REPORT TO

NSW DEPARTMENT OF EDUCATION

ON

REMEDIATION ACTION PLAN

FOR

LISMORE SOUTH PUBLIC SCHOOL – FLOOD RECOVERY REBUILD

AT

69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Date: 5 June 2025
Ref: E36310PTrpt6-RAP

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Executive Summary

The NSW Department of Education ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the Lismore South Public School (LSPS) – Flood Recovery Rebuild, at 69-79 Kyogle Street, South Lismore, NSW. For the purpose of the RAP, 'the site' includes the activity area only (i.e. the activity area) where works are proposed under the Review of Environmental Factors (REF). The site location is shown on Figure 1 and the RAP applies to the site as shown on Figure 2 attached in Appendix A.

The RAP includes a methodology to remediate and validate the site. A contingency plan for remediation is included together with site management procedures and an unexpected finds protocol (UFP) to be implemented during remediation.

The goal of the remediation is to reduce contamination-related risks to human health and the environment, and to render the site suitable for the proposed development from a contamination viewpoint.

The primary aim of the remediation at the site is to mitigate risks from asbestos in fill soil. The objectives of this RAP are to: provide a rationale to support the extent of proposed remediation and the remedial/validation approach; provide a methodology to remediate and validate the site; provide a contingency plan for the remediation works; outline site management procedures to be implemented during remediation work; and provide an unexpected finds protocol to be implemented during the development works.

The scope of work included a review of the previous reports, consultation with the client and preparation of a RAP.

The Detailed Site Investigation (DSI) identified fill impacted and contaminated with asbestos that requires remediation. The proposed remediation strategies for the contaminated fill include a combination of excavation and off-site disposal of contaminated fill/soil to a suitably licensed landfill, and in-situ capping of fill and long-term management of the capped areas via an Environmental Management Plan (EMP).

The anticipated sequence of remediation works is outlined at the beginning of Section 6 of this RAP. Remediation will occur concurrently with the development works and this should be considered by the determining authority so that the REF/approval align with the sequence of works and requirements of the RAP.

We are of the opinion that the site can be made suitable for the proposed development via remediation and the implementation of this RAP. A site validation report is to be prepared on completion of remediation activities and submitted to the determining authority to demonstrate that the site is suitable for the proposed development following completion of remediation/validation. An EMP will also be prepared to manage the contaminated fill capped on site as part of the remediation. The EMP will provide a passive management approach and is not expected to impose onerous constraints on the day-to-day site use under the proposed development scenario.

At the time of preparing this draft RAP, it is unclear whether the remediation will be Category 1 or Category 2. Advice will be needed from the client's expert planner in this regard. Reference should be made to the additional commentary in Section 10.1 of this RAP as it relates to the planning/approval requirements.

JKE is of the opinion that the RAP has met the objectives outlined in Section 2.1.

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

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Attachments

Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Before You Dig Australia	**BYDA**
Contaminated Land Management	**CLM**
Covered Outdoor Learning Area	**COLA**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Gap Investigation	**DGI**
Detailed Site Investigation	**DSI**
Environmental Management Plan	**EMP**
Environment Protection Authority	**EPA**
Fibre Cement Fragment(s)	**FCF**
General Learning Space	**GLS**
Health Investigation Level(s)	**HIL**
JK Environments	**JKE**
Lismore South Public School	**LSPS**
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**
Preliminary Site Investigation	**PSI**
Remediation Action Plan	**RAP**
Review of Environmental Factors	**REF**
Sampling, Analysis and Quality Plan	**SAQP**
State Environmental Planning Policy	**SEPP**
Source, Pathway, Receptor	**SPR**
Standing Water Level	**SWL**
Total Recoverable Hydrocarbons	**TRH**
Unexpected Finds Protocol	**UFP**
Virgin Excavated Natural Material	**VENM**
Work Health and Safety	**WHS**

Units	
Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Milligrams per Kilogram	**mg/kg**
Parts Per Million	**ppm**
Percentage weight for weight	**%w/w**
Percentage	**%**

1 CLIENT SUPPLIED INTRODUCTION

This Remediation Action Plan (RAP) has been prepared to support a Review of Environmental Factors (REF) for the rebuild of Lismore South Public School (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37 of the T&I SEPP.

The activity will be carried out at Lismore South Public School (LSPS) located 69-79 Kyogle Street, South Lismore (the site).

The purpose of this report is to provide a methodology to remediate and validate the site.

1.1 Client Provided Site Description

The site, located at 69-79 Kyogle Street, South Lismore, consists of two separate land parcels situated on either side of Wilson Street. The proposed activity will be undertaken on the eastern parcel, where most of the school's existing structures are located. The western parcel contains sports fields and temporary learning facilities. Figure 1 outlines the school's boundary, covering approximately 2.5 hectares. Due to flood damage, the existing buildings on the eastern parcel are currently unused, and students are temporarily using facilities on the sports field and oval, located on the western side of Wilson Street, adjacent to the primary school.

Figure 1 Aerial image of site (Source: Nearmap)

1.2 Proposed Activity Description

The proposed activity comprises the rebuild of the LSPS on the eastern parcel of the existing site, in South Lismore, and will be delivered in a single stage. The western parcel is out of the scope of the activity. Any works required on the western parcel (such as removal of demountable classrooms) will be subject to separate approval (if required).

A detailed description of the proposal is as follows:

1. Retention of the existing play equipment, Building K and covered outdoor learning area (COLA) on the western parcel.
2. Bulk earthworks, comprising fill and excavation and other site preparation works on the eastern parcel.
3. Construction of a new building on the eastern parcel for LSPS including:
    a. A one storey building (with undercroft areas below) fronting Kyogle Street containing a general learning space (GLS) hub, hall, library, support hub, administration, and pre-school.
    b. Undercroft outdoor learning areas as well as amenities and storage located on ground level.
4. Landscaping and public domain works, including tree planting, a games court in the northeast corner and an outdoor playing area adjacent to the preschool.
5. A car park on the eastern side of the site, with access from Kyogle Street.
6. Waste collection area access from Kyogle Street.
7. Multiple entrance points, including:
    a. Primary and secondary entries distributed on site frontages.
    b. Vehicular access point to provide access to waste collection/delivery areas and car parking.
8. Ancillary public domain mitigation measures.

Figure 2 below shows the scope of works. A selection of the supplied REF plans is attached in Appendix B.

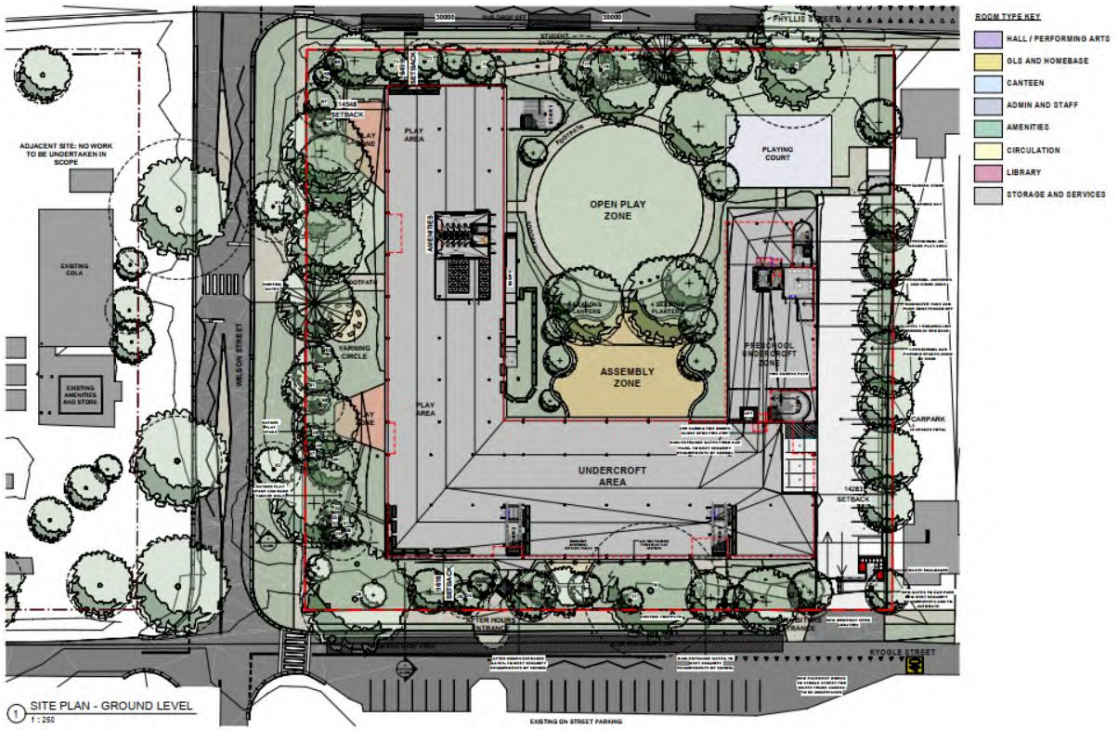


Figure 2 Proposed Site Plan (Source: EJE Architects)

2 RAP INTRODUCTION

The NSW Department of Education ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the LSPS – Flood Recovery Rebuild, at 69-79 Kyogle Street, South Lismore, NSW. For the purpose of the RAP, 'the site' includes the activity area only (i.e. the activity area). The site location is shown on Figure 1 and the RAP applies to the site as shown on Figure 2 attached in Appendix A.

The RAP includes a methodology to remediate and validate the site. A contingency plan for remediation is included together with site management procedures and an unexpected finds protocol (UFP) to be implemented during remediation.

2.1 Remediation Goal, Aims and Objectives

The goal of the remediation is to reduce contamination-related risks to human health and the environment, and to render the site suitable for the proposed development from a contamination viewpoint.

The primary aim of the remediation at the site is to mitigate risks from asbestos in fill soil. The objectives of this RAP are to:

- Provide a rationale to support the extent of proposed remediation and the remedial/validation approach;
- Provide a methodology to remediate and validate the site;
- Provide a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

2.2 Scope of Work

The RAP was prepared generally in accordance with a JKE proposal (Ref: E36310PTpropRAP_LSPS) of 4 December 2024 and written instruction from the client dated 20 February 2025. The scope of work included a review of the previous reports, consultation with the client and preparation of a RAP.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[1], Consultants Reporting on Contaminated Land (2020)[2] guidelines, other guidelines made under or with regards to the Contaminated Land Management Act (1997)[3] and State Environmental Planning Policy (Resilience and Hazards) 2021[4] (formerly known as SEPP55). 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] NSW EPA, (2020). *Consultants reporting on contaminated land, Contaminated Land Guidelines.* (referred to as Consultants Reporting Guidelines)

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

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

3 SITE INFORMATION

3.1 Summary of Previous Investigations

A summary of relevant information from reports provided to JKE is outlined in the table below:

Table 3-1: Previous information summary

<table>
<tr><th>Report</th><th>Summary of relevant information</th></tr>
<tr><td>Preliminary Site Investigation (PSI), 2023[5]</td><td>JKE previously undertook a PSI across the site and wider school property in December 2023. The PSI included a review of historical information and other relevant information for the site, a limited site inspection (i.e. which occurred from outside the site boundary), and preparation of a preliminary CSM.

A timeline summary of the historical land uses and activities identified for the site is presented below:

<table>
<tr><th>Year(s)</th><th>Potential Land Use / Activities</th></tr>
<tr><td>1901-1913</td><td>On-site
• Agricultural (grazing) and rural residential.

Off-site
• Agricultural (grazing) and rural residential.</td></tr>
<tr><td>1913 to present</td><td>On-site
• Agricultural (grazing), rural residential, commercial/industrial (potentially including motor mechanic at eastern end of site) and primary school;
• Ongoing construction/demolition of structures;
• Filling/earthworks for levelling purposes and installation of services;
• Use of pesticides around site and beneath building; and
• Use and impacts from hazardous building materials in former/existing structures.

Off-site
• Agricultural (i.e. grazing), rural residential, and commercial/ industrial (including fuel depots, cattle dips).</td></tr>
</table>

Potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC) were identified for the site, including: fill material; historical agricultural land use (grazing); historical motor mechanics workshop; use of pesticides, hazardous building materials (former and existing buildings); and off-site industrial/agricultural land uses (fuel depot and cattle dip).

A Detailed Site Investigation (DSI) was recommended (and was required) due to the occurrence of former land uses which listed in Table 1 of the Managing Land Contamination Planning Guidelines SEPP55 Remediation of Land (1998)[6] as activities that may cause contamination. The PSI report indicated that a DSI would be needed to establish whether the site is either suitable for its current state, or whether it needs to be remediated, with regards to Clause 4.6 of SEPP Resilience and Hazards 2021.

The PSI report recommended the following to better assess the risks associated with potential contamination at the site:</td></tr>
</table>

[5] JKE, (2023). *Report to School Infrastructure New South Wales on Contamination - Preliminary (Desktop) Site Investigation for Due Diligence – Flood Recovery at Lismore South Public School, 69-79 Kyogle Street, South Lismore, NSW.* (Ref: E36310PTrpt, dated 18 December 2023) (referred to as PSI)
[6] DUAP/EPA, (1998). *Managing Land Contamination Planning Guidelines, SEPP55 Remediation of Land* (referred to as SEPP55 Planning Guidelines)

Report	Summary of relevant information
	• A DSI to characterise the site contamination conditions and establish whether the site is suitable for the activity, or whether remediation is required. A SafeWork NSW search for historical dangerous goods licenses should also occur under the scope of the DSI; • A Sampling, Analysis and Quality Plan (SAQP) should be prepared for the DSI. Soil sampling from test pits would be preferred, however, locations could be combined with the geotechnical investigation where practicable. Preliminary waste classification assessment should occur concurrently with this investigation if it is anticipated that soil waste will need to be disposed off-site during the activity works; and • Where any buildings or structures are proposed to be demolished or refurbished, the project team must consider the need for updating the existing registers (and engage a suitably qualified consultant to do so where needed) prior to commencement of any works. An asbestos clearance certificate should be obtained following removal of any asbestos and/or hardstand. The PSI also included a high-level review of the asbestos register, and it was indicated that asbestos containing material (ACM) is present within the site buildings/structures.
Detailed Site Investigation (DSI), 2025[7]	The DSI was undertaken in 2024 (report was revised in 2025) and was confined to the site (i.e. the eastern portion of the existing Lismore South Public School property). Soil sampling for the DSI was undertaken from 12 boreholes, 13 test pits, and 10 surface samples, with groundwater sampling from one of three monitoring wells installed (it is noted only one monitoring well, made water). The boreholes/test pits encountered fill materials to depths of approximately 0.2m below ground level (BGL) to 0.8mBGL, underlain by clayey and sandy alluvial soils. The fill typically comprised clayey or sandy soil with inclusions of igneous and ironstone gravels, plastic fragments, metal fragments, brick fragments, glass fragments, ash, slag, wood chips, root fibres, and organic material. Fibre cement fragments (FCF)/asbestos containing material (ACM) were encountered in four fill profiles across the site. Two FCF were also encountered at the ground surface, however these were found not to contain asbestos and were therefore not ACM. A selection of soil and groundwater samples were analysed for the CoPC identified in the CSM. Lead, carcinogenic polycyclic aromatic hydrocarbons (PAHs) and asbestos (as bonded ACM) were reported in fill above the health-based site assessment criteria (SAC) and total recoverable hydrocarbon (TRH F3) in one fill sample was reported above the ecological 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. Zinc was reported above the ecological SAC in groundwater. The report concluded that remediation of the site will be required and we considered that remediation would be limited to addressing risks associated with the occurrence of bonded ACM in soil based on the DSI dataset. Additional investigation and risk assessment were also considered to be required beneath the buildings/structures (and to increase the asbestos in soil sampling density if optimisation of the remedial strategy is required). However, the report concluded that it would be reasonable to include the requirements for further investigation within the RAP as this work will need to occur after demolition. In summary, the DSI report recommendations included: • Preparation of an interim Asbestos Management Plan (AMP) to manage potential risks from asbestos in/on soil until the activity occurs;

[7] JKE, (2025). *Report to NSW Department of Education on Detailed Site Investigation for Lismore South Public School, - Flood Recovery Rebuild at 69-79 Kyogle Street, South Lismore, NSW.* (Ref: E36310PTrpt3rev2-DSI, dated 5 June 2025) (referred to as DSI)

Report	Summary of relevant information
	• Preparation and implementation of a RAP. In addition to the remediation and validation of fill, the RAP is to include requirements for a post-demolition investigation(s) to adequately address the data gaps identified; • Should the post-demolition investigation identify additional contamination that requires remediation outlined in the RAP, an addendum RAP/Remedial work Plan (RWP) must be prepared and implemented; • Preparation and implementation of a construction-phase AMP; • Preparation of a validation assessment report for the remediation works undertaken at the site; and • The client's expert planner should make an assessment of whether remediation at the site will be Category 1 or Category 2 as this could have implications for the planning/approvals processes for the works. Preliminary waste classifications were also included in the DSI and it was our opinion that all fill will classify as 'General Solid Waste (non-putrescible) containing Special Waste (asbestos)' for off-site disposal purposes. The DSI stated that confirmatory waste classification assessment is required.

3.2 Site Identification

Table 3-2: Site Identification

Current Site Owner (certificate of title):	Department of Education (DoE) (formerly Minister for Education)
Site Address:	69-79 Kyogle Street, South Lismore, NSW
Lot & Deposited Plan:	Lots 21, 22, 23 & 26 Section 1 in DP448737, Lot 1 in DP64010, and Lots 1 & 2 in DP158407
Current Land Use:	Vacant – formerly primary School (kindergarten to year 6)
Proposed Land Use:	Primary school
Local Government Area:	Lismore City Council
Current Zoning:	R2 Low Density Residential
Site Area (m^2) (approx.):	10,660
RL (AHD in m) (approx.):	10
Geographical Location (decimal degrees) (approx.):	Latitude: -28.8093516 Longitude: 153.2591089
Site Plans:	Appendix A

3.3 Summary of Site Setting and Description

The site is located in a mixed use (residential/commercial) area of South Lismore and is bound by Kyogle Street to the south, Phyllis Street to the north, and Wilson Street to the west. The site is located approximately 525m to the south and 710m to the west of Wilsons River at its closest points.

The regional topography is characterised by level to gently undulating floodplains, generally flattening out towards the nearby rivers. The site is relatively flat, and fill exists across the site to accommodate the existing development.

