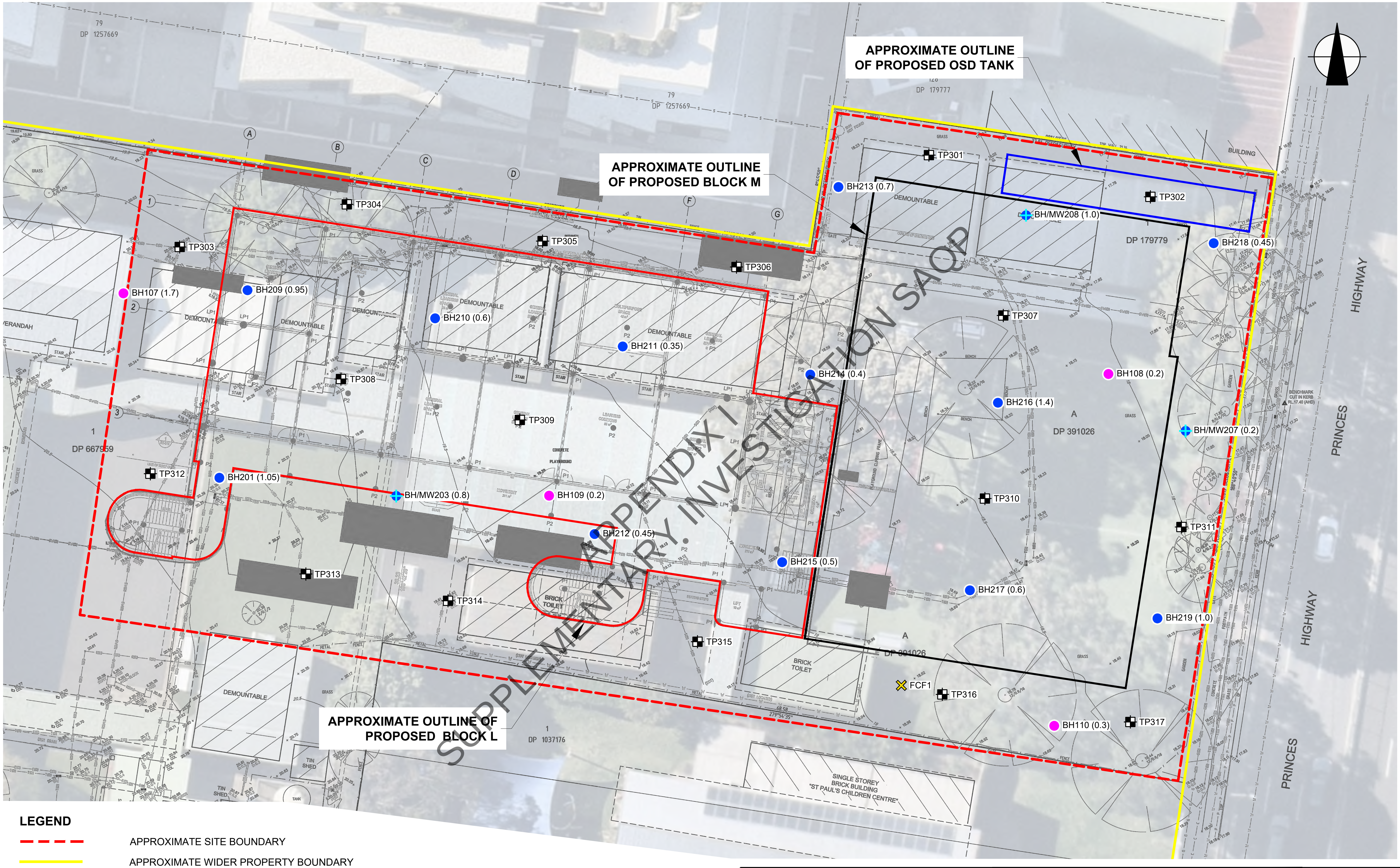
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	24B GLADSTONE STREET, KOGARAH, NSW
Project No: E32976BT2	Figure No: 1

JKEnvironments

PLOT DATE: 4/03/2025 2:32:32 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CADE32976BT2.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI, 2025)
BH/MW203	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI 2025
FCF(Surface)	)FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
TP301	PROPOSED TEST PIT LOCATION AND NUMBER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: **PROPOSED SUPPLEMENTARY INVESTIGATION SAMPLE LOCATION PLAN**

Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976BT2

Figure No: 2

JKEnvironments

PLOT DATE: 5/03/2025 10:35:18 AM DWG FILE: K:\5C EIS JOBS\32000\E32976BT KOGARAH (KPS_JCHS)\CAD\EP71307PT.DWG

Appendix B: Borehole Logs for Existing Monitoring Wells

JKGeotechnics

BOREHOLE LOG

Borehole No.
203

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~19.9 m
Date: 15/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING										ASPHALTIC CONCRETE: 100mm.t				
									-	FILL: Silty sand, fine to medium grained, dark grey.	M			SCREEN: 0.6kg, 0.1-0.4m, NO FCF
					N > 3 1,3/ 150mm REFUSAL					FILL: Sandy silty clay, low plasticity, dark grey, fine to medium grained sand, trace of fine to medium grained sandstone gravel.	w>PL			SCREEN: 1.5kg, 0.5-0.8m, NO FCF
						19			-	SANDSTONE: fine to medium grained, light grey.	DW	M		HAWKESBURY SANDSTONE
							1			REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE
						18	2							GROUNDWATER MONITORING WELL INSTALLED TO 12.18m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.18m TO 12.18m. CASING 0.1m TO 2.18m. 2mm SAND FILTER PACK 0.85m TO 12.18m. BENTONITE SEAL 0.1m TO 3.85m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						17	3							
						16	4							
						15	5							
						14	6							
						13								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
203

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1	**Core Size:** NMLC	**R.L. Surface:** ~19.9 m
Date: 15/1/25	**Inclination:** VERTICAL	**Datum:** AHD
Plant Type: JK308	**Bearing:** N/A	**Logged/Checked By:** J.F./A.B.

Water Loss\Level	RL (m AHD)	Depth (m)	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
	19	1.00	START CORING AT 1.00m					
ON COMPLETION OF CORING		1.00	SANDSTONE: fine to medium grained, light grey, with orange brown bands, bedded at 0-15°.	MW	M - H	0.90, 0.70	(1.35m) Be, 5°, P, R, Clay Vn	Hawkesbury Sandstone
98% RETURN	18	1.90	SANDSTONE: fine to medium grained, orange brown and light brown, with grey laminae, bedded at 0-15°.			1.1, 0.80, 0.90, 1.0, 1.2	(3.41m) XWS, 5°, 30 mm.t	
4 HRS AFTER COMPLETION	16	4.45	SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-5°.	FR		0.70	(4.44m) Be, 0°, P, R, Fe Vn	
	15	4.61	Extremely Weathered sandstone: sandy CLAY, low plasticity, light grey, fine to medium grained sand.	XW	Hd		(4.61-5.05m) HP: >600, >600, >600 kPa	
ON 13/2/25		5.05	SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 0-10°.	FR	M - H	0.80, 0.40, 1.1, 1.0	(5.67m) Be, 0°, P, R, Clay Vn; (6.05m) XWS, 0°, 10 mm.t	
	13							

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 203

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~19.9 m
Date: 15/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Depth (m)	RL (m AHD)	Core Description	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Specific	Formation
7.0–7.04		SANDSTONE: as above	FR	M - H		(7.04m) XWS, 0°, 5 mm.t	Hawkesbury Sandstone
7.04–7.6		SANDSTONE: fine grained, grey, with Siltstone, dark grey laminae, bedded at 0-5°.	FR	M - H	1.6		
7.6–7.85		LAMINITE: Sandstone, fine grained, grey, interlaminated with Siltstone, dark grey, bedded at 0-5°.	FR	L - M	0.30	(7.80m) XWS, 0°, 10 mm.t	
7.85–9.0	12	SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-10°.	FR	H	1.4, 1.2	(8.23m) Be, 0°, P, S, Clay Ct; (8.79m) Be, 0°, P, S, Clay Ct	
9.0–11.95	11, 10, 9, 8	SANDSTONE: fine to medium grained, light brown and orange brown, bedded at 0-20°.	SW	H	1.6, 2.2, 1.8, 1.7, 1.0, 3.2	(9.00m) Be, 0°, P, S, Fe Sn; (10.39m) Be, 10°, P, R, Fe Sn; (11.96m) Be, 0°, P, R, Clay Ct	
11.96–12.18		SANDSTONE: fine to medium grained, light grey, with grey laminae, bedded at 0-15°.	FR	H	1.1		
12.18		END OF BOREHOLE AT 12.18 m					

Column headers: Water Loss\Level; Barrel Lift; RL (m AHD); Depth (m); Graphic Log; CORE DESCRIPTION – Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components; Weathering; Strength; POINT LOAD STRENGTH INDEX $I_s(50)$ (VL -0.1, L -0.3, M -1, H -3, VH -10, EH); DEFECT DETAILS – SPACING (mm) 600 200 60 20; DESCRIPTION – Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness – Specific, General; Formation

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No. **207**

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** SPIRAL AUGER **R.L. Surface:** ~17.9 m
Date: 16/1/25 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING										FILL: Silty sand, fine to coarse grained, dark brown, trace of rubber and plastic fragments.	M			SYNTHETIC GRASS COVER
									-	SANDSTONE: fine to medium grained, light grey, red brown and orange brown.	DW	M		SCREEN: 12.35kg, 0-0.1m, NO FCF
														HAWKESBURY SANDSTONE
						17	1			REFER TO CORED BOREHOLE LOG				MODERATE 'TC' BIT RESISTANCE
														'TC' BIT REFUSAL
						16	2							GROUNDWATER MONITORING WELL INSTALLED TO 12.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.0m TO 12.7m. CASING 0.1m TO 3.5m. 2mm SAND FILTER PACK 1.8m TO 12.7m. BENTONITE SEAL 0.5m TO 1.8m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						15	3							
						14	4							
						13	5							
						12	6							
						11								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 207

2 / 3

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~17.9 m
Date: 16/1/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK308 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Core Description (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	Point Load Strength Index $I_s(50)$	Defect Details – Specific (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
				START CORING AT 0.68m					
		17	1	SANDSTONE: fine to medium grained, light brown, with light grey bands, massive.	MW	M	0.60, 0.60		Hawkesbury Sandstone
		16	2	as above, but with brown laminae, cross bedded at 0-20°.			0.70, 0.90		
ON COMPLETION OF CORING		15	3	SANDSTONE: fine to coarse grained, light grey, with red brown bands and grey laminae, bedded at 0-10°.	HW	L	0.10, 0.20, 0.20	(2.32m) XWS, 0°, 25 mm.t; (2.38m) Be, 10°, P, R, Clay Vn; (2.52m) Be, 10°, P, R, Clay FILLED, 5 mm.t; (2.58m) Be, 5°, P, R, Clay FILLED, 5 mm.t; (2.71m) Be, 5°, P, R, Clay Vn; (3.01m) XWS, 5°, 10 mm.t; (3.11m) XWS, 1°, 10 mm.t	
98% RETURN				Extremely Weathered sandstone: sandy silty CLAY, low plasticity, light grey and red brown, fine to medium grained sand.	XW	Hd		(3.68m) Be, 0°, P, R, Fe Sn	
ON 13/2/25		14	4	SANDSTONE: fine to medium grained, light grey, with orange brown laminae, bedded at 0-25°.	HW	L	0.30	(4.00m) Be, 0°, P, S, Clay FILLED, 5 mm.t; (4.10m) XWS, 0°, 50 mm.t; (4.23m) XWS, 10°, 70 mm.t	
		13	5	as above, but light grey, with grey and dark grey laminae.		L / M	0.20, 0.20, 0.40, 0.60	(5.25m) Be, 10°, P, S, Clay Vn; (5.58m) Be, 5°, P, R, Clay Ct	
		12	6	LAMINITE: Sandstone, fine to medium grained, grey, interbedded with Siltstone, dark grey, bedded at 0-5°.	FR	M - H	1.2		
		11		SANDSTONE: as below			0.90	(6.64m) J, 60°, P, R, Cn; (6.78m) Be, 0°, P, S, Clay Vn	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
207