A walkover inspection of the site was undertaken by JKE on 27 September 2024 as part of the DSI. The findings of the inspection were generally similar to the previous inspection and have been summarised below:

- Numerous vacant buildings and structures of brick, timber and metal construction were observed. The buildings appeared to be between one and two storey construction, some with under-croft paved areas;
- The single storey building in the south-east corner of the site appeared to have formerly been utilised as a day care centre with external play areas;
- Parts of the site were paved, generally in the vicinity of the buildings and in the central and south-west of the site, with the northern extent and north-east corner comprising grass covered playground;
- The entire site was fenced with lockable vehicle and pedestrian gated access onto all street frontages. A paved carpark was located in the south of the site;
- During the inspection, two surficial fibre cement fragments (FCF1 and FCF6) were identified on the site surface. These were collected as samples and submitted for asbestos analysis, and were found not to contain asbestos;
- Evidence of flood impacts (excess leaves and silty water levels) were observed on the sides of the buildings as high up as the first storey windows (4-5m from ground level); and
- All vegetation inspected appeared to be in good condition with no obvious evidence of phyto-toxic stress or die back.

3.4 Surrounding Land Use

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

- North – Phylis Street and residential properties;
- South – Kyogle Street with grass and weed covered verge, former Murwillumbah railway line, and commercial/industrial properties (warehousing, truck company, etc);
- East – Residential properties; and
- West – Wilson Street with the western portion of the wider school property beyond.

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

3.5 Underground Services

The 'Before You Dig Australia' (BYDA) plans were reviewed for the PSI/DSI 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. The BYDA plans indicated that a sewerage pipe extends through the lower eastern centre of the site from Lot 26 Section 1 in DP448737 extending out of the site in an east direction. Considering the geological conditions, there is a potential for the service trench to act as a

preferential pathway for contamination migration (i.e. through relatively permeable backfill), should mobile contamination be present. Although, previous investigations did not identify any concerns in this regard.

3.6 Summary of Geology, Soils and Hydrogeology

3.6.1 Regional Geology

Regional geological information was reviewed as part of the previous investigations. The information indicated that the site is underlain by Quaternary aged alluvial floodplain deposits, which typically consist of silt, very fine- to medium grained lithic to quartz-rich sand, and clay.

The subsurface conditions encountered during the DSI are summarised in the table below:

Table 3-3: Summary of Subsurface Conditions

Profile	Description
Pavement	Asphaltic Concrete (AC) pavement was encountered at the surface in BH2 and BH15 and the bituminous surface was approximately 30mm in thickness.
Fill	Fill was encountered at the surface or beneath the pavement in all borehole/test pit locations and extended to depths of between approximately 0.2mBGL to 0.8mBGL. TP8, BH9, TP10, and BH20 were terminated in the fill at a maximum depth of approximately 0.8mBGL. The fill typically comprised silty clay, silty sand, silty sandy gravel, sand, silty gravel, silty sandy clay, silty clayey sand, with inclusions of igneous and ironstone gravels, plastic fragments, metal fragments, brick fragments, glass fragments, ash, slag, wood chips, root fibres, and organic material. No staining or odours were encountered in fill material during field work. FCF/ACM was encountered in the fill material in TP6 (0-0.1mBGL), TP8 (0-0.2mBGL), TP16 (0.3-0.5mBGL), and TP17 (0.2-0.4mBGL).
Natural Soil	With the exception of TP8, BH9, TP10, and BH20, natural silty clay, silty sand, silty gravel, sandy clay alluvial soils were encountered beneath the fill material in all locations, and extended to depths of between approximately 0.55mBGL to 6mBGL. Neither odours nor staining were recorded in the natural soil during fieldwork.
Groundwater	Groundwater seepage was not encountered in the boreholes/test pits during drilling/excavation. All boreholes/test pits remained dry on completion of drilling/excavation and a short time after.

A copy of the borehole logs from the DSI is included in Appendix C.

3.6.2 Soil Landscapes of Central and Eastern NSW

Soil Landscapes of Central and Eastern NSW information previously reviewed indicated that the site is located within the Leycester soil landscape, which are generally characterised by moderate erodibility with some higher local occurrences, and high dispersity.

3.6.3 Dryland Salinity – National Assessment

There was no dryland salinity national assessment data for the site.

3.6.4 Acid Sulfate Soil (ASS) Risk and Planning

ASS information previously reviewed for the site indicated that the site is not located in the ASS risk area.

3.6.5 Hydrogeology and Groundwater

Hydrogeological information presented in the previous reports indicated:

- There was a total of 56 registered bores within a buffer of 2,000m;
- The nearest registered bore was located approximately 70m from the site and registered for monitoring purposes;
- The majority of the bores were registered for monitoring purposes;
- One bore registered for irrigation was cross gradient and within 130m of the site. All other bores registered for irrigation, water supply and/or stock and domestic purposes were located over 700m from the site; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 2.43m-29m, underlain by basalt or shale bedrock. Standing water levels (SWLs) in the bores ranged from 0.6m below ground level (BGL) to 8mBGL.

A summary of the groundwater conditions during the DSI is provided below:

Table 3-4: Summary of Groundwater Field Screening during DSI

Aspect	Details
Groundwater Depth	Groundwater seepage was not encountered during drilling, and all three monitoring wells (MW2, MW11, and MW23) remained dry during and a short time after completion of drilling. The SWL in MW2 was recorded at 5.3m during sampling on 15 October 2024.
Groundwater Field Parameters	Groundwater was only encountered in MW2 and was limited in volume at the base of the well. No field measurements were taken in order to prioritise sampling volume. The PID readings in the monitoring well headspace recorded during sampling/attempted sampling ranged from 0ppm to 0.2ppm.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling of MW2.

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

The closest surface water body is Wilsons River located approximately 525m to the north and approximately 710m to the east of the site at its closest points. The areas nearer to the river appear to be at a similar elevation to the site and the river is considered to be a potential receptor given the regional topography.

4 SITE CHARACTERISATION AND 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 and investigation data to date. Reference should also be made to the figures attached in the appendices.

4.1 Summary of Contamination (Site Characterisation)

A copy of the soil and groundwater data summary tables and borehole logs from the DSI report are included in Appendix C. The SAC exceedances are shown on Figure 3 in Appendix A. The following exceedances were reported for each media:

- In fill soil: carcinogenic PAHs, lead and asbestos were reported at concentrations above the health-based SAC and TRH F3 was reported at a concentration above the ecological SAC; and
- In groundwater: zinc was reported above the ecological SAC.

Considering multiple lines of evidence, JKE consider the asbestos impacts to be widespread. The maximum asbestos (ACM) concentration reported in soil was 0.1168%w/w (SAC of 0.01%w/w).

Asbestos as AF/FA was also detected in one location, albeit at a concentration below the SAC. Asbestos as AF/FA is 'friable' asbestos by definition in Schedule B1 of NEPM 2013, however, the DSI concluded that the AF/FA was associated with co-located bonded ACM. On this basis, and for the purpose of remediation/management, the asbestos in fill/soil is considered to be bonded/non-friable asbestos unless new information becomes available, or there is an unexpected find relating to a friable asbestos source.

Groundwater is not considered to be of concern for remediation purposes. The occurrence of TRH, lead and PAHs in fill were also assessed (in the DSI report) as posing a low risk and did not require remediation.

4.2 CSM

The table below includes a review of the CSM which has been used to design the remediation strategy. The CSM will require further review if additional site data becomes available.

Table 4-1: CSM

Contaminant source(s) and contaminants of concern	**Contamination sources/potential contamination sources:** fill material; use of pesticides; and hazardous building materials. **Contaminants of concern for remediation include:** asbestos in fill/soil. Other CoPC are to be assessed in further detail to address data gaps.
Affected media	**Affected medium for remediation:** fill/soil across the site. Remediation of groundwater is not being considered further in the context of the RAP. However, should the development design change, AEC associated with groundwater impacts must be reviewed and groundwater considered.

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, groundwater users and recreational water users within Wilsons River. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas).
Exposure pathways and mechanisms	The potential exposure pathway for asbestos is via inhalation of airborne asbestos fibres. Potential exposure pathways for other CoPC relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRHs, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site as a primary school. Potential exposure pathways for ecological receptors include primary/direct contact and ingestion. Such pathways are not considered to be significant where the soils are covered by buildings/pavements. 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.
Evaluation of data gaps	The primary data gap identified in the DSI was the limited sampling beneath the existing building/structure and pavements. Whilst the conditions are expected to be similar across the site due to the nature of the filling history, additional soil data (including inspection of the surface soils following slab removal) is required after demolition and removal of pavements/slabs. A pre-remediation/data gap investigation (DGI) framework is provided in Section 6.2.4 to address these items.

4.3 Remediation Extent

For the purpose of the RAP, remediation extends across the entire site, and applies to all fill. Fill was found to extend to depths of between 0.2mBGL to 0.8mBGL during the DSI. Please refer to Figure 2 in Appendix A which presents the approximate fill depths (i.e. depth to the base of fill, measured from the ground surface level) at the previous sample locations.

A holistic approach to remediation will occur whereby all fill will be deemed to be contaminated with asbestos (i.e. asbestos/ACM in fill at concentrations greater than the SAC) for remedial purposes. Notwithstanding, the extent of remediation and future management of the site will depend on the outcome of the pre-remediation DGI and the site validation process.

5 REMEDIATION OPTIONS AND PREFERRED REMEDIATION STRATEGY

5.1 Soil Remediation

The NSW EPA follows the hierarchy set out in NEPM 2013 for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;

Or if the above are not practicable:

3. Consolidation and isolation of the soil by on-site containment within a properly designed barrier; and
4. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; or
5. Where the assessment indicates that remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

For simplicity herein, the above hierarchy are respectively referred to as Option 1, Option 2, Option 3 etc.

The NEPM 2013 and the associated Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[8] prefer the following asbestos remediation hierarchy:

1. Minimisation of public risk;
2. Minimisation of contaminated soil disturbance; and
3. Minimisation of contaminated material/soil moved to landfill.

The NSW EPA Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition) (2017)[9] provides the following additional requirements to be taken into consideration:

- Remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed; and
- Where there are large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

The table below discusses and assesses a range of soil remediation options:

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

[9] NSW EPA, (2017). *Contaminated land Management, Guidelines for the NSW Site Auditor Scheme (3rd ed.).* (referred to as Site Auditor Guidelines 2017)

Table 5-1: Consideration of Soil Remediation Options

Option	Discussion	Assessment/Applicability
Option 1 **On-site treatment of contaminated soil**	On-site treatment can provide a mechanism to reuse the processed material, and in some instances, avoid the need for large scale earthworks. Treatment options are contaminant-specific and can include bio-remediation, soil washing, air sparging and soil vapour extraction, and thermal desorption. Depending on the treatment option, licences may be necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during incineration processes. Licences for re-use of treated material/waste may also be required.	Treatment options for asbestos in fill containing AF/FA are not applicable and are not endorsed by the NSW EPA.
Option 2 **Off-site treatment of contaminated soil**	Contaminated soils are excavated, transported to an approved/licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option is also contaminant-specific. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works under the waste and resource recovery regulatory framework.	Not applicable for fill due to the occurrence of asbestos (as noted above).
Option 3 **Consolidation and isolation of impacted soil by cap and containment**	This would include the consolidation of contaminated soil within an appropriately designed cell, followed by the placement of an appropriate barrier over the material to reduce the potential for future disturbance (or capping in-situ beneath appropriate capping layers). The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing environmental management plan (EMP) would be required and this would need to be publicly notified and made to be legally enforceable (e.g. via listings in the Section 10.7 planning certificate and on the land title).	Applicable for asbestos where the asbestos concentrations exceed the Health Screening Level (HSL) SAC. This option is applicable for the fill to be retained onsite (i.e. beneath paved/hardstand areas) and is well suited to asbestos. Capping the asbestos mitigates the risk of disturbance and exposure in the context of the proposed land use.

Option	Discussion	Assessment/Applicability
<u>Option 4</u> Removal of contaminated material (excavation and disposal) to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	This option is considered to be applicable to address risks from asbestos, and is often easy to implement concurrently with the construction works on sites where excavation works for the building and pavement footprint are proposed. It can also be used in conjunction with Option 3 to minimise the extent of capping/future management. This option can be problematic if contaminated fill exists around existing underground infrastructure that is to remain in-situ, or in tree protection zones (TPZ) etc.
<u>Option 5</u> Implementation of management strategy	Contaminated soils would be managed in such a way to reduce risks to the receptors and monitor the conditions over time so that there is an on-going minimisation of risk. This may occur via the implementation of monitoring programs.	Applicable for the long-term management of contamination, if capping occurs in accordance with Option 3. A passive management system is anticipated for the development if contaminated soil is capped in-situ.

5.2 Rationale for the Preferred Option for Remediation

The preferred option for remediation is a combination of Option 3 and Option 4 which includes excavation of contaminated fill soils for the building and pavement footprint and to enable installation of appropriate cap and containment in areas where excavation is not otherwise proposed. Option 5 would also apply where contaminated fill remains, which involves managing the site via a long-term EMP.

The preferred option for remediation is considered to be appropriate on the basis that:

- The asbestos contamination is considered to be widespread in fill;
- Excavating and disposing of surplus contaminated soil, only to the extent required to facilitate required excavation for the building and pavement footprint and the installation of the capping system, reduces unnecessary disturbance and disposal of material to landfill (this aligns with the asbestos remediation hierarchy);
- Capping the landscaped and/or the paved areas will result in an incomplete exposure pathway to asbestos during future day-to-day use of the site, hence mitigating the risks from exposure to the contaminants of concern; and
- The strategy is sustainable, economically viable considering it minimises soil disposal costs (compared to a scenario where all fill is removed from the site), it is commensurate with the level of risk posed by the contaminant and is technically achievable to implement concurrently with the proposed development works.

6 REMEDIATION DETAILS

Prior to commencement of demolition and any soil disturbance, the client, project manager and remediation contractor must review and make arrangements to meet the remediation site management requirements for the project as outlined in Section 9 of this RAP.

The following general sequence of works is anticipated:

- Pre-commencement meeting;
- Preparation and implementation of a construction phase AMP;
- Site establishment and demolition;
- Pre-remediation DGI and any additional associated reporting;
- Remediation and validation of remedial works (it is anticipated this will occur concurrently with construction); and
- Validation of imported soil materials. This includes materials imported to reinstate the remedial excavations and/or used as capping layers, together with engineering material such as sub-base and drainage materials (e.g. recovered aggregate etc), landscaping materials or any other materials imported for service trenches etc.

Validation of the works will occur progressively throughout the remediation and construction program.

Details in relation to the above are outlined in the respective subsection below.

6.1 Roles and Responsibilities

Table 6-1: Roles and Responsibilities

Role	Responsibility
Developer/ client	NSW Department of Education The client (also acting as project manager) is required to appoint the project team for the remediation/validation, review all documents prepared for the project and manage the implementation of the procedures outlined in this RAP. The project manager is to take reasonable steps so that the remediation contractor and others have understood the RAP and will implement it in its totality. The project manager will review the RAP and other documents and will update the parties involved of any changes to the development or remediation sequence (in consultation with the validation consultant).
Principal Contractor/ Remediation Contractor	ADCO. The principal contractor is engaged by the client and is required to review all documents prepared for the project and manage the implementation of the procedures outlined in this RAP. The principal contractor is to take reasonable steps so that the remediation contractor and others have understood the RAP and will implement it in its totality. The principal contractor is to engage the validation consultant and make provisions so that the pre-remediation DGI and associated reporting occurs prior to commencement of remediation. The principal contractor will review the RAP and other documents and will update the parties involved of any changes to the development or remediation sequence (in consultation with the validation consultant).

Role	Responsibility
	The principal contractor must implement the construction-phase AMP referred to in Section 9 during all works.
Remediation Contractor	To be confirmed. The remediation contractor (this may be the same entity as the principal contractor) is required to review all relevant documents prepared for the project, apply for any relevant removal licences or permits and implement the remediation requirements and relevant validation requirements (that are the remediation contractor's responsibility) outlined in this RAP. For remediation works involving asbestos in/on soil, the remediation contractor should be or must subcontract a Class B licensed asbestos removalist to manage and undertake any works associated with the removal/disturbance of bonded/non-friable asbestos. The Class B contractor will need to submit the required notification to SafeWork NSW for asbestos removal works. The remediation contractor is required to collect all documentation associated with the remediation activities and forward this documentation onto the principal contractor, client and project manager as they become available. The remediation contractor must implement the construction-phase AMP referred to in Section 9 during all works.
Validation Consultant	To be confirmed. The validation consultant[10] provides consulting advice and validation services in relation to the remediation. The validation consultant undertakes the pre-remediation DGI and prepares the validation report (and EMP where applicable), as required. The validation consultant is required to review any deviation to this RAP or any unexpected finds if and when encountered during the site work. The validation consultant must have a Licensed Asbestos Assessor (LAA) on staff to facilitate the preparation of asbestos removal clearance certificates, where required. The validation consultant is required to liaise with the principal contractor, client, project manager and remediation contractor on all matters pertaining to the site contamination, remediation and validation, carry out the required pre-remediation DGI, validation sampling and inspections.

6.2 Remediation and Associate Tasks

6.2.1 Pre-commencement Meeting

The project team is to have a pre-commencement meeting to discuss the sequence of remediation and the remediation and validation tasks. The site management plan for remediation works (see Section 9) must be reviewed by the project manager and remediation contractor, and appropriate steps are to be taken to ensure the adequate implementation of the plan. Any relevant requirements are to be addressed by the project team during the implementation of this RAP.

[10] The validation consultant must be a certified practitioner (specialising in site contamination), under one of the NSW EPA endorsed certification schemes, i.e. CEnvP SC or equivalent

6.2.2 Site Establishment and Demolition

The remediation contractor is to establish on site as required to facilitate the remediation and validation works. Consideration must be given to the work sequence and extent of remediation/excavation so that the site establishment (e.g. site sheds, fencing, access points etc) does not inhibit the required works. Any soil/gravel-type materials imported during the site establishment (e.g. DGB, 40/70 etc) must be validated in accordance with Section 7 of this report.

The demolition of buildings/structures etc must occur with regards to the findings of a hazardous building materials (HAZMAT) survey report.

As part of the demolition process, all visible FCF/ACM must be removed from the ground surface across the entire site prior to any works that disturb the existing pavements. An asbestos surface clearance for the ground surface across the entire site must be provided by a LAA to demonstrate this has occurred. This ground surface clearance will be in addition to any specific clearances associated with the demolition works.

Following pavement removal, the site is to be managed on the basis that the exposed soils contain asbestos and the site must therefore me managed accordingly with regards to the construction-phase AMP.

All waste from the demolition is to be disposed to facilities that are licenced by the NSW EPA to accept the waste. The demolition contractor is to maintain adequate records and retain all documentation for such activities including:

- A summary register including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with waste disposal docket numbers;
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste. Legible dockets are to be provided for all waste materials so they can be reconciled with the register.

The above information is to be supplied to the validation consultant for assessment and inclusion in the site validation report.

6.2.3 Construction Phase Asbestos Management Plan (AMP)

A construction-phase AMP must be prepared for the site by a LAA and implemented for the site remediation and development works. The AMP must include the minimum personal protective equipment (PPE), work health and safety (WHS) and other requirements outlined in the documents published by Safe Work Australia, WorkCover Authority of NSW, National Occupational Health and Safety Commission, and other relevant authorities as applicable.