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 | **Core Size:** NMLC | **R.L. Surface:** ~17.9 m
Date: 16/1/25 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK308 | **Bearing:** N/A | **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION: Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness (Specific)	Formation
98% RETURN					SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, and occasional siltstone bands, bedded at 0-5°	FR	M - H	1.3	(7.37m) Be, 0°, P, S, Clay Vn	Hawkesbury Sandstone
		10	8		SANDSTONE: fine to medium grained, light grey, massive, indistinct occasional grey laminae, indistinctly bedded at 0-5°.		H	1.1, 1.8, 1.7	(8.13m) CS, 0°, 50 mm.t	
		9	9		SANDSTONE: fine to medium grained, light grey, with grey laminae, cross-bedded at 10-20°.			2.1, 1.4, 1.0, 1.3, 0.90, 1.1	(9.07m) XWS, 0°, 10 mm.t (10.38m) Be, 0°, P, R, Clay Vn	
		8, 7	10, 11							
		6	12		SANDSTONE: fine to medium grained, light grey, massive, with grey brown indistinctly cross-bedded at 10-20°.			1.1, 1.4, 2.3	(11.70m) CS, 0°, 70 mm.t (12.58m) Be, 0°, P, S, Clay Vn	
		5, 4	13		END OF BOREHOLE AT 12.72 m					

Strength scale: VL -0.1, L -0.3, M -1, H -3, VH -10, EH
Spacing (mm): 600, 200, 60, 20
General

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No.
208

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Method:** HAND AUGER / SPIRAL AUGER **R.L. Surface:** ~18.1 m
Date: 31/1/25 TO 10/2/25 **Datum:** AHD
Plant Type: JK330 **Logged/Checked By:** J.F./A.B.

Groundwater Record	SAMPLES ES	U50	DB	DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING	ES					18				FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, plastic fragments, slag and root fibres.	M			GRASS COVER SCREEN: 10.55kg, 0-0.1m, NO FCF
				DS	N = 9 6,6,3					FILL: Silty sandy clay, low to medium plasticity, dark grey brown, fine to medium grained sand, trace of plastic fragments and ash.	w<PL M			APPEARS MODERATELY COMPACTED
						17	1		-	FILL: SIlty sand, fine to medium grained, dark grey brown.				HAND AUGER TO 0.55m
										SANDSTONE: fine to medium grained, orange brown.	DW	M		HAWKESBURY SANDSTONE MODERATE 'TC' BIT RESISTANCE
						16	2			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 9.4m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.4m TO 9.4m. CASING 0.1m TO 3.4m. 2mm SAND FILTER PACK 2.9m TO 9.4m. BENTONITE SEAL 0.1m TO 2.9m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						15	3							
						14	4							
						13	5							
						12	6							

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.1 m
Date: 31/1/25 TO 10/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK330 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Depth (m)	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS – DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) – Specific	Formation
	1.32	START CORING AT 1.32m					
98% RETURN	1.32 – 1.90	SANDSTONE: fine to medium grained, orange brown, with light grey bands, bedded at 0-5°.	MW	L - M	0.50, 0.20	(1.57m) Be, 0°, P, R, Fe Vn (1.62m) Be, 5°, C, R, Fe Vn	
0% RETURN	1.90 – 2.45	NO CORE 0.55m					
	2.45 – 3.25	SANDSTONE: fine to medium grained, red brown, with light grey bands and laminae, bedded at 0-20°.	MW	M - H	0.60, 1.0	(2.47m) Be, 0°, P, S, Clay Vn (3.24m) Be, 0°, P, R, Clay Ct	Hawkesbury Sandstone
	3.25 – 3.98	as above, but bedded at 0-10°.	HW	L; VL	0.20, 0.080	(3.38m) XWS, 5°, 40 mm.t (3.95m) XWS, 0°, 5 mm.t	Hawkesbury Sandstone
	3.98 – 4.03	NO CORE 0.05m					
	4.03 – 4.60	SANDSTONE: fine to medium grained, red brown and light grey, bedded at 0-10°.	MW	L	0.20		Hawkesbury Sandstone
ON 13/2/25	4.60 – 7.70	as above, but light grey, with dark grey laminae.	FR	L; M	0.20, 0.20, 0.30, 0.50, 0.70, 1.0, 0.60, 0.70	(4.97m) Be, 0°, P, S, Clay Ct (5.41m) Be, 5°, P, R, Fe Vn (5.77m) CS, 0°, 1 mm.t (6.37m) XWS, 0°, 60 mm.t (7.30m) Be, 0°, P, S, Clay Vn	Hawkesbury Sandstone
	7.70 –	SANDSTONE: as below.	MW	M - H	0.30	(7.73m) Be, 0°, P, R, Fe Ct (7.78m) XWS, 0°, 30 mm.t (7.88m) Be, 5°, P, S, Fe Ct	Hawkesbury Sandstone

RL (m AHD): 17, 16, 15, 14, 13, 12, 11
Depth (m): 2, 3, 4, 5, 6, 7

Strength: VL -0.1, L -0.3, M -1, H -3, VH -10, EH
Spacing (mm): 600, 200, 60, 20

JKGeotechnics

CORED BOREHOLE LOG

Borehole No.
208

Client: NSW DEPARTMENT OF EDUCATION
Project: PROPOSED UPGRADES
Location: KOGARAH PUBLIC SCHOOL, 24B GLADSTONE STREET, KOGARAH, NSW

Job No.: 32976LT1 **Core Size:** NMLC **R.L. Surface:** ~18.1 m
Date: 31/1/25 TO 10/2/25 **Inclination:** VERTICAL **Datum:** AHD
Plant Type: JK330 **Bearing:** N/A **Logged/Checked By:** J.F./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	SPACING (mm)	DEFECT DETAILS – DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness) Specific / General	Formation
0% RETURN		10			SANDSTONE: fine to medium grained, orange brown, with red brown and light grey bands, bedded at 0-15°.	MW	M - H	1.0			Hawkesbury Sandstone
					as above, but bedded at 0-30°.			2.2			
		9	9		SANDSTONE: fine to medium grained, orange brown and light grey, bedded at 0-15°.			0.20, 0.80		(8.92m) Be, 5°, P, R, Fe Ct	
					SANDSTONE: fine to medium grained, red brown and orange brown, bedded at 0-10°.		H	1.3		(9.40m) Be, 0°, P, R, Fe Ct	
		8	10					2.0			
		7	11					1.6, 1.8, 1.0			
					as above, but with light grey bands.			2.3		(11.64m) Be, 10°, P, S, Clay Vn	
		6	12		END OF BOREHOLE AT 12.05 m						
		5	13								
		4	14								

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:

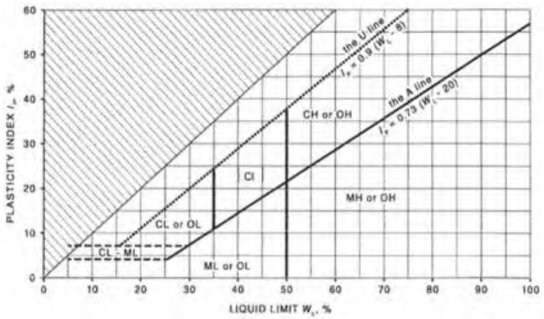
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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



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 U50 DB DS ASB ASS SAL PFAS	Sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos analysis. Soil sample taken over depth indicated, for acid sulfate soil analysis. Soil sample taken over depth indicated, for salinity analysis. Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL $w \approx$ PL w < PL $w \approx$ LL w > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.

Density Index/ Relative Density (Cohesionless Soils)	Symbol		Density Index (I_D) Range (%)	SPT 'N' Value Range (Blows/300mm)
	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

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength: Point Load Strength Index $Is_{(50)}$ (MPa)	Guide to Strength: 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 C: Activity Specific AMP

REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

ACTIVITY SPECIFIC ASBESTOS MANAGEMENT PLAN

FOR

ENVIRONMENTAL INVESTIGATION (TEST PITTING)

AT

24B GLADSTONE STREET, KOGARAH, NSW

Date: 19 March 2025

Ref: E32976BT2rpt5-AMP

JKEnvironments
www.jkenvironments.com.au

T: +61 2 9888 5000
JK Environments Pty Ltd
ABN 90 633 911 403

Report prepared by:

Katrina Taylor
Senior Associate | Environmental Scientist
Licenced Asbestos Assessor (LAA1025)

Report reviewed by:

Brendan Page
Principal | Environmental Scientist

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

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E32976BT2rpt5-AMP	Final Report	19 March 2025

Table of Contents

List of Tables

Attachments

Abbreviations

Asbestos Containing Material	**ACM**
Asbestos Fines/Fibrous Asbestos	**AF/FA**
Asbestos Management Plan	**AMP**
JK Environments	**JKE**
JK Geotechnics	**JKG**
National Association of Testing Authorities	**NATA**
Personal Protective Equipment	**PPE**
Protection of the Environment Operations	**POEO**
Work Health and Safety	**WHS**

Units

Fibres per millilitre	**Fibres/mL**
Kilogram	**kg**
Micron	**µm**

1 INTRODUCTION

NSW Department of Education ('the client') commissioned JK Environments (JKE) to carry out a supplementary environmental investigation for the proposed development works at Lot 4, 47-51 Waratah Street, Kirrawee, NSW ('the site'). This Activity Specific Asbestos Management Plan (AMP) has been prepared exclusively to manage asbestos-related risks during the intrusive supplementary investigation works. This AMP is not intended to be used for the day-to-day management of asbestos at the site during the typical site operations and is not be used in relation to any asbestos materials associated with the buildings or structures on site.

The proposed scope of intrusive field works at the site includes the excavation of test pits for environmental purposes. These intrusive works may disturb asbestos impacted fill at the site. This AMP includes management requirements for working, handling, temporary storage, removal, transportation and disposal procedures, and visual clearance inspections. The AMP has been prepared generally in accordance with the requirements of SafeWork NSW.

1.1 Aims and Objectives

The aim of the AMP is to outline the procedures to be implemented in order to effectively manage the asbestos-impacted material at the site during intrusive works, in accordance with relevant Codes of Practice and Work Health and Safety (WHS) legislation. The objectives of the AMP are to:

- Outline the applicability of the AMP and the various roles and responsibilities;
- Provide a protocol for managing the excavation works, including the identification of safe work procedures to minimise potential health effects to site workers/contractors and adjacent land users; and
- Document procedures for potential asbestos waste handling and transport.

1.2 Scope of Work

The scope of work includes preparation of the AMP which provides:

- Details of roles and responsibilities;
- Methodologies for protecting workers during intrusive field works, including personal protective equipment (PPE), decontamination and visual surface clearance requirements; and
- Procedures and protocols to manage the asbestos related risks, minimise potential asbestos exposure risks to personnel/workers involved in the field works, safe handling of asbestos containing materials and minimisation of potential asbestos exposure risks to the general public/site users in the vicinity of the proposed work areas on site.

The scope of work was undertaken with reference to the WHS Regulation 2017 and the SafeWork NSW Codes of Practice: How to Manage and Control Asbestos in the Workplace (2022)[1]; and How to Safely Remove Asbestos (2022)[2]. Other guidelines and legislation/regulations have been referenced throughout the AMP where applicable.