An Asbestos Removal Control Plan (ARCP) must be prepared by the remediation contractor and issued to SafeWork, and notification of asbestos removal is to be provided to SafeWork, at least five days prior to commencement of works.

6.2.4 Pre-remediation DGI and Reporting

Prior to the commencement of the pre-remediation DGI, the validation consultant must prepare a detailed SAQP in accordance with the Consultants Reporting Guidelines and NEPM (2013). The SAQP is to include a review of the relevant earthworks plans and proposed development plans which we expect should be available at that time.

The objectives of the pre-remediation DGI are to:

- Further characterise, via spatial distribution, the fill/soil contamination conditions in areas previously not investigated (i.e. beneath buildings and structures and beneath pavements). The data gap investigation is to be undertaken post-demolition of the existing structures;
- Provide additional waste classification data for off-site soil disposal;
- Assess whether any of the CoPC occur at concentrations that require further remediation and/or variation to the validation plan outlined in the RAP;
- Document/confirm the extent of remediation and the validation plan; and
- Facilitate the preparation of a RWP in the event that additional or alternative remediation/validation strategies are required.

Reference is to be made to Figure 4 in Appendix A for the proposed investigation locations, and to Appendix D which includes the proposed test pit location coordinates. The investigation will include:

- Soil sampling from 42 test pit locations positioned across the site on a ~15m grid spacing (a higher density of fill sampling is required for asbestos characterisation unless remediation proceeds on the assumption that all fill is contaminated with asbestos). Soil samples from each fill profile encountered (and at a minimum frequency of one sample per 1m fill depth) are to be screened in the field (10L bulk field screening procedure) for asbestos and a representative sample is to be collected for asbestos laboratory analysis (500ml NEPM 2013);
- Inspection and soil sampling from 12 test pit locations (assumed to be part of the 42 above) positioned within the former building/structure footprints. Additional sampling locations may be required following inspection of the site surface subsequent to demolition and slab removal, if there are unexpected finds that warrant additional targeted sampling;
- The test pits will be excavated using a mechanical excavator, sampling from the excavator bucket;
- The test pits will be excavated to the base of the fill and into the natural ground (where possible) so that the depth of fill is confirmed;
- Soil samples will be collected from each fill profile for laboratory analysis (from the 12 locations where chemical analysis is proposed), and one sample from each location will be collected from the underlying natural soil if possible. If there are any indicators of contamination in the natural soil (e.g. staining or odours) then deeper sampling should occur based on the limitations of the excavator;
- Bulk (10L) field asbestos quantification will occur in accordance with the NEPM (2013) requirements from all 42 locations. Suspected asbestos materials (e.g. fibre cement) will be collected from these locations during this process, should they be encountered;
- Additional samples are also to be collected if any visual or olfactory indicators of potential contamination are observed in other areas; and
- All samples will be screened using a photo-ionisation detector (PID).

A minimum of 10 fill soil samples from the 42 test pits will be analysed for asbestos in soil (500mL). Given the CSM suggests that asbestos impacts are from bonded ACM, this analysis would target locations where degraded or suspected friable forms of asbestos materials are identified or a selection of representative samples.

One surficial fill soil sample and one sample per change in fill profile thereafter is to be collected from the 12 test pits within the building footprints and these are to be analysed for: Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml NEPM 2013). A minimum of six of the natural samples (from within the building footprints) are to be analysed for heavy metals, TRH/BTEX, and PAHs for waste classification purposes (natural soils must be analysed for pesticides if pesticides are detected in the overlying fill). The samples are to be selected based on the results of the fill soil analysis and field observations.

Appropriate QA/QC samples are to be obtained and analysed for soil, with regards to the NEPM (2013) requirements.

A record of any potential point source/s of contamination identified after demolition is to be maintained.

On completion of the pre-remediation DGI, the validation consultant is to review the scope and extent of remediation and assess whether additional risks are identified that warrant remediation outside the scope of this RAP. Based on the findings of the pre-remediation DGI, a stand-alone RWP must be prepared to document the remedial approach, with regards to the construction methods and works sequence. The client/developer and project manager must then establish the appropriate course of action in relation to any additional planning/consent requirements prior to making arrangements to carry out the additional works.

The investigation and reporting is expected to take approximately 3 to 5 weeks to complete. This should be adequately considered in the project timeline and the investigation should be initiated as soon as possible.

6.2.5 Remediation Details - Excavation and Off-site Disposal of Contaminated Fill

The excavation and off-site disposal remediation procedure is to be applied where all fill can be completely removed.

The DSI included a preliminary waste classification of fill as **General Solid Waste (non-putrescible) containing Special Waste (asbestos)**. This classification is to be updated/confirmed following the pre-remediation DGI. We note that the receiving landfill is likely to require a standalone waste classification letter confirming this and the quantity of waste being disposed. This waste classification documentation should be arranged well in advance of the commencement of any excavation/soil disposal works.

The project team must carefully consider the sequence of works and requirements in relation to the proposed development and the excavation/remediation of fill. Where piling is required for the proposed development, if practicable (and subject to consideration of relevant geotechnical and construction-related constraints etc), we recommend that the fill be excavated/removed prior to the commencement of piling so

that piling does not occur through the fill (where possible). Piling through the fill and into the natural soil/bedrock will create a mixed waste stream that will include special waste (asbestos) for disposal purposes. This can add significant additional costs to the project if not managed properly.

The procedure for excavation of fill soil is outlined in the table below:

Table 6-2: Remediation Details – Excavation and Disposal of Contaminated Fill

Step	Primary Role/ Responsibility	Procedure
1.	Validation Consultant	Waste Classification Letter A waste classification addendum letter for fill must be prepared to confirm the final expected waste quantities and the waste classification.
2.	Remediation contractor	Address Stability Issues and Underground Services: Geotechnical/structural advice must be sought regarding the stability of adjacent structures and/or adjacent areas prior to commencing remediation (as required). Stability issues are to be addressed to the satisfaction of a suitably qualified geotechnical/structural engineer. This may require the installation of temporary shoring, if specified by the engineer. All underground services are to be appropriately disconnected or rerouted to facilitate the works.
3.	Remediation contractor	Establish Asbestos Related Controls and Arrange Licenses and Tracking Requirements Prior to the commencement of any excavation that disturbs asbestos in soil, asbestos related controls, licences and tracking requirements must be implemented as outlined in the construction phase AMP (refer to Section 6.2.3).
4.	Remediation contractor	PPE and WHS: Confirm PPE and WHS requirements prior to commencement of remediation works. All personnel involved in the remediation works must wear appropriate PPE as specified in the construction phase AMP.
5.	Remediation contractor (or their nominated Class B licensed sub-contractor) and validation consultant	Excavation and disposal of fill, followed by validation: Following pavement removal, remediation will be undertaken as follows: • Submit an application to dispose of the fill (in accordance with the assigned waste classification) to a facility that is appropriately licensed by the NSW EPA to receive the waste, and obtain authorisation to dispose; • The excavation and removal of asbestos impacted or contaminated soil must be completed in accordance with the construction-phase AMP and the ARCP; • The areas where fill is to be removed must be marked out using an appropriate method; • The fill depths in the proposed area of excavation must be confirmed with the remediation contractor prior to excavation The fill is to be excavated down to the top of the underlying natural soil level and the validation consultant is to undertake inspections during this process; • Experienced personnel must monitor the fill excavation process so that fill is not 'over excavated' into natural soil which could result in additional and unnecessary landfill fees. The details of the excavation works will need to be agreed with the remediation contractor. The works should be done in the most efficient manner that minimises cross contamination; • Load the fill directly into trucks and dispose of the soil to a facility licensed by the NSW EPA to receive the waste (the landfill will require a copy of the waste classification report refer to Item 1 above); and

		• All documents including landfill disposal dockets must be retained by the remediation contractor/asbestos removal contractor and forwarded to the client and validation consultant. This documentation forms a key part of the validation process and is to be included in the validation report.
6.	Validation consultant	<u>Validation of Excavations:</u> Once all fill is removed, the base and walls of the excavation are to be validated in accordance with the validation plan outlined in Section 7, which includes completion of a surface clearance by a LAA.
7.	Remediation contractor	<u>Survey of Excavations:</u> Once the excavation is successfully validated, the remediation contractor is to undertake a survey of the horizontal extent of the excavation. This information must clearly document the extent of the areas where all fill is successfully removed as these areas will not be subject to future management controls under the EMP. This process is to be repeated for each relevant area where this remedial strategy is implemented.

Part 7 of the Protection of the Environment (POEO) Waste Regulation sets out the requirements for the transportation and management of asbestos waste and Clause 79 of the POEO Waste Regulation requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10m^2 of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use the NSW EPA-endorsed waste tracking system.

Clause 78 of the POEO Waste Regulation requires that a person who transports asbestos waste must ensure that:

- Any part of any vehicle in which the person transports the waste is covered, and leak-proof, during the transportation; and
- If the waste consists of bonded asbestos material—it is securely packaged during the transportation; and
- If the waste consists of friable asbestos material—it is kept in a sealed container during transportation; and
- If the waste consists of asbestos-contaminated soils—it is wetted down.

Asbestos waste cannot be re-used or recycled.

6.2.6 Remediation Details - Capping of Contaminated Fill

The premise for remediating the site area where all fill cannot be removed is based around capping the fill/soil beneath appropriate (clean) capping layers. The proposed capping system requires consideration during the design phase of the building, pavements and landscaping etc.

JK had not been provided with detailed landscape or pavement plans or for-construction drawings at the time of preparing this RAP, hence some assumptions have been made in designing the capping specification. Consequently, these requirements must be reviewed and discussed by the project team well in advance of construction commencing. In the event that the capping specification needs to be altered, an addendum to

the RAP must be prepared by JKE or by the validation consultant, and approved by the client and determining authority, prior to commencement (alternatively this can occur via consultation as part of the RWP preparation).

Table 6-3: Remediation Details – In-situ Capping Specification

Area	Capping Specification^
New buildings/any structures	Installation of: • Geotextile marker layer over the contaminated fill; • >50mm clean imported (validated) basecourse, as required for engineering specification; and • Concrete slab as required.
TPZs - existing trees (being retained)	Trees being retained are shown on the demolition plan in Appendix B. Capping in the TPZ is to include installation of: • Geotextile marker layer over the contaminated fill, installed to within 0.5m of the tree base; • Mesh geogrid overlapped by >1,000mm across geotextile marker and extended to within 100mm of the tree base; • >200mm of clean imported (validated) topsoil, which can be tapered towards the tree base; and • >50mm of mulch to the surface. Consideration is also to be given to constructing a raised bed around the trees using garden edging in order to maintain the >200mm clean cover.
Footpaths or on-grade pavements	Installation of: • Geotextile marker layer over the contaminated fill; • >50mm clean imported (validated) basecourse, as required for engineering specification; and • Concrete or bitumen as required.
Turfed areas/unpaved areas, and new plantings for shallow-rooted plants/shrubs	Installation of: • Geotextile marker layer over the contaminated fill; • >500mm clean imported (validated) topsoil/growing medium; and • Surface finish to required development design. Any new plantings can only occur in the clean soil (i.e. above the marker layer).
New planting areas (trees and shrubs)	Excavation of a tree pit >500mm greater than the outer diameter of the root ball in all directions, and installation of: • Geotextile marker layer over the contaminated fill and folded down on the walls of the tree pit (this must be secured to the geotextile marker in the area adjoining the tree pit – a >1,000mm overlap and use of soil 'U' nails to pin down the geotextile would be acceptable); • There is no need for the marker to be placed at the base of the tree pit as this may inhibit the growth/establishment of the tree; • Backfill with clean imported (validated) topsoil/growing medium; and • Surface finish to required development design.
Service trenches	Excavation of the service trench below the design level and greater than the required width of the conduit/service, then installation of: • Geotextile marker layer lining the trench and over the contaminated fill (this must be secured to the geotextile marker in the area adjoining the trench – a

	>1,000mm overlap and use of soil 'U' nails to pin down the geotextile would be acceptable); • Backfill with clean imported (validated) material; and • Surface finish to required development design.

^ The capping specification relates to the remediation only and has not considered engineering or landscape requirements for the site. Engineering and landscape design requirements must be assessed by others in the context of the RAP requirements and the validation consultant must be advised if any aspects of the capping are not achievable or require alternative solutions.

The proposed remediation and validation steps associated with in-situ capping of impacted fill are outlined in the following table.

Table 6-4: Remediation Details – In-situ Capping

Step	Primary Role/ Responsibility	Procedure
1.	Remediation contractor/principal contractor Validation consultant	<u>Service Trenching and Establishment of Pre-Capping Site Levels:</u> The principal contractor and remediation contractor are to undertake the relevant site preparation works, piling/footing excavations and any excavations required to facilitate the capping procedures. Any surplus excavated materials must be managed and disposed off-site appropriately in accordance with the relevant requirements in Section 6.2.5 and with regards to the same principles in Steps 1 to 6 in Table 6-2. The remediation contractor is to undertake an 'emu' pick to remove and visible FCF from the surface/walls of the area prior to commencement of capping. The validation consultant/LAA is to inspect the area following the 'emu' pick and an asbestos clearance certificate is to be issued confirming there is no visible FCF on the exposed soil surfaces at the base and walls of the area. Any imported materials used are to be validated by the validation consultant in accordance with Section 7. This may include but is not limited to coarse gravels (e.g. 40/70) for driveways, DGB, material used to create a piling platform etc.
2.	Remediation contractor	<u>Survey of site levels:</u> After the excavation levels are achieved to facilitate the minimum capping requirements (i.e. the pre-capping levels), a pre-capping levels survey is to be completed by the remediation contractor prior to the placement of any overlying clean capping layers or construction of pavements etc. The purpose of the survey is to provide factual information of the site levels, and the horizontal extent of the marker, prior to installation of the clean capping layers. Survey points must be taken at appropriate frequencies (say every 5m lineal for narrow areas, a 5m grid for broader areas, and more frequently for significant change in surface elevation such as service trenches and tree pits etc). The pre-capping levels survey is to be provided to the client/project manager and the validation consultant prior to any further capping works commencing.
3.	Validation consultant and remediation contractor	<u>Capping:</u> The cap is to be constructed in accordance with the capping specification outlined in Table 6-3 (or as subsequently specified in the RWP). Any imported materials are to be validated in accordance with Section 7. Validated materials can then be used to achieve the minimum capping requirements for the project.

Step	Primary Role/ Responsibility	Procedure
4.	Remediation contractor	Post-Capping Survey of site levels: After completion of capping, a post-capping levels survey is to be completed by the remediation contractor. The purpose of the survey is to provide factual information regarding the capping thickness and confirm that the minimum capping requirements have been achieved. Survey points must be taken at appropriate frequencies as noted for the pre-capping survey. The post-capping levels survey is to be provided to the client/project manager and the validation consultant.

6.3 Remediation Documentation

The remediation contractor must retain all documentation associated with the remediation, including but not limited to:

- Asbestos management documentation, including all relevant notifications and monitoring reports, and clearance certificates where applicable (additional details in this regard are to be outlined in the construction-phase AMP);
- Waste disposal dockets and register (see below);
- Waste tracking documentation;
- Survey information as specified;
- Photographs of remediation works; and
- Imported materials documentation (see below and the example imported material tracking form in Appendix E).

Copies of these documents must be forwarded to the project manager and the validation consultant for assessment and inclusion in the validation report.

6.3.1 Waste Register

All waste removed from the site is to be appropriately classified, tracked and managed in accordance with the relevant guidelines and regulations. The remediation contractor is to maintain adequate records and retain all documentation for waste disposal activities including:

- A summary register (in Microsoft Excel format) including details such as waste disposal dates, waste materials descriptions, disposal locations (i.e. facility details) and reconciliation of this information with the associated waste classification documentation and the waste disposal docket numbers;
- Waste tracking records and transport certificates (where waste is required to be tracked/transported in accordance with the regulations); and
- Disposal dockets for the waste (i.e. weighbridge dockets for each load).

An example waste tracking register is attached in Appendix E.

Any soil waste classification documentation is to be prepared in accordance with the reporting requirements specified by the NSW EPA as outlined in the Consultants Reporting Guidelines and the NSW EPA Waste

Classification Guidelines (2014). The documentation must be reviewed by the validation consultant (if the documentation is prepared by others) prior to the waste leaving the site.

Applicants shall consult with Council's Manager of Waste Services to determine the capability of waste facilities to accept contaminated waste.

A review of the disposal facility's Environment Protection Licence (EPL) issued under the Protection of the Environment Operations (POEO) Act (1997)[11] is to be undertaken to assess whether the facility is appropriately licensed to receive the waste.

The above information is to be provided to the validation consultant for inclusion in the validation report. The register must be set up at the beginning of the project and provided to the validation consultant regularly (i.e. weekly) so the details can be checked and any rectification of the record keeping process can occur in a timely manner.

6.3.2 Imported Materials Register

The remediation contractor (and/or their nominated construction contractor) is to maintain for the duration of the project an imported material register. This must include a register (in Microsoft Excel format) with details of each imported material type, supplier details, summary record of where the imported materials were placed on site, and importation docket numbers and a tally of quantities (separated for each import stream). Legible dockets for imported materials are to be provided electronically so these can be reconciled with the register.

Examples of imported materials for this project may include but would not be limited to: site preparation materials (e.g. DGB, 40/70, material to create the piling platform etc); and landscaping materials such as topsoil garden mixes, mulches etc.

Any materials brought to site (at least up to the point that the validation report is issued) must be validated in accordance with Section 7 of this RAP.

The above information is to be provided to the validation consultant for inclusion in the validation report. It is recommended that the register be set up at the beginning of the project and provided to the validation consultant regularly (say on fortnightly basis) so the details can be checked and any rectification of the record keeping process can occur in a timely manner.

An example imported materials register is attached in Appendix E.

[11] NSW Government, (1997)). *Protection of Environment Operations Act.* (referred to as POEO Act 1997)

7 VALIDATION PLAN

Validation is necessary to demonstrate that remedial measures have been successful and that the site is suitable for the intended land use. The sampling program for the validation is outlined in Section 7.1. This is the minimum requirement based on the remediation strategy.

7.1 Validation Sampling and Documentation

The table below outlines the validation requirements for the site:

7.1.1 Validation Requirements – Demolition

Table 7-1: Validation Requirements - Demolition

Aspect	Sampling	Analysis	Observations and Documentation
Demolition and surface ACM clearance	Not applicable	Not applicable	Photographs to be taken. Visual asbestos clearance certificate/s to be undertaken and asbestos air fibre monitoring results to be provided. Disposal dockets to be retained. A letter of compliance is required from the demolition contractor confirming that the demolition occurred with regards to the HAZMAT reports. LAA is to undertake a surface clearance inspection for ACM and prepare a clearance certificate so that the surface is free of visible ACM prior to the commencement of any excavation works.

7.1.2 Validation Requirements – Fill Removal (Excavation/Disposal), and Cap and Contain

Table 7-2: Validation Requirements – Fill

Aspect	Sampling	Analysis	Observations and Documentation
Excavation and Off-site Disposal of Impacted Fill (Section 6.2.5)			
Validation sampling following removal of all contaminated fill (Option 4)	Not applicable	Not applicable	Observations to be recorded by the validation consultant to document that there is no fill remaining across the base of the excavation and to document the lithology on the base and walls of the excavations. LAA to provide asbestos surface clearance for the base and walls of the remedial excavations for visible asbestos forms (i.e. FCF/ACM) only.

Aspect	Sampling	Analysis	Observations and Documentation
			Photographs are to be taken by the validation consultant. Air monitoring results to be reviewed (where air monitoring is specified under the AMP). Disposal dockets to be retained by the remediation contractor and forwarded to validation consultant for inclusion in the validation report. Validated area/remedial excavations to be surveyed by the remediation contractor or their chosen sub-contractor.
Capping of Impacted Fill (Section 6.2.6)			
Validation (clearance inspection) prior to installation of marker and capping layer/s	Not required.	Not required	LAA to provide asbestos surface clearance for the base and walls of the remedial area for visible asbestos forms (i.e. FCF/ACM) only. Air monitoring results to be reviewed (where air monitoring is specified under the AMP). Photographs are to be taken by the validation consultant. Disposal dockets to be retained by the remediation contractor and forwarded to validation consultant for inclusion in the validation report.
Survey of site levels.	Not required	Not required	Pre- and post-capping surveys are to be undertaken by the remediation contractor or their chosen sub-contractor. As-built details for the development are to be documented on as-built drawings by the remediation contractor/principal contractor and provided to the validation consultant. As a minimum these must include: - Pre- and post-capping levels surveys, including surveys (and surveys of the horizontal extent of the marker layers, should these be installed as a requirement of the RWP); - The location and depth of any underground services; - Finished surface details (e.g. pavements, tiled/paved areas, concrete

Aspect	Sampling	Analysis	Observations and Documentation
			building floor slab thicknesses, landscape layer thickness etc).
Inspections.	Not required	Not required	Validation consultant to carry out inspections to document the installation of the cap. Key hold points for inspections include: - On completion of excavation, prior to installation of overlying capping layers; - During importation of materials used to construct the cap; and - Finished surface levels. A photographic record is to be maintained by the remediation contractor and validation consultant.
Validation of imported materials.	As indicated below in Section 7.1.3.	As indicated below in Section 7.1.3.	As indicated below in Section 7.1.3.

7.1.3 Validation Requirements - Imported Materials

The table below outlines the validation requirements for material imported onto the site:

Table 7-3: Validation Requirements – Imported Materials

Aspect	Sampling	Analysis	Observations and Documentation
Imported VENM backfill (if required)	Minimum of three samples per source	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml NEPM 2013 analysis). Additional analysis may be required depending on the site history of the source property.	Remediation contractor to supply existing VENM documentation/report (report to be prepared in accordance with the NSW EPA waste classification reporting requirements). A hold point remains until the validation consultant approves the material for importation or advises on the next steps. Material is to be inspected upon importation by the validation consultant to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Photographic documentation and an inspection log are to be maintained. Where check sampling occurs by the validation consultant due to deficiencies or irregularities in existing VENM documentation, the following is required: - Date of sampling and description of material sampled;

Aspect	Sampling	Analysis	Observations and Documentation
			- An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the Validation Assessment Criteria (VAC).
Imported engineering materials such as recycled aggregate, road base etc Excavated Natural Material (ENM)	Minimum of three samples per source/material type. ENM testing must meet the specification within the ENM Order. If the analysis is not compliant, the validation consultant must carry out an ENM assessment and prepare a report in accordance with the ENM Order/Exemption prior to material being imported.	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml quantification). As required in the ENM Order, plus check sampling of three samples as noted above.	Remediation contractor to provide product specification and documentation to confirm the material has been classified with reference to a relevant Resource Recovery Order/Exemption. A hold point remains until the validation consultant approves the material for importation or advises on the next steps. Review of the facility's EPL, where applicable. Material is to be inspected by the validation consultant upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Where check sampling occurs by the validation consultant due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.
Imported engineering materials comprising only natural quarried products.	At the validation consultant's discretion based on robustness of supplier documentation.	At the validation consultant's discretion based on robustness of supplier documentation.	Remediation contractor to provide documentation from the supplier confirming the material is a product comprising only natural quarried material. A hold point remains until the validation consultant approves the material for importation or advises on the next steps. Review of the quarry's EPL. Material is to be inspected by the validation consultant upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation.

Aspect	Sampling	Analysis	Observations and Documentation
			Where check sampling occurs by the validation consultant due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.
Imported garden mix/turf underlay/topsoil	Minimum of three samples per source.	Heavy metals (as above), TRHs, BTEX, PAHs, OCPs, PCBs and asbestos (500ml). Analysis of mulch can be limited to asbestos (500ml) and visual observations to confirm there are no anthropogenic materials.	Remediation contractor to provide documentation from the supplier confirming the product specification. This must include a description of the Australian Standard or other relevant product specification under which the material is produced, and the components. A hold point remains until the validation consultant approves the material for importation or advises on the next steps. Material is to be inspected by the validation consultant upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation. The validation consultant is to review any existing/available analysis results for the materials. A minimum of one batch for each imported material type (from each individual supplier) must be inspected by the validation consultant. This inspection must be repeated for each material type from each supplier, a minimum of once per month thereafter. The monthly inspections are only required where additional batches are imported over such a duration. Where check sampling occurs by the validation consultant due to deficiencies or irregularities in existing documentation, the following is required: - Date of sampling and description of material sampled; - An estimate of the volume of material imported at the time of sampling; - Sample location plan; and - Analytical reports and tabulated results with comparison to the VAC.

Aspect	Sampling	Analysis	Observations and Documentation
Mulch	Minimum of three samples per source.	Asbestos (gravimetric quantification using methods endorsed in NEPM 2013).	As above.

7.2 Validation Assessment Criteria and Data Assessment

The VAC to be adopted for the validation assessment are outlined in the table below:

Table 7-4: VAC

Validation Aspect	VAC
Validation of excavations and disposal of fill	The VAC for soil validation is no visible asbestos (i.e. FCF/ACM), on the surface during the LAA inspection/clearance process. The validation report is to include a mass balance of disposal dockets and volume of material removed from the site.
Validation of capping	Validation of capping will occur via a review of survey information, as-built drawings and via the inspection process. The validation report is to include cross-sections documenting the completed capping details for the various areas of the site.
Imported materials	Material imported as general fill is expected to only be VENM. VENM is defined in the POEO Act 1997 as material: • 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. Recycled materials are to meet the criteria of the relevant exemption/order under which they are produced. Analytical results for VENM and other imported materials will need to be consistent with expectations for those materials. For VENM, it is expected that: - Heavy metal concentrations are to be less than the most conservative Added Contaminant Limit (ACL) concentrations for an 'urban residential and public open space' exposure setting presented in Schedule B1 of the NEPM 2013, except for lead which should be nominally less than 100mg/kg. We note the lead ACL is 1,100mg/kg and this concentration is not deemed to be representative of VENM; and - Organic compounds are to be less than the laboratory PQLs and asbestos to be absent. All materials imported onto the site must also be adequately assessed as being appropriate for the final use of the site. A risk-based assessment approach is to be adopted with regards to the tier 1 screening criteria presented in Schedule B1 of NEPM 2013.

Validation Aspect	VAC
	Aesthetics: all imported materials are to be free of staining and odours. Imported landscaping materials must be visually free of any anthropogenic materials such as plastic, metal, slag etc.

Data should initially be assessed as above or below the VAC. Statistical analysis is not proposed, however, can be considered in relation to data (not including asbestos), where applied in accordance with the NEPM (2013) and the EPA Sampling Design Guidelines 2022[12].

7.3 Validation Sampling, Analysis and Quality Plan (SAQP)

Appropriate QA/QC samples must be obtained during the validation (where applicable) and analysed for the same suite of contaminants as the primary samples (excluding asbestos). As a minimum, QA/QC sampling is to include duplicates (5% inter-laboratory and 5% intra-laboratory), trip spikes and trip blanks. Rinsate samples must be obtained if re-usable sampling equipment is utilised. On the basis that remediation is focussed on asbestos, this QA/QC analysis is expected to be focussed on imported materials validation processes.

DQOs and DQIs must be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and should be reflected in the validation report.

DQOs have been broadly established for the validation with regards to the seven-step process outlined NEPM (2013). The seven steps include the following which are detailed further in the following subsections:

- State the problem;
- Identify the decisions/goal of the study;
- Identify information inputs;
- Define the study boundary;
- Develop the analytical approach/decision rule;
- Specify the performance/acceptance criteria; and
- Optimise the design for obtaining the data.

DQIs are to be assessed based on field and laboratory considerations for precision, accuracy, representativeness, completeness and comparability.

7.3.1 Step 1 - State the Problem

Validation data is required to demonstrate that the remediation is successful and that the site is suitable for the proposed activity/land use described in Section 1.

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

7.3.2 Step 2 - Identify the Decisions of the Study

The remediation goal, aims and objectives are defined in Section 2.1. The decisions to be made reflect these objectives and are as follows:

- Was the pre-remediation DGI and the remediation undertaken in accordance with the RAP/RWP?
- If there were any deviations, what were these and how do they impact the outcome of the validation?
- Are any of the validation results above the VAC?
- Is the site suitable for the proposed development from a contamination viewpoint?

7.3.3 Step 3 - Identify Information Inputs

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

- Existing relevant data from previous reports;
- Pre-remediation DGI sampling results and any associated reports;
- Site information, including site observations, inspections, waste and imported materials registers;
- Validation sampling and analysis;
- Field and laboratory QA/QC data; and
- Records relating to unexpected finds (where applicable).

7.3.4 Step 4 - Define the Study Boundary

The remediation and validation (and the resulting validation report and EMP) will be confined to the site boundaries.

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

7.3.5.1 VAC

The validation data will be assessed in accordance with the requirements outlined in Section 7.1 and 7.2.

7.3.5.2 Field and Laboratory QA/QC

Field QA/QC is to include analysis of inter-laboratory duplicates (5% frequency), intra-laboratory duplicates (5% frequency), trip spike (one per sampling event), trip blank (one per sampling event) and rinsate samples (one per sampling event, only where re-usable equipment is utilised). Field QA/QC samples are to be analysed for the contaminants of concern, except asbestos. The trip spike will only be analysed for BTEX.

DQIs for field and laboratory QA/QC samples are defined below:

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 trip blank samples will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to the reference material used as the blank medium.

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, the validation consultant is to adopt the most conservative concentration reported.

7.3.5.3 Appropriateness of PQLs

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

7.3.6 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 is to be undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected. Quantitative limits on decision errors have not been established due to the nature of the validation data being collected.

7.3.7 Step 7 - Optimise the Design for Obtaining Data

The design is to be optimised via the collection of validation data to demonstrate the success of the key aspects of the remediation. Data collection will be via various methods including inspections/clearances, sampling and laboratory analysis.

7.3.8 Sampling Plan

The proposed sampling plan is described in Section 7.1.

7.4 Validation Report and EMP

As part of the site validation process, a site validation report will be prepared by the validation consultant on completion of the remediation and validation works. The report will present the results of the validation assessment and will be prepared in accordance with the Consultants Reporting Guidelines.

Where contamination remains on site, an EMP will also be prepared as part of the validation process to document the long-term site management requirements (as required). It is anticipated that the EMP will include 'passive' management requirements for maintaining the integrity of the capping layers, and will provide contingencies for minor intrusive works should these layers need to be breached in future. The notification and enforcement mechanisms for the EMP are to include notation on the planning certificate under Section 10.7 of the Environmental Planning and Assessment Act (1979) and a covenant registered on the title to land under Section 88B of the Conveyancing Act (1919).

8 CONTINGENCY PLAN

A review of the proposed remediation works has indicated that the greatest risks that may affect the success of the remediation include identification of unexpected finds. Contingency plans to address these risks are outlined below, in conjunction with a selection of other contingencies that may apply to this project.

8.1 Unexpected Finds

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. At this site, these types of hazards may include: underground tanks or other buried infrastructure and odorous or stained hydrocarbon impacted soils. Suspected friable sources of asbestos such as severely degraded/friable FCF, or other materials such as lagging etc would also be unexpected and is to be managed in accordance with the UFP.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the remediation contractor must contact the validation consultant, the client and the project manager and advise them of the find;
- Temporary barricades should be erected to isolate the area from access to workers;
- The client is to engage the validation consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination in order to allow for remediation of the material;
- In the event additional remediation is required, the procedures outlined within this report should be adopted where appropriate. Alternatively, an addendum RAP or RWP is to be prepared;
- An additional sampling and analytical rationale should be established by the validation consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling is to be undertaken and the results are to be included in the validation report.

8.2 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in Section 7, the only option is to not accept the material. Alternative material must be sourced that meets the importation requirements.

8.3 Remediation Strategy Changes

Any material change to the proposed remediation strategy will require revision of the RAP or preparation of an addendum RAP. This must not occur without appropriate consultation and approvals from the client, determining authority and other relevant parties as applicable.

9 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client and project manager must also make reference to the REF/approval for specific site management requirements for the overall development of the site.

This site management plan has been prepared with regards to the Lismore City Council Regional Policy for the Management of Contaminated Land (2007)[13].

9.1 Construction-Phase Asbestos Management Plan (AMP)

A construction-phase AMP must be prepared prior to the commencement of remediation work and must be implemented during remediation. The construction-phase AMP must consider the specific activities to be undertaken during remediation that involve asbestos, informed by the results of the DSI and the pre-remediation DGI.

The AMP must include the minimum personal protective equipment (PPE), work health and safety (WHS) and other requirements outlined in the documents published by Safe Work Australia, WorkCover Authority of NSW, National Occupational Health and Safety Commission, and other relevant authorities as applicable.

An ARCP must be prepared by the remediation contractor and issued to SafeWork, and notification of asbestos removal is to be provided to SafeWork at least five days prior to commencement of works.

We recommend that asbestos air-fibre monitoring be included in the construction phase AMP due to the sensitive nature of the surrounding land use. Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory. The monitoring results must conform to the requirements of the NOHSC Guidance note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

A monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded. The following levels will be used as action criteria during the air monitoring:

- <0.01 Fibres/ml: Work procedures deemed to be successful;
- 0.01 to 0.02 Fibres/ml: Inspection of the site and review of procedures; and
- >0.02 Fibres/ml: Stop work, inspection of the site, review of procedures, clean-up, rectification works where required and notify the relevant regulator.

9.2 Interim Site Management

The site is part of the wider Lismore South Public School property, and as such interim management of the site for the potential occurrence of asbestos is required. It is however understood that the site is generally

[13] Lismore City Council, (2007). *Regional Policy for the Management of Contaminated Land* (referred to as Lismore Council Contaminated Land Policy)

disused and not accessed regularly. Notwithstanding, 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) must be prepared and implemented to manage the site.

In the event that any intrusive work is to occur in the remediation area prior to the commencement of remediation, a task-specific AMP and WHS plan must be prepared by the contractor undertaking the works, with due consideration to the contamination encountered to date.

9.3 Project Contacts and Signage

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. These details are to be confirmed when the various roles and responsibilities are assigned.

A sign displaying the contact details of the remediation contractor and site manager (if different from the remediation contractor) must be displayed on the site adjacent to the site access, including a contact telephone number that is available 24 hours a day, 7 days a week. The sign must be clearly legible from the street and be displayed for the duration of the remediation works.

9.4 Security

Appropriate fencing should be installed as required to secure the site. Warning signs should be erected, which outline the PPE required for remediation work.

9.5 Timing and Sequencing of Remediation Works

The anticipated sequence of remediation works is outlined at the beginning of Section 6 of this RAP. Remediation will occur concurrently with the development works to facilitate the implementation of the requirements under this RAP.

The determining authority must consider the nature/scope of remediation so that the conditions in the REF/approval align with the sequence of works and requirements of the RAP. Notably, remediation requires completion of construction as parts of the constructed development (e.g. landscaping etc) will form the cap, and the DGI work will occur after demolition. Hence, remediation can only occur concurrently with construction and it will not be possible to remediate the site prior to demolition/construction commencing.

9.6 Site Soil and Water Management Plan

The remediation contractor is to prepare a detailed soil and water management plan prior to the commencement of site works and this should consider the requirements of the AMP. Silt fences should be used to control the surface water runoff at all appropriate locations of the site and appropriate measures are to be implemented to manage soil/water disturbance to the satisfaction of the regulator/determining authority. Reference should be made to the consent conditions for further details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines/low-points, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities. Reference is also to be made to the AMP in this regard.

The soil and water management plan is to address the requirements in Clause 3.2.1(2) of the Lismore Council Contaminated Land Policy.

9.7 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[14] should be adopted. Other measures specified in the consent conditions should also be complied with. Noise producing machinery and equipment should only be operated between the hours approved by the determining authority (refer to determination documents).

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are likely to affect residences, notifications should be provided to the relevant authorities and the residents by the project manager, specifying the expected duration of the noisy works.

The use of any plant and/or machinery shall not cause vibrations in excess of the relevant NSW EPA guidelines and Australian Standards, on any premises.

9.8 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;

[14] Australian Standard, (2002). *AS2460: Acoustics - Measurement of the Reverberation Time in Rooms.*

- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the development area; and
- Geofabric could be placed over exposed soils in the event that excavation is staged.

If stockpiles are to remain on-site or soil remains exposed for a period of longer than several days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the relevant waste classification guidelines.

Reference should also be made to the construction phase AMP in this regard.

9.9 Dewatering

Dewatering is not expected to be required within the scope of remediation. In the event that dewatering is required during construction, WaterNSW must be contacted to provide additional details regarding the approval process.

Groundwater must not be pumped to sewer or stormwater without obtaining prior approval from the relevant authorities. The groundwater will require some level of treatment prior to discharge. Or alternatively, pumped groundwater would need to be stored appropriately then removed by a liquid waste contractor.

9.10 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act 1997;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product to suppress any odours that may be generated by excavated materials; and

- Use of protective covers (e.g. builder's plastic).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted. The following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- A suitable proprietary product could be sprayed on material during excavation and following stockpiling to reduce odours (subject to an appropriate assessment of the product by the validation consultant);
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM:
  - reduce the exposed surface of the odorous materials;
  - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
  - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

9.11 Work Health and Safety (WHS) Plan

A site specific WHS plan should be prepared by the remediation contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in SafeWork NSW WHS regulations.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers, steel cap boots, hard hats and asbestos-related PPE. The specific asbestos-related PPE will be specified in the construction phase AMP. Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

9.12 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the remediation contractor should develop a waste management plan to minimise the amount of waste produced from the site and promote recycling of building materials such as concrete pavement to the extent practicable, but with due consideration to the asbestos impacts in fill.