[1] Safe Work NSW (2022a). *Code of Practice How to Manage and Control Asbestos in the Workplace*. (referred to as CoP How to Manage and Control Asbestos in the Workplace) (December 2022)
[2] Safe Work NSW (2022b). *Code of Practice How to Safely Remove Asbestos*. (referred to as CoP How to Safely Remove Asbestos) (December 2022)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	24B Gladstone Street, Kogarah, NSW
Lot & Deposited Plan:	Lot 1 in DP179779, Lot A in DP391026, and part of Lot 1 in DP667959
Current Land Use:	Primary School (Kindergarten to Year 6)
Site Area (m^2) (approx.):	4,375
Geographical Location (decimal degrees) (approx. centre of site):	Latitude: -33.9618430 Longitude: 151.1370970
Site Plans:	Appendix A

JKE has previously undertaken a Phase 1 Desktop Assessment (desktop), a Phase 2 Preliminary Intrusive Investigation (intrusive investigation), and a Detailed Site Investigation (DSI) at the site. The following asbestos related finds were reported during the previous investigations:

- A single fragment of bonded asbestos containing material (ACM) on fill/soil during the site inspection in 2020. The source of the asbestos appeared to be a fibre cement board at the base of the neighbouring fence and was considered unlikely to be associated with on-site soils in that vicinity;
- A bag of fibre cement fragments (FCF)/suspected ACM (collected by others) was found on site during the DSI works in 2025. It was unclear if the material in the bag was associated with the demolition works recently undertaken at the site, or associated with surficial FCF/ACM identified on the exposed fill soils beneath these buildings (i.e. associated with imported fill); and
- Detection of asbestos [asbestos fines/fibrous asbestos (AF/FA)] in fill/soil material in one location (BH203, refer to Figure 2). The asbestos was in the friable form based on the laboratory identification of AF/FA and the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[3] definitions. However, the occurrence of AF/FA appeared to be minor and not representative of the broader soil conditions as there were no detections elsewhere on site. The concentration of AF/FA in the fill soil sample from BH203 was very low and was below the respective Site Assessment Criterion (SAC) of 0.001%w/w presented in Schedule B1 of NEPM 2013. The source of asbestos in fill at this location was considered likely to either be associated with historical demolition activities, or imported fill material which was encountered to varying depths across the site. The asbestos was detected in fill soils beneath asphaltic concrete pavement.

Asbestos as AF/FA was not identified in any other samples collected from the site, therefore, the asbestos impact at BH203 was considered likely to be associated with bonded (non-friable) asbestos containing material (ACM) as sporadic occurrences of AF/FA can often be found co-located with ACM. The occurrence of demolition rubble inclusions in the fill supported this opinion.

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

Based on the above, management provisions discussed in this AMP are on the basis that asbestos in soil is associated with bonded/non-friable ACM (i.e. ‘fibro’) in the vicinity of BH203.

3 ASBESTOS CONTAMINATION INFORMATION

The presence of asbestos in fill has only been confirmed at one location, BH203.

There is considered to be a potential for additional occurrences of asbestos in fill in other areas of the site as the fill contained demolition rubble inclusions which is often a precursor for asbestos. Notwithstanding, the investigations have not identified asbestos in fill/soil at any other location to date.

The exposure pathway for asbestos is via inhalation of airborne asbestos fibres. Exposure to asbestos fibres poses a potential risk to human health. The potential for release and transport of asbestos fibres via disturbance of soil containing asbestos has the potential to increase during the proposed excavation works. The human receptors most at risk of asbestos fibre release during field works and soil disturbance activities include the excavator operator, field engineer and nearby land users (e.g. site workers, contractors, land users beyond the site boundary, and visitors). Risks to these receptors will be mitigated under this AMP.

Asbestos fibres can range in size from 0.1 to 10 microns (µm) (one tenth the size of a grain of sand) and are a potential particulate respiratory hazard. The small fibres gain relatively easy access to the lung airways and air sacs. Damage to the respiratory tract generally tends to be time/dose dependent. An individual exposed to high doses of asbestos for long periods of time will have an increased risk of developing asbestos related diseases. In addition, the effects of asbestos related diseases are usually not detectable for 1 to 30 years after the initial exposure. This is called the latency period, and is a distinguishing feature of asbestos related diseases.

4 APPLICATION OF THE AMP AND RESPONSIBILITIES

4.1 Application of the AMP

This AMP shall apply from the commencement of soil/fill disturbance works at each test pit location, until disturbance of the fill ceases and the test pit is reinstated. The AMP is not intended to be a long-term management plan and as such it will cease to apply on completion of the field works.

4.2 Roles and Responsibilities

JKE is primarily responsible for the implementation of this AMP and will be responsible for securing the work area, arranging air monitoring during the works, implementing risk mitigation measures (as required) and managing any occurrences of asbestos encountered during test pitting.

Day to day works will be managed by the JKE field scientist, reporting to the project manager. The JKE field scientist is deemed to be a competent person and will be responsible for:

- Coordinating airborne asbestos monitoring (subcontracted to Clear Safe);
- Asbestos clearance inspections;
- Asbestos sampling and assessment;
- Review of results of any assessments;
- Advice and recommendations arising from monitoring and/or inspections during test pitting;
- Review and comment on WHS documentation with respect to asbestos assessment, management and control (as required); and
- Notification of field staff and the client if required, of any observed or documented non-compliance with this AMP.

JKE's Licensed Asbestos Assessor (LAA) is available to provide advice on WHS issues for asbestos-related works, as required, in the event suspected friable asbestos is observed. The LAA holds a NSW Asbestos Assessor Licence.

5 LEGISLATIVE REQUIREMENTS

5.1 Legislative Requirements and Regulations/Guidelines

All works must be undertaken with regards to (but not limited to) the following:

- Protection of the Environment Operations (POEO) Act 1997 (NSW);
- POEO (Waste) Regulation 2014 (NSW);
- Work Health and Safety Act 2011 (NSW);
- Work Health and Safety Regulation 2017 (NSW);
- Contaminated Land Management Act 1997 (NSW);
- CoP How to Manage and Control Asbestos in the Workplace;
- CoP How to Safely Remove Asbestos;
- National Occupational Health and Safety Commission (NOHSC), (2005). Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (NOHSC:3003 [2005]);
- NOHSC, (2005). Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment 3rd Edition (NOHSC:3008 [1995]);
- AS/NZS 1715:2009 Selection, Use and Maintenance of Respiratory Protective Devices; and
- AS/NZS 1716:2012 Respiratory Protective Devices.

5.2 Non-Compliance with the AMP

Where a non-compliance with this AMP is identified, JKG's project Principal is to be notified. Where a non-compliance cannot be rectified, site works should cease, the AMP and asbestos controls reviewed, and revisions made as required.

5.3 SafeWork NSW Notification

Asbestos removal works triggering notification to SafeWork NSW is not proposed.