9.13 Incident Management Contingency

The validation consultant should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly, if any incident occurs at the site (e.g. a fuel spill during refuelling of machinery), the validation consultant should be advised to assess potential impacts on contamination conditions and the remediation/validation timetable.

9.14 Hours of Operation

Hours of operation should be between those approved by the determining authority under the development approval process.

9.15 Community Consultation and Complaints

The remediation contractor should provide details for managing community consultation and complaints within their construction plans. Such plans must consider Clause 3.2.1(12) of the Lismore Council Contaminated Land Policy as applicable.

10 CONCLUSIONS

The DSI identified fill impacted and contaminated with asbestos that requires remediation. The proposed remediation strategies for the contaminated fill include a combination of excavation and off-site disposal of contaminated fill/soil to a suitably licensed landfill, and in-situ capping of fill and long-term management of the capped areas via an EMP.

The anticipated sequence of remediation works is outlined at the beginning of Section 6 of this RAP. Remediation will occur concurrently with the development works and this should be considered by the determining authority so that the REF/approval align with the sequence of works and requirements of the RAP.

We are of the opinion that the site can be made suitable for the proposed development via remediation and the implementation of this RAP. A site validation report is to be prepared on completion of remediation activities and submitted to the determining authority to demonstrate that the site is suitable for the proposed development following completion of remediation/validation. An EMP will also be prepared to manage the contaminated fill capped on site as part of the remediation. The EMP will provide a passive management approach and is not expected to impose onerous constraints on the day-to-day site use under the proposed development scenario.

JKE is of the opinion that the RAP has met the objectives outlined in Section 2.1.

The regulatory requirements applicable for the site are outlined in Section 10.1.

10.1 Regulatory Requirements

The regulatory requirements applicable for the remediation are discussed in the following table:

Table 10-1: Regulatory Requirement

Guideline / Legislation / Policy	Applicability
Lismore Council Contaminated Land Policy	Clause 3.2.1(9) of the Lismore Council Contaminated Land Policy states that: *No contaminated soil shall be encapsulated or capped on the site that contains concentrations of contaminants that are above the soil investigation levels for urban development sites in NSW for the range of land uses permissible on the subject site. The on-site containment of contaminated soil is a Category 1 activity under this policy and requires development consent of Council.* This policy contains references to various guidelines and regulations that have since been updated. The client's expert planners should provide advice as to the validity/currency of the policy and the implications with regards to the remediation category.
SEPP Resilience and Hazards 2021	As noted in the DSI, the remediation category should be confirmed by the client's expert planner. The client's expert planner is to assess the remedial requirements and any implications of the Lismore Council Contaminated Land Policy, and provide their planning advice in relation to the remediation category and approvals/planning pathway.

Guideline / Legislation / Policy	Applicability
	Any relevant notices for remediation and/or completion of remediation are to be issued/supplied where required and in accordance with SEPP Resilience and Hazards 2021.
POEO Act 1997 (and associated regulations)	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner. Appropriate waste tracking must occur for all waste that is disposed off-site, where required. Activities must be carried out in a manner which does not result in the pollution of waters.
POEO (Waste) Regulation 2014	Part 7 of the POEO Waste Regulation 2014 set outs the requirements for the transportation and management of asbestos waste and Clause 79 of the POEO Waste Regulation requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10 square meters of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use the NSW EPA-endorsed asbestos waste tracking system. Appropriate waste tracking is required for all waste that is disposed off-site, in accordance with the regulations.
Work Health and Safety Regulation (2017) SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace (2022)	Sites with asbestos become a 'workplace' when work is carried out there and require a register and AMP. Appropriate SafeWork NSW notification will be required for licensed asbestos removal works or handling. These requirements must be evaluated following the hazardous building materials survey and on completion of the additional soil sampling associated with the pre-remediation DGI.
NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997	The requirement to notify the NSW EPA should be assessed as part of the site validation process.

11 LIMITATIONS

The report limitations are outlined below:

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

Important Information About This Report

These notes have been prepared by JKE to assist with the 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 assessment. If the subject site is sold, ownership of the assessment report should be transferred by JKE to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment 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 assessment 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 assessments 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 assessment 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 an investigation can reduce exposure to the risk of the presence of contamination, no investigation can eliminate the risk. Even a rigorous professional assessment 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.

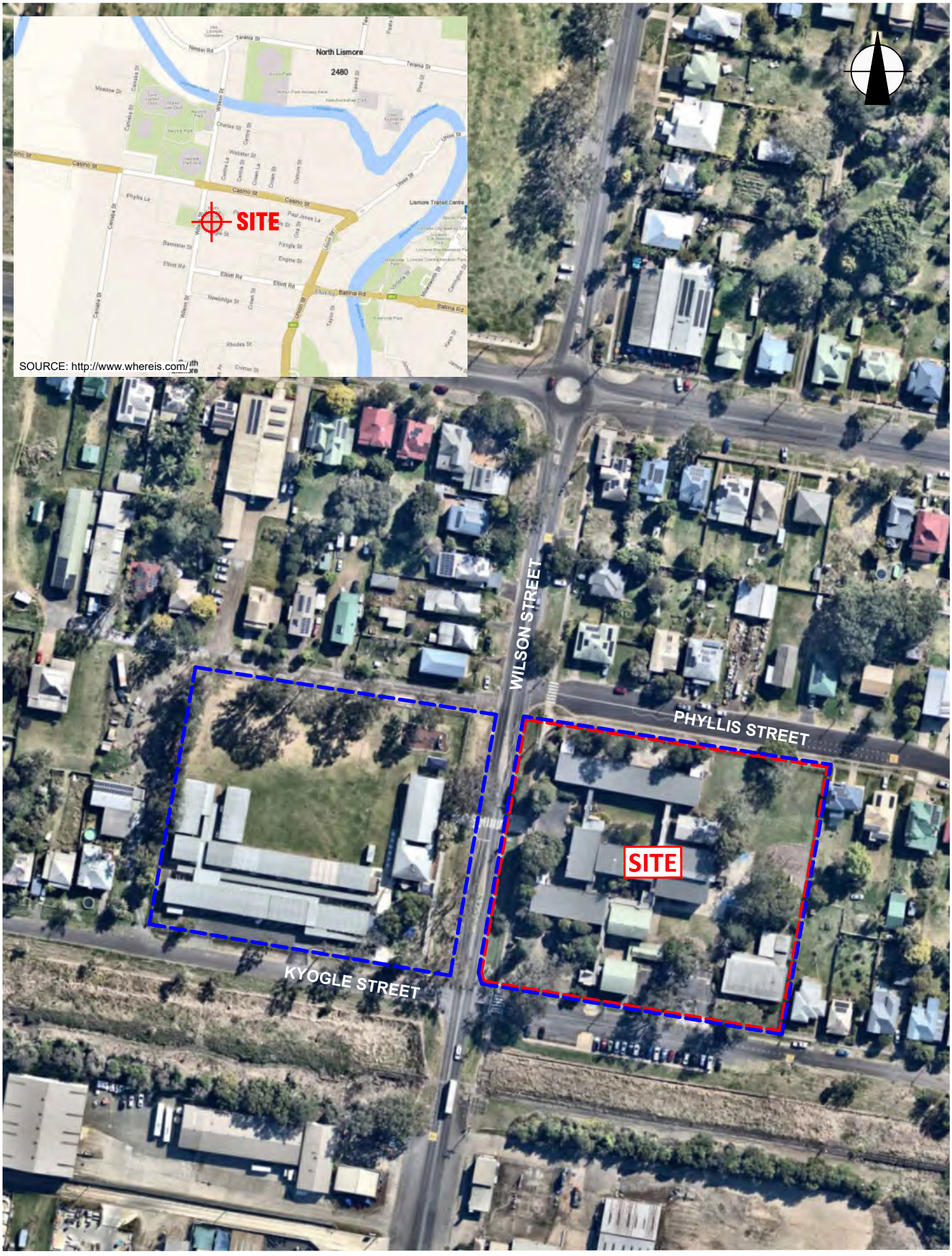
Misinterpretation of Reports by Design Professionals:
Costly problems can occur when design professionals develop plans based on misinterpretation of the report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals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

Logs Should not be Separated from the 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 assessment. 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 assessment. 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 report 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:
As the 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 report, and you are encouraged to read them closely.

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: 69-79 KYOGLE STREET, LISMORE, NSW

Report Ref: E36310PTrpt6-RAP

Figure No: 1

JKEnvironments

PLOT DATE: 22/10/2024 3:42:19 PM DWG FILE: K:\SC EIS \JOBS\36000\SIE36310PT SOUTH LISMORE (SLPS)\CAD\E36310PTRPT3.DWG

LEGEND

APPROXIMATE PSI SITE BOUNDARY	
APPROXIMATE SITE BOUNDARY	
AREAS OF FORMER BUILDINGS/STRUCTURES	
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH19	JKE/JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW2	JKE/JKG BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
TP3	JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
SS	SOIL SAMPLE LOCATION AND NUMBER
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: 69-79 KYOGLE STREET, LISMORE, NSW

Report Ref: E36310PTrpt6-RAP

Figure No: 2

JKEnvironments

PLOT DATE: 5/06/2025 1:04:57 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36310PT SOUTH LISMORE (SLPS)\CADD\E36310PTRPT3.DWG

TP6	0-0.1m
ACM	0.0651%w/w
AF/FA	Detected

APPROXIMATE OUTLINE OF PROPOSED BUILDING

TP16	0.4-0.5m
C_PAH	3.5mg/kg
ACM	0.0187%w/w

MW2	
Zinc	72µg/L

TP8	0-0.2m
ACM	0.1168%w/w

TP4	0.5-0.6m
TRH F3	850mg/kg

TP17	0.2-0.4m
ACM	0.0124%w/w

APPROXIMATE OUTLINE OF PROPOSED PAVEMENT

LOTS OWNED BY FARMERS AND MOTOR MECHANICS

TP25	0.4-0.5m
Lead	440mg/kg

BH1 (0.3), TP6 (0.4), SS26, BH/MW11 (0.4), TP16 (0.5), BH21 (0.2), BH7 (0.4), SS27, BH12 (0.3), BH/MW2 (0.2), SS28, TP17 (0.6), TP22 (0.8), BH13 (0.3), SS29, TP3 (0.65), TP18 (0.5), TP8 (0.8), SS31, BH/MW23 (0.4), FCF1, TP4 (0.6), SS30, TP14 (0.3), SS32, BH19 (0.4), TP24 (0.4), SS33, SS34, TP5 (0.4), FCF6, TP9 (0.6), TP10 (0.8), BH15 (0.6), TP20 (0.7), SS35, TP25 (0.4)

LEGEND

- APPROXIMATE PSI SITE BOUNDARY
- APPROXIMATE SITE BOUNDARY
- AREAS OF FORMER BUILDINGS/STRUCTURES
- BH(Fill Depth) — JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH19 — JKE/JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH/MW2 — JKE/JKG BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- TP3 — JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
- SS — SOIL SAMPLE LOCATION AND NUMBER
- 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

- SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK
- SOIL/SURFACE CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
- GROUNDWATER CONTAMINATION ABOVE SAC
- ASBESTOS DETECTED - NOT ABOVE SAC

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

Location: 69-79 KYOGLE STREET, LISMORE, NSW

Report Ref: E36310PTrpt6-RAP

Figure No: 3

JKEnvironments

PLOT DATE: 5/06/2025 1:05:59 PM DWG FILE: K:\5C EIS JOBS\36000'S\E36310PT SOUTH LISMORE (SLPS)\CADE\E36310PTRPT3.DWG

APPROXIMATE OUTLINE OF PROPOSED BUILDING

APPROXIMATE OUTLINE OF PROPOSED PAVEMENT

LOTS OWNED BY FARMERS AND MOTOR MECHANICS

BH1 (0.3) TP6 (0.4) TP101 SS26 TP102 TP103 TP104 BH/MW11 (0.4) TP16 (0.5) BH21 (0.2) TP105 TP106 TP107 BH7 (0.4) SS27 TP108 BH12 (0.3) TP109 TP110 BH/MW2 (0.2) TP111 TP112 TP17 (0.6) TP113 TP22 (0.8) TP114 SS28 BH13 (0.3) SS29 TP115 TP3 (0.65) TP116 TP117 TP118 TP119 TP18 (0.5) TP120 TP121 TP122 TP8 (0.8) TP123 SS31 TP124 TP125 BH/MW23 (0.4) FCF1 TP126 SS30 TP4 (0.6) TP14 (0.3) SS32 TP127 TP128 TP129 TP130 BH19 (0.4) TP131 TP132 TP24 (0.4) SS33 SS34 TP133 TP5 (0.4) TP134 TP135 TP136 TP137 FCF6 TP9 (0.6) TP138 TP139 TP20 (0.7) TP140 TP10 (0.8) BH15 (0.6) TP141 SS35 TP142 TP25 (0.4)

LEGEND

APPROXIMATE PSI SITE BOUNDARY	
APPROXIMATE SITE BOUNDARY	
AREAS OF FORMER BUILDINGS/STRUCTURES	
BH(Fill Depth)	JKE BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH19	JKE/JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW2	JKE/JKG BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
TP3	JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
SS	SOIL SAMPLE LOCATION AND NUMBER
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
TP101	PROPOSED TEST PIT LOCATION AND NUMBER

0 6 12 18 24 30
SCALE 1:600 @A3 METRES

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

Title: **PROPOSED DGI SAMPLE LOCATION PLAN**

Location: 69-79 KYOGLE STREET, LISMORE, NSW

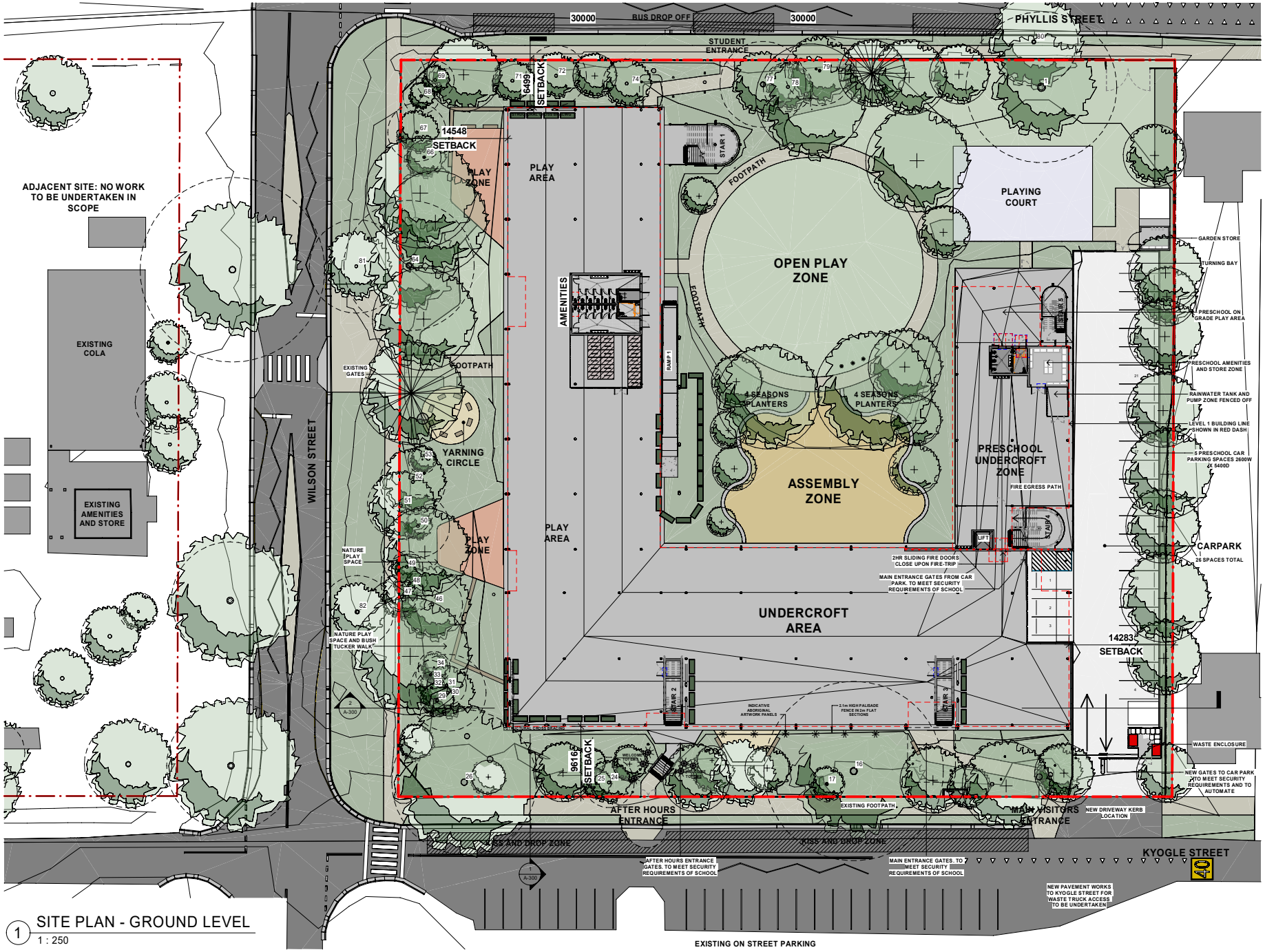
Report Ref: E36310PTrpt6-RAP

Figure No: 4

JKEnvironments

PLOT DATE: 5/06/2025 1:14:02 PM DWG FILE: K:\SC EIS \JOBS\36000\SIE\36310PT SOUTH LISMORE (SLPS)\CAD\E36310PTRPT6.DWG

Appendix B: Proposed Development Plans



1 SITE PLAN - GROUND LEVEL
1 : 250

ROOM TYPE KEY

- HALL / PERFORMING ARTS
- GLS AND HOMEBASE
- CANTEEN
- ADMIN AND STAFF
- AMENITIES
- CIRCULATION
- LIBRARY
- STORAGE AND SERVICES

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REV	DATE	COMMENTS	DRN	CHKD	VRFD
F	22/11/2024	90% SCHEMATIC ISSUE UPDATE	MG	KG	
G	29/11/2024	100% SCHEMATIC ISSUE	MG	KG	
H	04/12/2024	SDRP CHANGES	MG	KG	
J	20/01/2025	ISSUE TO CONSULTANTS	MG	KG	
K	28/01/2025	ISSUE TO CONSULTANT	MG	KG	
L	06/02/2025	ISSUE FOR REF	MG	KG	
M	11/02/2025	ISSUE FOR CLIENT REVIEW	MG	KG	
N	18/02/2025	ISSUE FOR REF UPDATE	MG	KG	
P	20/02/2025	ISSUE FOR REF UPDATE	MG	KG	
Q	10/03/2025	ISSUE FOR REF UPDATE	MG	KG	
R	03/06/2025	ISSUE FOR REF UPDATE	MG	KG	