6 MANAGEMENT

This section outlines the requirements for managing the intrusive field works which we understand will broadly include:

1) Excavation of test pits using mechanical excavator;
2) Environmental soil sampling; and
3) On-site management of spoil and reinstatement of the test pit locations as agreed with the client.

We note that the site itself is fenced off and isolated from the wider school property. The following subsections outline the field work procedure to be implemented in the asbestos zone and also the remaining areas in the site that fall outside of this zone.

6.1 Areas of Site Outside the Asbestos Works Zone

6.1.1 PPE

As a minimum, all personnel on site will be required to wear the following PPE during intrusive works involving soil disturbance unless otherwise outlined in task specific documentation:

- Steel-capped boots (preferably lace-less);
- Hard hat meeting relevant standards;
- High visibility clothing;
- Gloves; and
- P2 rated disposable dust mask, or a half-face respirator fitted with an appropriate particulate filter in compliance with the relevant standards. Respiratory Protective Devices and be used in accordance with AS/NZS 1715:2009.

6.1.2 Field Work

For all areas of the site outside of the identified asbestos works zone (refer to Figure 2 in Appendix A), the following actions are to be implemented:

- The asphaltic concrete pavement can be removed as required at each test pit location and should be kept separate from the underlying material. This material will be reinstated in the test pit as appropriate. In test pits positioned beneath astir turf, the Astro turf will be cut and peeled back;
- To minimise the release of fugitive dust into the air the soil will be kept damp at all times (but not flooded). This will include the use of water sprays where necessary during excavation and sampling;
- On completion of sampling, the test pits will be backfilled to the surface with the spoil. A vibrating sled will be used to compact layers of spoil in the test pits. Excess spoil will be left on site in a skip bin. Where additional material is required to make up levels within the test pits, sand will be introduced and compacted;
- Test pits excavated in paved areas will be finished with cold mix levelled to match the surrounding ground surface. Test pits excavated in astro turf will be compacted to the surrounding ground level and the previously peeled back astro turf will be laid back over the top and pinned using u-nails;
- The JKE field scientist will inspect the ground surface following test pitting and reinstatement of the borehole to confirm there is not visible excess spoil material; and
- The air monitoring subcontractor (Clear Safe) will be conducting air monitoring throughout the works.

6.1.3 Unexpected Finds Contingency

In the event that ACM is encountered in the soil in areas outside of the asbestos works zone, or if the material is suspected of being friable asbestos, all works must cease and the procedures outlined under Section 6.2 Asbestos Works Zone (BH203) must be implemented.

6.2 Asbestos Works Zone (BH203 area)

6.2.1 Asbestos Specific PPE

In addition to the site specific PPE, as a minimum, all personnel on site will be required to wear the following asbestos specific PPE during works in asbestos work zones unless otherwise outlined in task specific documentation:

- P2 rated disposable dust mask, or a half-face respirator fitted with an appropriate particulate filter in compliance with the relevant standards. Respiratory Protective Devices and be used in accordance with AS/NZS 1715:2009;
- Disposable coveralls that prevent tearing and penetration of asbestos fibres (e.g. coveralls type 5, category 3 per EN ISO 13982–1 or equivalent); and
- Disposable boot covers made of a material consistent with the disposable coveralls or:
  - Gumboots may be worn in the asbestos removal area if they are decontaminated upon exiting the asbestos removal area; or
  - A separate set of work boot may be maintained in the asbestos work zone.

Care should be taken to ensure PPE compatibility and that a suitable degree of worker comfort is maintained. Regardless of the PPE adopted, asbestos removal workers must undertake appropriate personal decontamination upon leaving the asbestos work zone as outlined in the CoP How to Safely Remove Asbestos.

6.2.2 Field Work

The asbestos works zone is shown on Figure 2 in Appendix A. The following actions are to be implemented:

- Establish a defined asbestos work zone to limit access to the work area by installing bollards/witches' hats and warning signs so that the areas are not encroached upon by other site users (we note that other site users will be limited to the archaeological consultants undertaking their works concurrently). The zone will carry appropriate signage to indicate that asbestos disturbance/removal works are in progress. Where reasonably practicable to do so, the exclusion area will be established at a distance of 5-10m from the test pit/borehole using bollards or similar;
- The asphaltic concrete pavement will be removed as required at each test pit location and should be kept separate from the underlying material. This material will be disposed of accordingly;
- Prior to excavation of the fill, the surrounding areas will be covered with builder's plastic, or a similar material, to minimise the transfer of contaminated dust and/or soil to the surrounding areas;
- Works are to occur as required and any excavated material or spoil generated will be set aside on geofabric or builders' plastic, and managed on the assumption that it contains asbestos until or unless demonstrated otherwise;
- To minimise the release of fibres into the air the soil will be kept damp at all times (but not flooded). This will include the use of water sprays where necessary during excavation and sampling;

- On completion of sampling, the test pits will be backfilled to the surface with the spoil. A vibrating sled will be used to compact layers of spoil in the test pits. Excess spoil will be left on site in a skip bin. Where additional material is required to make up levels within the test pits, washed sand will be introduced and compacted;
- Test pits excavated in paved areas will be finished with cold mix levelled to match the surrounding ground surface. Test pits excavated in astro turf will be compacted to the surrounding ground level and the previously peeled back astro turf will be laid back over the top and pinned using u-nails;
- The JKE field scientist will inspect the ground surface following test pitting and reinstatement of the borehole to confirm there is not visible asbestos material; and
- The air monitoring subcontractor (Clear Safe) will be conducting air monitoring throughout the works.

6.3 Air Monitoring

During the intrusive field works, air monitoring will be undertaken by the subcontractor (Clear Safe) using calibrated portable air sampling pumps. Monitoring locations will be determined by Clear Safe, however, preliminary discussions have suggested two locations along the common boundary with residential areas and an additional three locations surrounding the work area each day. At the end of each day, the pumps and attached filters will be collected and analysed at a NATA-accredited laboratory.

Air monitoring works shall be conducted in accordance with NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (NOHSC:3003 [2005]). The results of air monitoring are to be provided to the JKE. The following action levels will be applied upon receipt of results:

- Reading of less than 0.01 fibres/mL – control measures implemented were appropriate and no action required; and
- Reading greater than 0.02 fibres/mL - control measures implemented may not have been appropriate, further action/site rectification may be required. SafeWork may need to be notified.

6.4 Isolation, Barricading and Signage

JKE is to take reasonable steps so the necessary measures are in place for the effective exclusion of unauthorised persons to asbestos work zones. The location, type and positioning of signs and labels must be decided, or authorised, by a competent person (i.e. the field scientist). Warning signs may include some of the following examples:

6.5 Restriction of Access to Asbestos Work Zone

Access to the asbestos- work area(s) will be restricted only to:

- Workers engaged for the intrusive field works, including JKE's field scientist and the excavator operator;
- Other persons associated with the intrusive field works such as the LAA (where required); and
- Anyone allowed under the WHS Regulation or another law to be in the asbestos works area.

6.6 Wet Methods

A low-pressure water spray is to be available and utilised as required for wetting down asbestos-impacted soils. This will be the primary control for dust generation and is considered adequate given the small-scale nature of the disturbance.

As a precautionary measure, this water spray will be utilised for wetting down all soils (including outside of the asbestos work zone), during the intrusive works.

6.7 Decontamination

A decontamination zone is to be established adjacent to a single entry/exit point to the asbestos work zone. Personal decontamination will include:

- Wiping down boots and coveralls with a wet rag and scraping off any soil clods; and
- Removing coveralls, gloves and then respirator/mask and placing in appropriate plastic asbestos waste bags within the provided disposal bin located at the entry/exit point.

Decontamination of the excavator/field equipment will include wiping down of the excavator bucket and any other equipment that comes into contact with the fill/soil.

6.8 Waste Management

6.8.1 Asbestos Waste (consumables and visible ACM)

Disposable items of PPE are to be bagged prior to being removed from the asbestos work zone. The bagged PPE will be deemed asbestos waste and will be bagged and placed in the designated asbestos waste bin onsite. Asbestos waste shall not be allowed to accumulate excessively within the work area and shall be bagged or placed in the skip bin as the work proceeds.

Sporadic fragments of ACM may be identified during the works and it is anticipated that this material will be sampled for further laboratory analysis.

6.8.2 Loading, Transport and Disposal of Asbestos Waste

Any asbestos waste from the works will be loaded directly into the designated asbestos waste bin onsite. The contents will be secured at the end of each working day (i.e. using a lockable lid or locating the skip in a secure area) to prevent unauthorised access.

The waste transporter is licenced for asbestos waste disposal and copies of asbestos waste disposal certificates/receipts will be obtained by JKE.

6.9 Clearance

The JKE field scientist will visually check the ground surface and clear any visible fibre cement/suspected ACM prior to moving to the next location. The result will be noted on the test pit logs and a clearance certificate will be issued.

7 DOCUMENTATION REQUIREMENTS

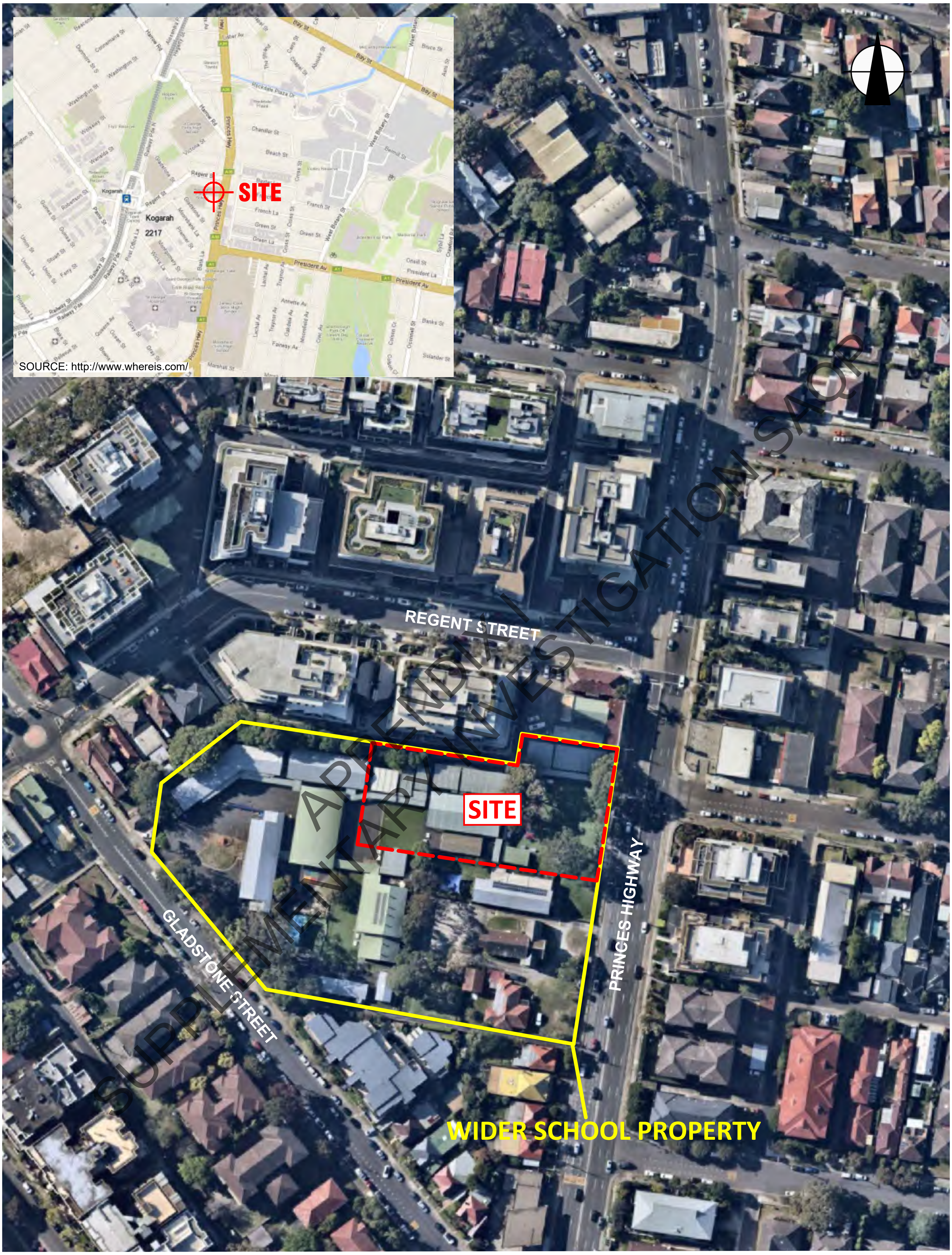
JKE will maintain records in relation to the works and implementation of the AMP. This will include but will not be necessarily limited to the following:

- Air monitoring reports and clearances;
- Waste disposal dockets (once received from the waste transporter); and
- Incident reports.