PROJECT : **LISMORE SOUTH PUBLIC SCHOOL (LSPS) SINSW #230301**

CLIENT : **SCHOOL INFRASTRUCTURE NSW (SINSW)**

SITE : **69 TO 79 KYOGLE STREET, LISMORE SOUTH, NSW,2480**

DRAWING : **SITE PLAN - GROUND FLOOR**

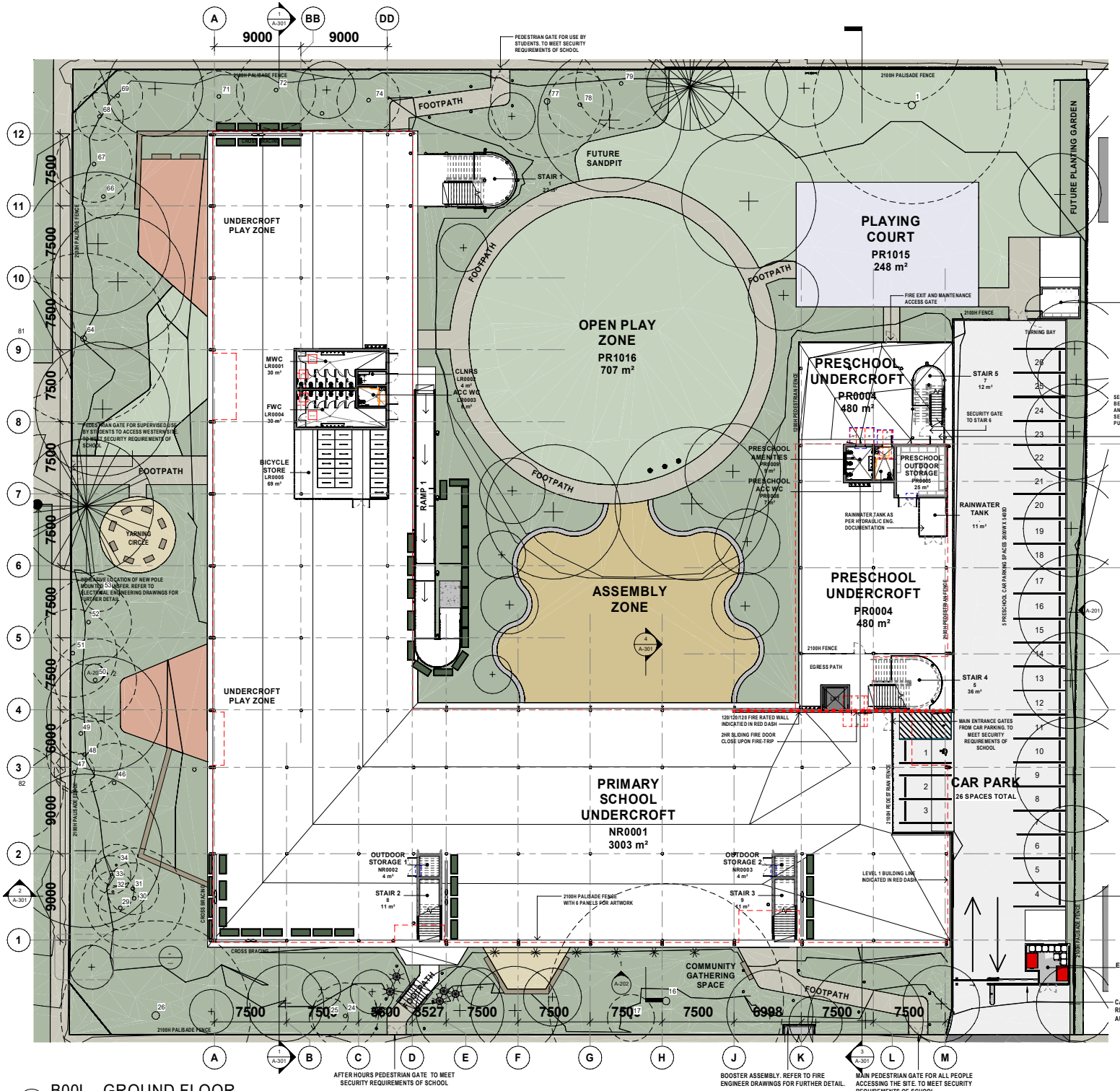
WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

Autodesk Docs://Richmond River - Flood Recovery/LSPS-EJE-00-ZZ-M0-A-0000.rvt

PROJECT No :	DRAWN :	DATE :	SCALES :
14931	MG	03/06/2025	As indicated @ A1 1 : 500 @ A3

PHASE :	BUILDING ID:	Level No:	DRAWING No :	REV :
CD	ZZ	GF	A-020	R

EJE Integrity Innovation Inspiration



1 B00L - GROUND FLOOR
1 : 200

ROOM TYPE KEY

- HALL / PERFORMING ARTS
- GLS AND HOMEBASE
- CANTEEN
- ADMIN AND STAFF
- AMENITIES
- CIRCULATION
- LIBRARY
- STORAGE AND SERVICES
- PROPOSED TREES
- EXISTING TREES

FLOOD RESILIENT REQUIREMENTS

1. ALL STRUCTURES ARE TO HAVE FLOOD RESILIENT MATERIALS BELOW OR AT THE FPL. SERVICES SUCH AS AIR CONDITIONING UNITS, ELECTRICAL SWITCHBOARDS, STORAGE HOT WATER UNUTS AND WATER TANKS TO BE PLACED ABOVE THE FPL.
2. FENCING MUST BE PERMEABLE TO ALLOW THE PASSAGE OF FLOOD FLOWS (MINIMUN 90% VOID SPACE) OR BE COLLAPSIBLE UNDER FLOOD FLOW
3. ANY ENCLOSURE BELOW THE FLOOD PLANNING LEVEL MUST HAVE OPENINGS TO ALLOW AUTOMATIC ENTRY AND EXIT OF FLOODWATER.

FURTHER INFORMATION IS TO BE PROVIDED FOR THESE REQUIREMENTS DURING DETAIL DESIGN.

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REVISION	BY	AMENDMENT	DATE
A	MG	ISSUE TO CONSULTANT	26/03/2024
B	MG	ISSUE TO CLIENT	08/04/2024
C	MG	100% CONCEPT	07/06/2024
D	MG	25% SCHEMATIC ISSUE	20/09/2024
E	MG	50% SCHEMATIC ISSUE	18/10/2024
F	MG	90% SCHEMATIC ISSUE	15/11/2024
G	MG	90% SCHEMATIC ISSUE UPDATE	22/11/2024
H	MG	100% SCHEMATIC ISSUE	29/11/2024
J	MG	SORP RESPONSE	04/12/2024
K	MG	ISSUE TO CONSULTANTS	28/01/2025
L	MG	ISSUE FOR REF	06/02/2025
M	MG	ISSUE FOR CONSULTANTS	12/02/2025
N	MG	ISSUE FOR REF UPDATE	18/02/2025
P	MG	ISSUE FOR REF UPDATE	20/02/2025
Q	MG	ISSUE FOR REF UPDATE	10/03/2025
R	MG	ISSUE FOR REF UPDATE	03/06/2025

CLIENT : SINSW

DRAWING : **GROUND FLOOR PLAN**

PROJECT : LISMORE SOUTH PUBLIC SCHOOL
69-79 KYOGLE STREET, LISMORE SOUTH, NSW
BUNDJALUNG COUNTRY

DRAWN :

PROJECT No : 14931

SCALES : 1 : 400 @ A3
As indicated @ A1

DATE :

PHASE : SD

DRAWING No : A-100

REV : R

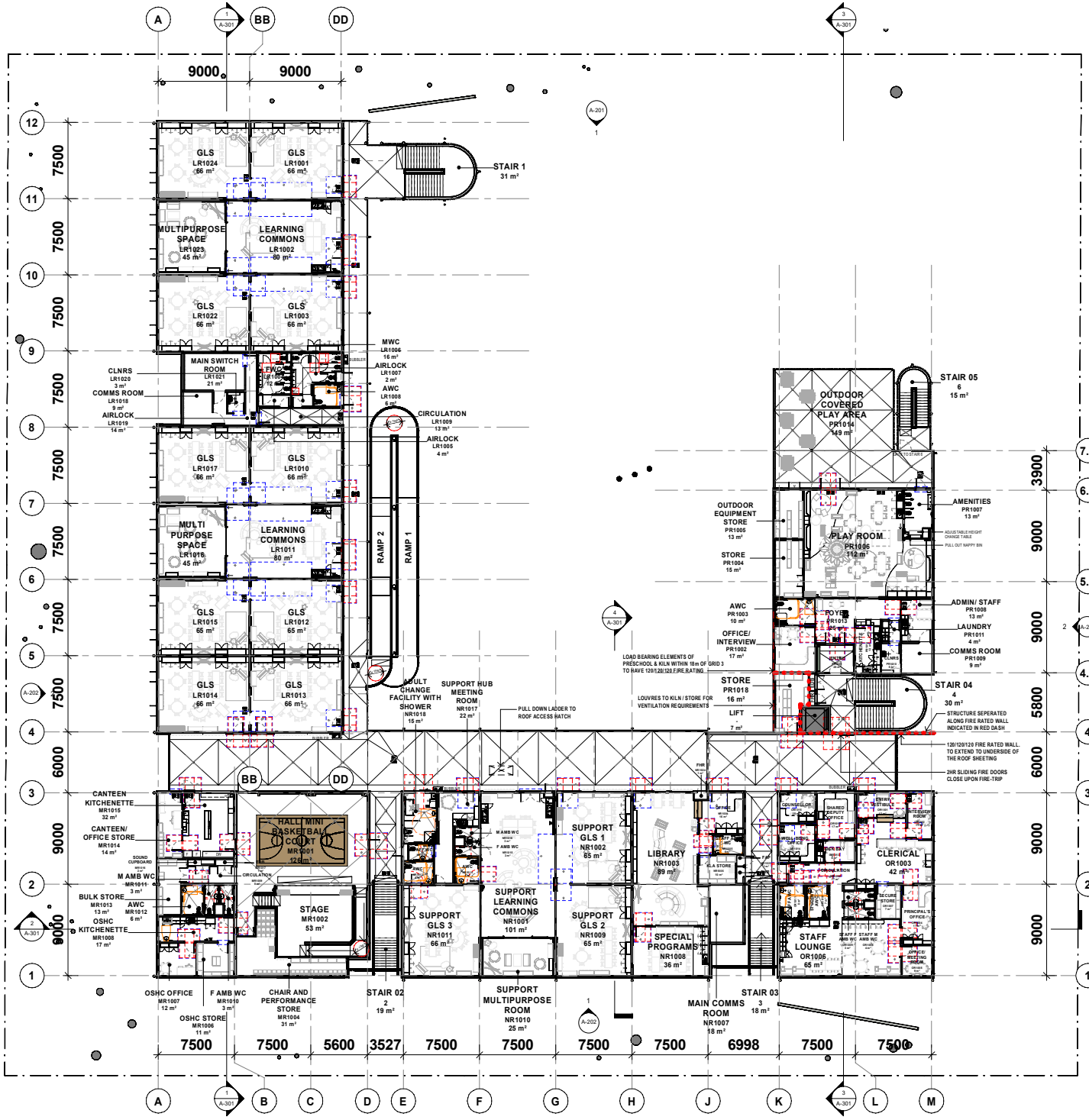
DRAWN : MG

DATE : 03/06/2025

BUILDING ID: B00L

LEVEL NO.: GF

EJE Integrity Innovation Inspiration



1 B00L - LEVEL 1
1 : 200

ROOM TYPE KEY

- HALL / PERFORMING ARTS
- GLS AND HOMEBASE
- CANTEEN
- ADMIN AND STAFF
- AMENITIES
- CIRCULATION
- LIBRARY
- STORAGE AND SERVICES
- PROPOSED TREES
- EXISTING TREES

FLOOD RESILIENT REQUIREMENTS

1. ALL STRUCTURES ARE TO HAVE FLOOD RESILIENT MATERIALS BELOW OR AT THE FPL. SERVICES SUCH AS AIR CONDITIONING UNITS, ELECTRICAL SWITCHBOARDS, STORAGE HOT WATER UNUTS AND WATER TANKS TO BE PLACED ABOVE THE FPL.
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REVISION	BY	AMENDMENT	DATE
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B	MG	ISSUE TO CLIENT	08/04/2024
C	MG	100% CONCEPT	07/06/2024
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E	MG	50% SCHEMATIC ISSUE	18/10/2024
F	MG	90% SCHEMATIC ISSUE	15/11/2024
G	MG	90% SCHEMATIC ISSUE UPDATE	22/11/2024
H	MG	100% SCHEMATIC ISSUE	29/11/2024
J	MG	SORP RESPONSE	04/12/2024
K	MG	ISSUE TO CONSULTANTS	28/01/2025
L	MG	ISSUE FOR REF	06/02/2025
M	MG	ISSUE FOR CONSULTANTS	12/02/2025
N	MG	ISSUE FOR REF UPDATE	18/02/2025
P	MG	ISSUE FOR REF UPDATE	20/02/2025
Q	MG	ISSUE FOR REF UPDATE	03/06/2025

CLIENT : SINSW

DRAWING : **LEVEL 1 PLAN**

PROJECT : LISMORE SOUTH PUBLIC SCHOOL
69-79 KYOGLE STREET, LISMORE SOUTH, NSW
BUNDJALUNG COUNTRY

DRAWN : PROJECT No : **14931**

SCALES : 1 : 400 @ A3
As indicated @ A1

DATE :

PHASE : **SD**

DRAWING No : **A-101**

REV : **Q**

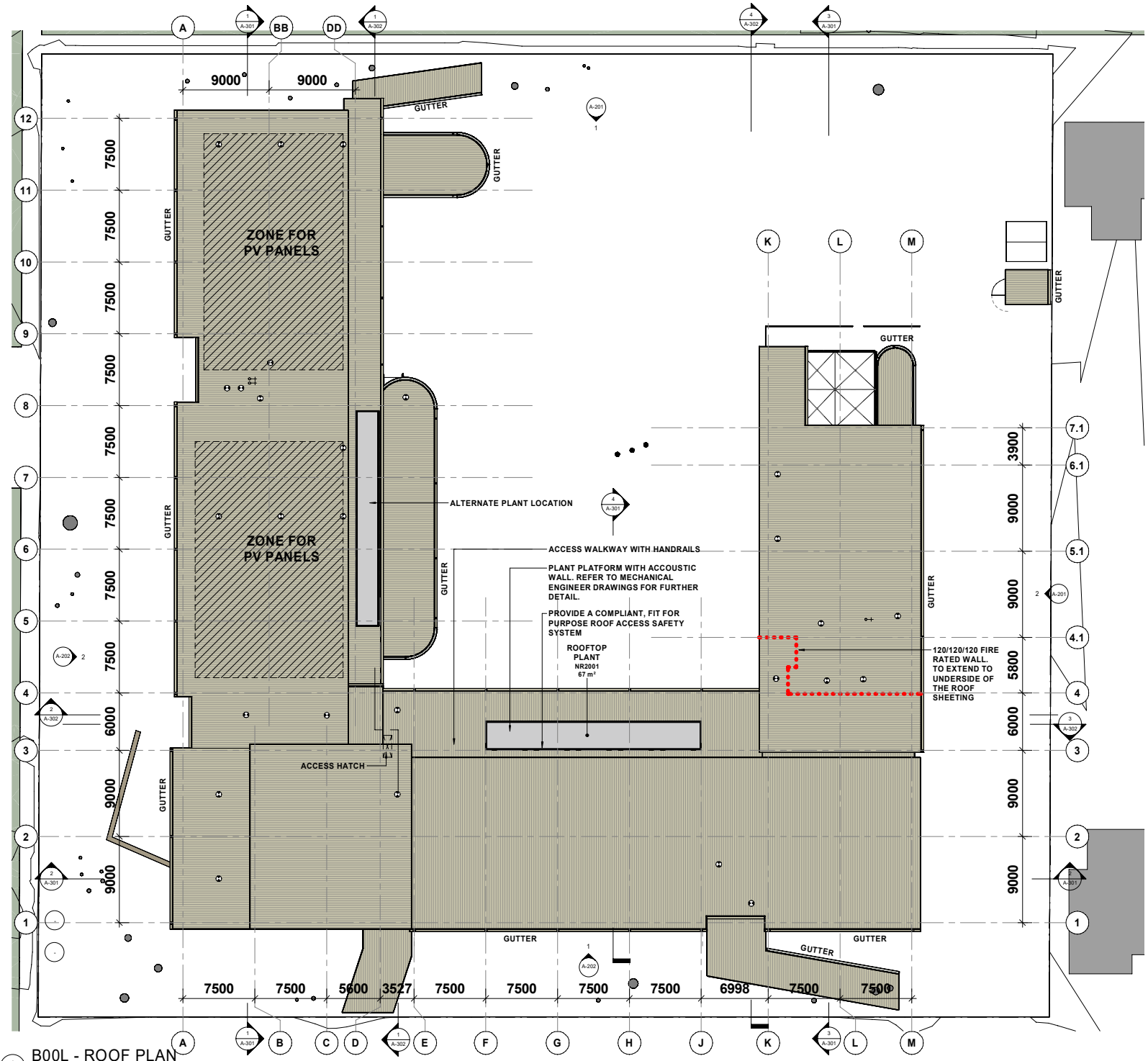
DRAWN : **MG**

DATE : **03/06/2025**

BUILDING ID: **B00L**

LEVEL NO.: **L1**

EJE Integrity Innovation Inspiration



1 B00L - ROOF PLAN
1 : 200

MATERIAL LEGEND

CPT. ## = CARPET
MS. ## = METAL SHEET
PC. ## = POWDERCOAT
PT. ## = PAINT FINISH
TL. ## = TILE
V. ## = VINYL
CONC. = CONCRETE

REFER TO FINISHES SCHEDULE FOR FURTHER DETAILS

FLOOD RESILIENT REQUIREMENTS

1. ALL STRUCTURES ARE TO HAVE FLOOD RESILIENT MATERIALS BELOW OR AT THE FPL. SERVICES SUCH AS AIR CONDITIONING UNITS, ELECTRICAL SWITCHBOARDS, STORAGE HOT WATER UNUTS AND WATER TANKS TO BE PLACED ABOVE THE FPL.
2. FENCING MUST BE PERMEABLE TO ALLOW THE PASSAGE OF FLOOD FLOWS (MINIMUN 90% VOID SPACE) OR BE COLLAPSIBLE UNDER FLOOD FLOW
3. ANY ENCLOSURE BELOW THE FLOOD PLANNING LEVEL MUST HAVE OPENINGS TO ALLOW AUTOMATIC ENTRY AND EXIT OF FLOODWATER.

FURTHER INFORMATION IS TO BE PROVIDED FOR THESE REQUIREMENTS DURING DETAIL DESIGN.