8 LIMITATIONS

- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during future development or maintenance 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 future work;
- 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 have not and will not make any determination regarding finances associated with the site;
- 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.

Appendix A: Report Figures



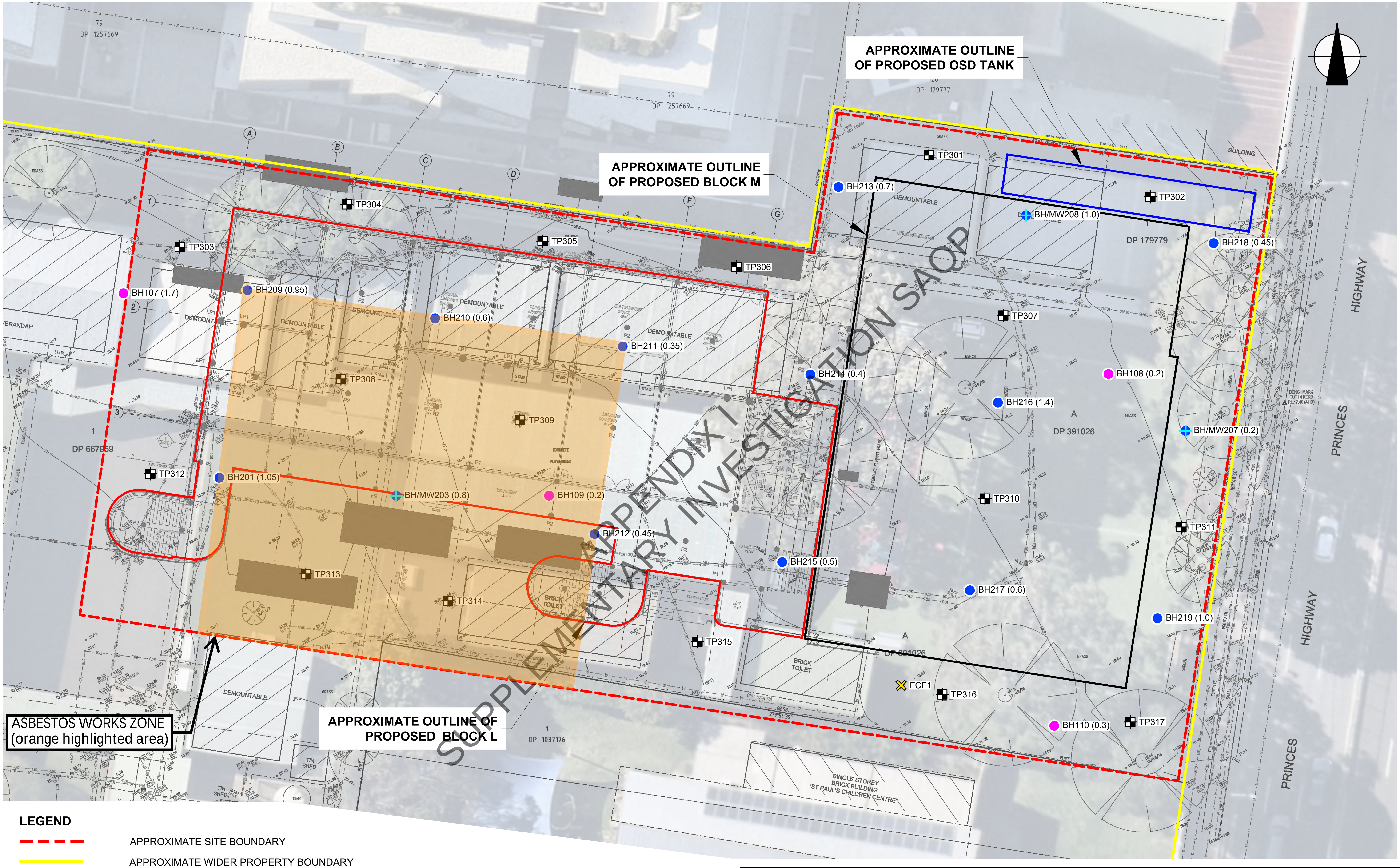
AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	SITE LOCATION PLAN
Location:	24B GLADSTONE STREET, KOGARAH, NSW
Project No: E32976BT2	Figure No: 1

JKEnvironments

PLOT DATE: 4/03/2025 2:32:32 PM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CADIE32976BT2.DWG



LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(yellow line)	APPROXIMATE WIDER PROPERTY BOUNDARY
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE INTRUSIVE INVESTIGATION, 2020)
BH202	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI, 2025)
BH/MW203	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI 2025
FCF(Surface)	)FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
TP301	PROPOSED TEST PIT LOCATION AND NUMBER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 3 6 9 12 15
SCALE 1:300 @A3 METRES

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

Title: **ASBESTOS WORKS ZONE**

Location: 24B GLADSTONE STREET, KOGARAH, NSW

Project No: E32976BT2

Figure No: 2

JKEnvironments

PLOT DATE: 5/03/2025 10:35:18 AM DWG FILE: K:\5C EIS JOBS\32000'S\E32976BT KOGARAH (KPS_JCHS)\CAD\EP71307PT.DWG

Appendix D: 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)[20] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[21]. The NEPM (2013) is consistent with these documents.

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

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

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

B. **Precision**

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

C. **Accuracy**

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

D. **Representativeness**

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

E. **Completeness**

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

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

[20] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[21] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix E: Guidelines and Reference Documents

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

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)

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 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

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

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)

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