ACN 002 912 843 | ABN 82 644 649 849
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REVISION	BY	AMENDMENT	DATE
A	MG	ISSUE TO CONSULTANT	26/03/2024
B	MG	ISSUE TO CLIENT	08/04/2024
C	MG	100% CONCEPT	07/06/2024
D	MG	25% SCHEMATIC ISSUE	20/09/2024
E	MG	50% SCHEMATIC ISSUE	18/10/2024
F	MG	90% SCHEMATIC ISSUE	15/11/2024
G	MG	90% SCHEMATIC ISSUE UPDATE	22/11/2024
H	MG	100% SCHEMATIC ISSUE	29/11/2024
J	MG	SORP RESPONSE	04/12/2024
K	MG	ISSUE TO CONSULTANTS	28/01/2025
L	MG	ISSUE FOR CONSULTANTS	12/02/2025
M	MG	ISSUE FOR REF UPDATE	18/02/2025
N	MG	ISSUE FOR REF UPDATE	20/02/2025
P	MG	ISSUE FOR REF UPDATE	10/03/2025
Q	MG	ISSUE FOR REF UPDATE	03/06/2025

CLIENT : SINSW

DRAWING : **ROOF PLAN**

PROJECT : LISMORE SOUTH PUBLIC SCHOOL
69-79 KYOGLE STREET, LISMORE SOUTH, NSW
BUNDJALUNG COUNTRY

DRAWN :

PROJECT No : **14931**

SCALES : 1 : 400 @ A3
1 : 200 @ A1

DATE :

PHASE : **SD**

DRAWING No : **A-102**

REV : **Q**

DRAWN : **MG**

DATE : **03/06/2025**

BUILDING ID: **B00L**

LEVEL NO.: **LR**

EJE Integrity Innovation Inspiration

Appendix C: JKE DSI Laboratory Summary Tables and Logs

Laboratory 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.

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**																				
BH1	0-0.1	F: Silty Sand	**15**	<0.4	**27**	**24**	**11**	<0.1	**11**	**77**	**6.8**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	**17**	<0.4	**28**	**25**	**12**	<0.1	**9**	**81**	**6.2**	**0.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH2	0.05-0.2	F: Silty Sandy Gravel	<4	<0.4	**20**	**16**	**30**	<0.1	**24**	**120**	**0.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP3	0-0.1	F: Silty Sand	<4	<0.4	**10**	**9**	**11**	<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
TP3	0.5-0.6	F: Sand	<4	<0.4	**5**	<1	**2**	<0.1	<1	**2**	**0.06**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP4	0-0.1	F: Silty Sand	<4	<0.4	**14**	**18**	**27**	<0.1	**11**	**86**	**1.3**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP4	0.4-0.5	F: Silty Clay	<4	<0.4	**21**	**22**	**39**	<0.1	**20**	**110**	**4.2**	**0.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP4	0.5-0.6	F: Silty Gravel	<4	<0.4	**4**	**9**	**12**	<0.1	**5**	**24**	**3.4**	**0.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP4	0.8-0.9	Silty Clay	<4	<0.4	**30**	**16**	**10**	<0.1	**15**	**32**	**1.1**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP5	0-0.1	F: Silty Sand	<4	<0.4	**25**	**15**	**9**	<0.1	**12**	**57**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP6	0-0.1	F: Silty Sand	<4	<0.4	**8**	**13**	**20**	<0.1	**8**	**59**	**1.6**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected
TP6	0.3-0.4	F: Silty Sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH7	0-0.1	F: Silty Clay	<4	<0.4	**15**	**20**	**15**	<0.1	**10**	**79**	**0.07**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP8	0-0.1	F: Silty Sandy Clay	<4	**1**	**14**	**15**	**26**	<0.1	**9**	**100**	**5.8**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	<4	**0.5**	**15**	**15**	**25**	<0.1	**9**	**110**	**6.2**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP8	0.4-0.5	F: Silty Gravelly Clay	<4	<0.4	**5**	**19**	**5**	<0.1	**18**	**57**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH9	0-0.1	Fill: Silty Sand	<4	<0.4	**8**	**9**	**13**	<0.1	**4**	**33**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP10	0-0.1	F: Silty Sand	<4	<0.4	**11**	**10**	**14**	<0.1	**8**	**55**	**24**	**2.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP10	0.4-0.5	F: Silty Sandy Clay	<4	<0.4	**24**	**10**	**9**	<0.1	**20**	**62**	**9.6**	**1.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH11	0.0-0.1	Fill: Silty Sand	<4	<0.4	**7**	**12**	**11**	<0.1	**7**	**47**	**1.2**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH12	0-0.2	F: Silty Clay	<4	<0.4	**9**	**6**	**11**	<0.1	**4**	**54**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH13	0-0.1	F: Silty Clay	<4	<0.4	**17**	**12**	**17**	<0.1	**10**	**63**	**6.1**	**1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP14	0-0.1	F: Silty Sand	<4	<0.4	**12**	**22**	**25**	**0.1**	**9**	**220**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP14	0.9-1	Sandy Clay	<4	<0.4	**32**	**14**	**6**	<0.1	**30**	**64**	**0.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH15	0-0.1	F: Silty Sandy Gravel	**5**	<0.4	**10**	**15**	**9**	<0.1	**8**	**44**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP16	0-0.1	F: Silty Sand	<4	<0.4	**11**	**14**	**10**	<0.1	**14**	**64**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	<4	<0.4	**12**	**14**	**11**	<0.1	**13**	**61**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP16	0.4-0.5	F: Silty Clay	<4	<0.4	**20**	**15**	**37**	<0.1	**22**	**81**	**17**	**3.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP16	1.0-1.2	Silty Clay	<4	<0.4	**24**	**15**	**9**	<0.1	**14**	**23**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP17	0-0.1	F: Silty Sand	<4	<0.4	**11**	**14**	**13**	<0.1	**11**	**71**	**0.56**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP17	0.3-0.4	F: Silty Sandy Clay	<4	<0.4	**34**	**19**	**30**	<0.1	**25**	**81**	**8.6**	**1.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP18	0-0.1	F: Silty Clayey Sand	<4	<0.4	**17**	**15**	**14**	<0.1	**11**	**85**	**0.3**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP18	0.4-0.5	F: Silty Clay	<4	<0.4	**26**	**16**	**14**	<0.1	**18**	**66**	**3.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH19	0-0.1	F: Silty Sand	<4	<0.4	**5**	**11**	**10**	<0.1	**5**	**46**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH20	0-0.1	F: Silty Clay	<4	<0.4	**9**	**9**	**10**	<0.1	**5**	**31**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH20	0.3-0.4	F: Silty Gravel	**7**	<0.4	**9**	**15**	**11**	<0.1	**9**	**44**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH21	0-0.1	F: Silty Sand	<4	<0.4	**12**	**8**	**9**	<0.1	**7**	**38**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP22	0-0.1	F: Silty Sand	<4	<0.4	**10**	**9**	**10**	<0.1	**5**	**39**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP22	0.3-0.4	F: Silty Sandy Clay	<4	<0.4	**19**	**22**	**38**	<0.1	**16**	**120**	**5.4**	**0.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH23	0-0.1	F: Silty Sand	<4	<0.4	**9**	**10**	**12**	<0.1	**6**	**56**	**0.4**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	<4	<0.4	**9**	**12**	**26**	<0.1	**6**	**59**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP24	0-0.1	F: Silty Sand	**4**	<0.4	**4**	**14**	**14**	<0.1	**7**	**44**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP24	0.3-0.4	F: Silty Gavelly Clay	<4	<0.4	**14**	**7**	**3**	<0.1	**5**	**21**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH25	0-0.1	F: Silty Clay	<4	<0.4	**26**	**16**	**8**	<0.1	**24**	**61**	**1.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH25	0.3-0.4	F: Gravelly Clay	<4	<0.4	**42**	**18**	**15**	<0.1	**55**	**78**	**1.2**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH25	0.4-0.5	F: Sandy Clay	<4	<0.4	**33**	**16**	**440**	<0.1	**29**	**72**	**4.8**	**0.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH25	0.8-0.9	Silty Clay	<4	<0.4	**26**	**17**	**10**	<0.1	**11**	**20**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS26	0-0.1	F: Sandy Gravel	<4	**1**	**14**	**16**	**15**	<0.1	**7**	**85**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS27	0-0.1	F: Silty Clay	<4	<0.4	**13**	**17**	**8**	<0.1	**13**	**100**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS28	0-0.1	F: Silty Sand	**18**	**2**	**27**	**24**	**16**	<0.1	**11**	**130**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS29	0-0.1	F: Silty Sand	<4	**0.9**	**12**	**19**	**16**	<0.1	**14**	**120**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS30	0-0.1	F: Silty Sand	**7**	<0.4	**7**	**28**	**17**	<0.1	**11**	**84**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS31	0-0.1	F: Silty Sand	<4	<0.4	**18**	**17**	**12**	<0.1	**14**	**140**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS32	0-0.1	F: Silty Sand	<4	<0.4	**9**	**13**	**9**	<0.1	**10**	**98**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS33	0-0.1	F: Silty Clay	<4	<0.4	**11**	**10**	**10**	<0.1	**8**	**84**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS34	0-0.1	F: Silty Sand	<4	<0.4	**13**	**11**	**7**	<0.1	**6**	**45**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SS35	0-0.1	F: Silty Clay	<4	<0.4	**24**	**16**	**22**	<0.1	**19**	**280**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA
SDUP1	BH11 (0-0.1m)	F: Silty Sand	<4	<0.4	**8**	**14**	**12**	<0.1	**9**	**55**	**0.3**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	<4	<0.4	**9**	**12**	**11**	<0.1	**9**	**47**	**1.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP2	BH23 (0-0.1m)	F: Silty sand	<4	<0.4	**7.9**	**9.1**	**6.8**	<0.1	**5.7**	**46**	**0.051**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP3	BH19 (0-0.1m)	F: Silty Sand	<4	<0.4	**13**	**9**	**8**	<0.1	**6**	**49**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP4	BH21 (0-0.1m)	F: Silty sand	<4	<0.4	**14**	**11**	**9.3**	<0.1	**9.3**	**42**	**0.47**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF1	Surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
FCF2-TP8	0-0.2	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF3-TP6	0-0.1	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF4-TP16	0.4-0.5	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF5-TP17	0.2-0.4	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF6	Surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
Total Number of Samples			61	61	61	61	61	61	61	61	51	51	43	43	43	43	43	43	43	43	33	31
Maximum Value			18	2	42	28	440	0.1	55	280	24	3.5	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																						
Number of Fill Samples			NC	NC	NC	NC	**48**	NC	NC	NC	NC	**38**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	**24.19**	NC	NC	NC	NC	**0.716**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	**61.91**	NC	NC	NC	NC	**0.571**	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
UCL Value			NC	NC	NC	NC	**63.14**	NC	NC	NC	NC	**0.872**	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**								
BH1	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH2	0.05-0.2	F: Silty Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP3	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	**88**	<0.2	<0.5	<1	<1	<1	0
TP3	0.5-0.6	F: Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP4	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
TP4	0.4-0.5	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
TP4	0.5-0.6	F: Silty Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
TP4	0.8-0.9	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
TP5	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP6	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH7	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP8	0-0.1	F: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP8	0.4-0.5	F: Silty Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH9	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP10	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
TP10	0.4-0.5	F: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH11	0.0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH12	0-0.2	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH13	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP14	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP14	0.9-1	Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH15	0-0.1	F: Silty Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP16	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP16	0.4-0.5	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP16	1.0-1.2	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP17	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP17	0.3-0.4	F: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP18	0-0.1	F: Silty Clayey Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP18	0.4-0.5	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH19	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH20	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH20	0.3-0.4	F: Silty Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.3
BH21	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP22	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP22	0.3-0.4	F: Silty Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH23	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP24	0-0.1	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP24	0.3-0.4	F: Silty Gavelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH25	0-0.1	F: Silty Clay	0m to <1m	Sand	<25	**50**	<0.2	<0.5	<1	<1	<1	0
BH25	0.3-0.4	F: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH25	0.4-0.5	F: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH25	0.8-0.9	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP1	BH11 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP2	BH23 (0-0.1m)	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP3	BH19 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
SDUP4	BH21 (0-0.1m)	F: Silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	-
Total Number of Samples					51	51	51	51	51	51	51	51
Maximum Value					<PQL	88	<PQL	<PQL	<PQL	<PQL	<PQL	0.4

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

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH1	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	0.05-0.2	F: Silty Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP3	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP3	0.5-0.6	F: Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0.4-0.5	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0.5-0.6	F: Silty Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0.8-0.9	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP5	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP6	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH7	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP8	0-0.1	F: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP8	0.4-0.5	F: Silty Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH9	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP10	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP10	0.4-0.5	F: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH11	0.0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH12	0-0.2	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH13	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP14	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP14	0.9-1	Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH15	0-0.1	F: Silty Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP16	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP16	0.4-0.5	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP16	1.0-1.2	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP17	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP17	0.3-0.4	F: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP18	0-0.1	F: Silty Clayey Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP18	0.4-0.5	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH19	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH20	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH20	0.3-0.4	F: Silty Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH21	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP22	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP22	0.3-0.4	F: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH23	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP24	0-0.1	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP24	0.3-0.4	F: Silty Gavelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH25	0-0.1	F: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH25	0.3-0.4	F: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH25	0.4-0.5	F: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH25	0.8-0.9	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP1	BH11 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP2	BH23 (0-0.1m)	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP3	BH19 (0-0.1m)	F: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP4	BH21 (0-0.1m)	F: Silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3

JKEnvironments

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

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH1	0-0.1	Coarse	<25	<50	**140**	**120**
BH1 - [LAB_DUP]	0-0.1	Coarse	<25	<50	**150**	**120**
BH2	0.05-0.2	Coarse	<25	<50	<100	<100
TP3	0-0.1	Coarse	<25	**88**	<100	<100
TP3	0.5-0.6	Coarse	<25	<50	<100	<100
TP4	0-0.1	Coarse	<25	<50	<100	<100
TP4	0.4-0.5	Fine	<25	<50	<100	<100
TP4	0.5-0.6	Coarse	<25	<50	**850**	**690**
TP4	0.8-0.9	Fine	<25	<50	<100	<100
TP5	0-0.1	Coarse	<25	<50	**160**	**150**
TP6	0-0.1	Coarse	<25	<50	<100	<100
BH7	0-0.1	Fine	<25	<50	<100	<100
TP8	0-0.1	Fine	<25	<50	**200**	**140**
TP8 - [LAB_DUP]	0-0.1	Fine	<25	<50	**200**	**130**
TP8	0.4-0.5	Fine	<25	<50	<100	<100
BH9	0-0.1	Coarse	<25	<50	<100	<100
TP10	0-0.1	Coarse	<25	<50	**140**	<100
TP10	0.4-0.5	Fine	<25	<50	<100	<100
BH11	0.0-0.1	Coarse	<25	<50	<100	<100
BH12	0-0.2	Fine	<25	<50	<100	<100
BH13	0-0.1	Fine	<25	<50	<100	<100
TP14	0-0.1	Coarse	<25	<50	**120**	**110**
TP14	0.9-1	Fine	<25	<50	<100	<100
BH15	0-0.1	Coarse	<25	<50	<100	<100
TP16	0-0.1	Coarse	<25	<50	<100	<100
TP16 - [LAB_DUP]	0-0.1	Coarse	<25	<50	<100	<100
TP16	0.4-0.5	Fine	<25	<50	<100	<100
TP16	1.0-1.2	Fine	<25	<50	<100	<100
TP17	0-0.1	Coarse	<25	<50	<100	<100
TP17	0.3-0.4	Fine	<25	<50	<100	<100
TP18	0-0.1	Coarse	<25	<50	**190**	**140**
TP18	0.4-0.5	Fine	<25	<50	<100	<100
BH19	0-0.1	Coarse	<25	<50	<100	<100
BH20	0-0.1	Fine	<25	<50	<100	<100
BH20	0.3-0.4	Coarse	<25	<50	<100	<100
BH21	0-0.1	Coarse	<25	<50	<100	<100
TP22	0-0.1	Coarse	<25	<50	<100	<100
TP22	0.3-0.4	Fine	<25	<50	<100	<100
BH23	0-0.1	Coarse	<25	<50	**100**	<100
BH23 - [LAB_DUP]	0-0.1	Coarse	<25	<50	**140**	<100
TP24	0-0.1	Coarse	<25	<50	<100	<100
TP24	0.3-0.4	Fine	<25	<50	<100	<100
BH25	0-0.1	Fine	<25	**50**	**300**	**180**
BH25	0.3-0.4	Fine	<25	<50	<100	<100
BH25	0.4-0.5	Fine	<25	<50	<100	<100
BH25	0.8-0.9	Fine	<25	<50	<100	<100
SDUP1	BH11 (0-0.1m)	Coarse	<25	<50	<100	<100
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	Coarse	<25	<50	<100	<100
SDUP2	BH23 (0-0.1m)	Coarse	<25	<50	<100	<100
SDUP3	BH19 (0-0.1m)	Coarse	<25	<50	<100	<100
SDUP4	BH21 (0-0.1m)	Coarse	<25	<50	<100	<100
Total Number of Samples			51	51	51	51
Maximum Value			<PQL	88	850	690

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

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH1	0-0.1	Coarse	700	1000	2500	10000
BH1 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
BH2	0.05-0.2	Coarse	700	1000	2500	10000
TP3	0-0.1	Coarse	700	1000	2500	10000
TP3	0.5-0.6	Coarse	700	1000	2500	10000
TP4	0-0.1	Coarse	700	1000	2500	10000
TP4	0.4-0.5	Fine	800	1000	3500	10000
TP4	0.5-0.6	Coarse	700	1000	2500	10000
TP4	0.8-0.9	Fine	800	1000	3500	10000
TP5	0-0.1	Coarse	700	1000	2500	10000
TP6	0-0.1	Coarse	700	1000	2500	10000
BH7	0-0.1	Fine	800	1000	3500	10000
TP8	0-0.1	Fine	800	1000	3500	10000
TP8 - [LAB_DUP]	0-0.1	Fine	800	1000	3500	10000
TP8	0.4-0.5	Fine	800	1000	3500	10000
BH9	0-0.1	Coarse	700	1000	2500	10000
TP10	0-0.1	Coarse	700	1000	2500	10000
TP10	0.4-0.5	Fine	800	1000	3500	10000
BH11	0.0-0.1	Coarse	700	1000	2500	10000
BH12	0-0.2	Fine	800	1000	3500	10000
BH13	0-0.1	Fine	800	1000	3500	10000
TP14	0-0.1	Coarse	700	1000	2500	10000
TP14	0.9-1	Fine	800	1000	3500	10000
BH15	0-0.1	Coarse	700	1000	2500	10000
TP16	0-0.1	Coarse	700	1000	2500	10000
TP16 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
TP16	0.4-0.5	Fine	800	1000	3500	10000
TP16	1.0-1.2	Fine	800	1000	3500	10000
TP17	0-0.1	Coarse	700	1000	2500	10000
TP17	0.3-0.4	Fine	800	1000	3500	10000
TP18	0-0.1	Coarse	700	1000	2500	10000
TP18	0.4-0.5	Fine	800	1000	3500	10000
BH19	0-0.1	Coarse	700	1000	2500	10000
BH20	0-0.1	Fine	800	1000	3500	10000
BH20	0.3-0.4	Coarse	700	1000	2500	10000
BH21	0-0.1	Coarse	700	1000	2500	10000
TP22	0-0.1	Coarse	700	1000	2500	10000
TP22	0.3-0.4	Fine	800	1000	3500	10000
BH23	0-0.1	Coarse	700	1000	2500	10000
BH23 - [LAB_DUP]	0-0.1	Coarse	700	1000	2500	10000
TP24	0-0.1	Coarse	700	1000	2500	10000
TP24	0.3-0.4	Fine	800	1000	3500	10000
BH25	0-0.1	Fine	800	1000	3500	10000
BH25	0.3-0.4	Fine	800	1000	3500	10000
BH25	0.4-0.5	Fine	800	1000	3500	10000
BH25	0.8-0.9	Fine	800	1000	3500	10000
SDUP1	BH11 (0-0.1m)	Coarse	700	1000	2500	10000
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	Coarse	700	1000	2500	10000
SDUP2	BH23 (0-0.1m)	Coarse	700	1000	2500	10000
SDUP3	BH19 (0-0.1m)	Coarse	700	1000	2500	10000
SDUP4	BH21 (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**										
BH1	0-0.1	<25	<50	**140**	**120**	<0.2	<0.5	<1	<1	<1	0
BH1 - [LAB_DUP]	0-0.1	<25	<50	**150**	**120**	<0.2	<0.5	<1	<1	<1	0
BH2	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP3	0-0.1	<25	**88**	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP3	0.5-0.6	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP4	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP4	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.4**
TP4	0.5-0.6	<25	<50	**850**	**690**	<0.2	<0.5	<1	<1	<1	**0.3**
TP4	0.8-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
TP5	0-0.1	<25	<50	**160**	**150**	<0.2	<0.5	<1	<1	<1	**0.1**
TP6	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH7	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP8	0-0.1	<25	<50	**200**	**140**	<0.2	<0.5	<1	<1	<1	0
TP8 - [LAB_DUP]	0-0.1	<25	<50	**200**	**130**	<0.2	<0.5	<1	<1	<1	0
TP8	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH9	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP10	0-0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	**0.3**
TP10	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH11	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH12	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH13	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP14	0-0.1	<25	<50	**120**	**110**	<0.2	<0.5	<1	<1	<1	0
TP14	0.9-1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH15	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.1**
TP16	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP16 - [LAB_DUP]	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP16	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP16	1.0-1.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP17	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP17	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP18	0-0.1	<25	<50	**190**	**140**	<0.2	<0.5	<1	<1	<1	0
TP18	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH19	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH20	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH20	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.3**
BH21	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP22	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP22	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH23	0-0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<1	**0.1**
BH23 - [LAB_DUP]	0-0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	**0.1**
TP24	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP24	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH25	0-0.1	<25	**50**	**300**	**180**	<0.2	<0.5	<1	<1	<1	0
BH25	0.3-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH25	0.4-0.5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH25	0.8-0.9	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP1	BH11 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP2	BH23 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP3	BH19 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
SDUP4	BH21 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	-
Total Number of Samples		51	51	51	51	51	51	51	51	51	46
Maximum Value		<PQL	88	850	690	<PQL	<PQL	<PQL	<PQL	<PQL	0.4

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**
24/09/2024	BH1	0-0.2	No	>10	10,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH1	0-0.1	583.69	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
24/09/2024	BH2	0.1-0.2	NA	<10	8,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH2	0.05-0.2	480.5	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
26/09/2024	TP3	0-0.1	No	>10	11,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP3	0-0.1	667.27	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
26/09/2024	TP3	0.5-0.6	NA	<10	4,850	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP4	0-0.1	665.52	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
26/09/2024	TP3	1.2-1.4	NA	<10	8,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27/09/2024	TP4	0-0.1	No	>10	11,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP4	0-0.1	665.52	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
27/09/2024	TP4	0.3-0.5	NA	<10	8,950	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27/09/2024	TP5	0-0.1	No	>10	12,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP5	0-0.1	487.27	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
27/09/2024	TP5	0.3-0.5	NA	>10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27/09/2024	TP6	0-0.1	NA	>10	12,050	52.3	7.845	0.0651	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP6	0-0.1	777.81	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	Chrysotile	–	0.0019	<0.01	<0.001
26/09/2024	TP6	0.2-0.4	NA	>10	14,550	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946-A	TP6	0.3-0.4	585.15	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
26/09/2024	TP6	1.0-1.2	NA	>10	10,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH7	0-0.1	553.59	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
25/09/2024	BH7	0-0.2	No	>10	11,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/09/2024	TP8	0-0.2	No	>10	13,650	106.3	15.9375	0.1168	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP8	0-0.1	581.08	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
25/09/2024	TP8	0.3-0.6	NA	>10	12,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	BH9	0-0.1	No	>10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH9	0-0.1	616.09	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
26/09/2024	TP10	0-0.1	No	>10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP10	0-0.1	520.07	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
24/09/2024	BH11	0-0.3	No	>10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/09/2024	BH11	0..7-1.0	NA	<10	6,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/09/2024	BH12	0-0.1	No	>10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH12	0-0.2	539.19	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
25/09/2024	BH13	0-0.1	No	>10	11,650	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH13	0-0.1	576.23	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
26/09/2024	TP14	0-0.1	No	>10	11,950	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP14	0-0.1	762.85	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
26/09/2024	TP14	0.8-1.0	NA	>10	12,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH15	0-0.1	494.21	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
24/09/2024	BH15	0.1-0.4	NA	>10	10,650	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP16	0-0.1	No	>10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP16	0-0.1	658.69	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
26/09/2024	TP16	0.3-0.5	NA	>10	11,900	14.9	2.2305	0.0187	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP16	0.9-1.2	NA	>10	12,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP17	0-0.1	No	>10	10,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP17	0-0.1	664.51	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
26/09/2024	TP17	0.2-0.4	NA	>10	13,450	11.1	1.671	0.0124	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP17	0.8-1.0	NA	>10	10,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP18	0-0.1	No	>10	11,750	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP18	0-0.1	511.23	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
26/09/2024	TP18	0.3-0.5	NA	>10	10,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP18	0.8-1.1	NA	>10	12,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/09/2024	BH19	0-0.2	No	>10	11,650	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH19	0-0.1	747.49	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
27/09/2024	BH20	0-0.2	No	>10	10,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH20	0-0.1	261.81	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
26/09/2024	BH21	0-0.4	No	>10	11,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH21	0-0.1	731	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
26/09/2024	TP22	0-0.1	No	>10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP22	0-0.1	688.35	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
26/09/2024	TP22	0.3-.5	NA	>10	11,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP22	0.6-0.8	NA	>10	13,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP22	1.3-1.5	NA	>10	12,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24/09/2024	BH23	0-0.4	No	<10	8,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH23	0-0.1	537.41	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
24/09/2024	BH23	0.5-1.0	NA	<10	5,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP24	0-0.1	No	>10	11,850	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	TP24	0-0.1	864.83	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
26/09/2024	TP24	0.2-0.4	NA	>10	12,400	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
26/09/2024	TP24	0.5-0.7	NA	>10	11,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
25/09/2024	BH25	0-0.2	No	>	10,550	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	362946	BH25	0-0.1	324.68	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001

Concentration above the SAC **VALUE**

JKEnvironments

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_{35} (F1)	>C_{15}-C_{28} (F2)	>C_{28}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	**15**	**27**	**24**	**11**	**11**	**77**	<1	<0.1	<25	<50	**140**	**120**	<0.2	<0.5	<1	<1	**0.57**
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	**17**	**28**	**25**	**12**	**9**	**81**	<1	<0.1	<25	<50	**150**	**120**	<0.2	<0.5	<1	<1	**0.5**
BH2	0.05-0.2	F: Silty Sandy Gravel	Coarse	NA	NA	NA	<4	**20**	**16**	**30**	**24**	**120**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.05**
TP3	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**10**	**9**	**11**	**5**	**35**	<1	<0.1	<25	**88**	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP3	0.5-0.6	F: Sand	Coarse	NA	NA	NA	<4	**5**	<1	**2**	<1	**2**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
TP4	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**14**	**18**	**27**	**11**	**86**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
TP4	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	<4	**21**	**22**	**39**	**20**	**110**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
TP4	0.5-0.6	F: Silty Gravel	Coarse	NA	NA	NA	<4	**4**	**9**	**12**	**5**	**24**	<1	NA	<25	<50	**850**	**690**	<0.2	<0.5	<1	<1	**0.4**
TP4	0.8-0.9	Silty Clay	Fine	NA	NA	NA	<4	**30**	**16**	**10**	**15**	**32**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
TP5	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**25**	**15**	**9**	**12**	**57**	<1	<0.1	<25	<50	**160**	**150**	<0.2	<0.5	<1	<1	<0.05
TP6	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**8**	**13**	**20**	**8**	**59**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
BH7	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**15**	**20**	**15**	**10**	**79**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
TP8	0-0.1	F: Silty Sandy Clay	Fine	NA	NA	NA	<4	**14**	**15**	**26**	**9**	**100**	<1	<0.1	<25	<50	**200**	**140**	<0.2	<0.5	<1	<1	**0.57**
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	Fine	NA	NA	NA	<4	**15**	**15**	**25**	**9**	**110**	<1	<0.1	<25	<50	**200**	**130**	<0.2	<0.5	<1	<1	**0.65**
TP8	0.4-0.5	F: Silty Gravelly Clay	Fine	NA	NA	NA	<4	**5**	**19**	**5**	**18**	**57**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH9	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**8**	**9**	**13**	**4**	**33**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP10	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**11**	**10**	**14**	**8**	**55**	<1	<0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	**1.6**
TP10	0.4-0.5	F: Silty Sandy Clay	Fine	NA	NA	NA	<4	**24**	**10**	**9**	**20**	**62**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.91**
BH11	0.0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**7**	**12**	**11**	**7**	**47**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
BH12	0-0.2	F: Silty Clay	Fine	NA	NA	NA	<4	**9**	**6**	**11**	**4**	**54**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH13	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**17**	**12**	**17**	**10**	**63**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.65**
TP14	0-0.1	F: Silty Sand	Coarse	**7.5**	**15**	NA	<4	**12**	**22**	**25**	**9**	**220**	<1	<0.1	<25	<50	**120**	**110**	<0.2	<0.5	<1	<1	<0.05
TP14	0.9-1	Sandy Clay	Fine	NA	NA	NA	<4	**32**	**14**	**6**	**30**	**64**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.05**
BH15	0-0.1	F: Silty Sandy Gravel	Coarse	NA	NA	NA	**5**	**10**	**15**	**9**	**8**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP16	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**11**	**14**	**10**	**14**	**64**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**12**	**14**	**11**	**13**	**61**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP16	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	<4	**20**	**15**	**37**	**22**	**81**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**2.5**
TP16	1.0-1.2	Silty Clay	Fine	NA	NA	NA	<4	**24**	**15**	**9**	**14**	**23**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP17	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**11**	**14**	**13**	**11**	**71**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
TP17	0.3-0.4	F: Silty Sandy Clay	Fine	NA	NA	NA	<4	**34**	**19**	**30**	**25**	**81**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.86**
TP18	0-0.1	F: Silty Clayey Sand	Coarse	NA	NA	NA	<4	**17**	**15**	**14**	**11**	**85**	<1	<0.1	<25	<50	**190**	**140**	<0.2	<0.5	<1	<1	**0.07**
TP18	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	<4	**26**	**16**	**14**	**18**	**66**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
BH19	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**5**	**11**	**10**	**5**	**46**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH20	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**9**	**9**	**10**	**5**	**31**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH20	0.3-0.4	F: Silty Gravel	Coarse	NA	NA	NA	**7**	**9**	**15**	**11**	**9**	**44**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH21	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**12**	**8**	**9**	**7**	**38**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP22	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**10**	**9**	**10**	**5**	**39**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP22	0.3-0.4	F: Silty Sandy Clay	Fine	NA	NA	NA	<4	**19**	**22**	**38**	**16**	**120**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
BH23	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**9**	**10**	**12**	**6**	**56**	<1	<0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	**0.08**
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**9**	**12**	**26**	**6**	**59**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP24	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	**4**	**4**	**14**	**14**	**7**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP24	0.3-0.4	F: Silty Gavelly Clay	Fine	NA	NA	NA	<4	**14**	**7**	**3**	**5**	**21**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH25	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**26**	**16**	**8**	**24**	**61**	<1	<0.1	<25	**50**	**300**	**180**	<0.2	<0.5	<1	<1	**0.1**
BH25	0.3-0.4	F: Gravelly Clay	Fine	**7.1**	**33**	NA	<4	**42**	**18**	**15**	**55**	**78**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
BH25	0.4-0.5	F: Sandy Clay	Fine	NA	NA	NA	<4	**33**	**16**	**440**	**29**	**72**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.5**
BH25	0.8-0.9	Silty Clay	Fine	NA	NA	NA	<4	**26**	**17**	**10**	**11**	**20**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SS26	0-0.1	F: Sandy Gravel	Coarse	NA	NA	NA	<4	**14**	**16**	**15**	**7**	**85**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS27	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**13**	**17**	**8**	**13**	**100**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS28	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	**18**	**27**	**24**	**16**	**11**	**130**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS29	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**12**	**19**	**16**	**14**	**120**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS30	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	**7**	**7**	**28**	**17**	**11**	**84**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS31	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**18**	**17**	**12**	**14**	**140**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS32	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**9**	**13**	**9**	**10**	**98**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS33	0-0.1	F: Silty Clay	Fine	NA	NA	NA	<4	**11**	**10**	**10**	**8**	**84**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS34	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	<4	**13**	**11**	**7**	**6**	**45**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS35	0-0.1	F: Silty Clay	Fine	**6.7**	**21**	NA	<4	**24**	**16**	**22**	**19**	**280**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP1	BH11 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	<4	**8**	**14**	**12**	**9**	**55**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	<4	**9**	**12**	**11**	**9**	**47**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
SDUP2	BH23 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	<4	**7.9**	**9.1**	**6.8**	**5.7**	**46**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.051**
SDUP3	BH19 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	<4	**13**	**9**	**8**	**6**	**49**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP4	BH21 (0-0.1m)	F: Silty sand	Coarse	NA	NA	NA	<4	**14**	**11**	**9.3**	**9.3**	**42**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1
Total Number of Samples				3	3	0	61	61	61	61	61	61	51	43	51	51	51	51	51	51	51	51	51
Maximum Value				7.5	33	NA	18	42	28	440	55	280	<PQL	<PQL	<PQL	88	850	690	<PQL	<PQL	<PQL	<PQL	2.5

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_{35} (F1)	>C_{15}-C_{28} (F2)	>C_{28}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH1	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH2	0.05-0.2	F: Silty Sandy Gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP3	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP3	0.5-0.6	F: Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	300	2800	50	85	70	105	20
TP4	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP4	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1100	5600	65	105	125	45	20
TP4	0.5-0.6	F: Silty Gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	300	2800	50	85	70	105	20
TP4	0.8-0.9	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP5	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP6	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH7	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP8	0-0.1	F: Silty Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP8	0.4-0.5	F: Silty Gravelly Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH9	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP10	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP10	0.4-0.5	F: Silty Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH11	0.0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	300	2800	50	85	70	105	20
BH12	0-0.2	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH13	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP14	0-0.1	F: Silty Sand	Coarse	7.5	15	NA	100	200	230	1200	280	780	170	180	180	120	300	2800	50	85	70	105	20
TP14	0.9-1	Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH15	0-0.1	F: Silty Sandy Gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP16	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP16	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP16	1.0-1.2	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP17	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP17	0.3-0.4	F: Silty Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP18	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP18	0.4-0.5	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH19	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH20	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH20	0.3-0.4	F: Silty Gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	300	2800	50	85	70	105	20
BH21	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP22	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP22	0.3-0.4	F: Silty Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH23	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP24	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP24	0.3-0.4	F: Silty Gavelly Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH25	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH25	0.3-0.4	F: Gravelly Clay	Fine	7.1	33	NA	100	200	240	1200	420	1300	170	--	180	120	1300	5600	65	105	125	45	20
BH25	0.4-0.5	F: Sandy Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH25	0.8-0.9	Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
SS26	0-0.1	F: Sandy Gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS27	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS28	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS29	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS30	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS31	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS32	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS33	0-0.1	F: Silty Clay	Fine	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS34	0-0.1	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SS35	0-0.1	F: Silty Clay	Fine	6.7	21	NA	100	200	240	1200	360	960	--	180	--	--	--	--	--	--	--	--	--
SDUP1	BH11 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP2	BH23 (0-0.1m)	F: Silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP3	BH19 (0-0.1m)	F: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP4	BH21 (0-0.1m)	F: Silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20

TABLE S7
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0-0.1	F: Silty Sand	**15**	<0.4	**27**	**24**	**11**	<0.1	**11**	**77**	**6.8**	**0.57**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**100**	**100**	<0.2	<0.5	<1	<1	Not Detected
BH1 - [LAB_DUP]	0-0.1	F: Silty Sand	**17**	<0.4	**28**	**25**	**12**	<0.1	**9**	**81**	**6.2**	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**120**	**120**	<0.2	<0.5	<1	<1	NA
BH2	0.05-0.2	F: Silty Sandy Gravel	<4	<0.4	**20**	**16**	**30**	<0.1	**24**	**120**	**0.2**	**0.05**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP3	0-0.1	F: Silty Sand	<4	<0.4	**10**	**9**	**11**	<0.1	**5**	**35**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	**54**	<100	<100	**54**	<0.2	<0.5	<1	<1	Not Detected
TP3	0.5-0.6	F: Sand	<4	<0.4	**5**	<1	**2**	<0.1	<1	**2**	**0.06**	**0.06**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP4	0-0.1	F: Silty Sand	<4	<0.4	**14**	**18**	**27**	<0.1	**11**	**86**	**1.3**	**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
TP4	0.4-0.5	F: Silty Clay	<4	<0.4	**21**	**22**	**39**	<0.1	**20**	**110**	**4.2**	**0.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP4	0.5-0.6	F: Silty Gravel	<4	<0.4	**4**	**9**	**12**	<0.1	**5**	**24**	**3.4**	**0.4**	NA	NA	NA	NA	NA	<25	<50	**290**	**780**	**1070**	<0.2	<0.5	<1	<1	NA
TP4	0.8-0.9	Silty Clay	<4	<0.4	**30**	**16**	**10**	<0.1	**15**	**32**	**1.1**	**0.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP5	0-0.1	F: Silty Sand	<4	<0.4	**25**	**15**	**9**	<0.1	**12**	**57**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**140**	**140**	<0.2	<0.5	<1	<1	Not Detected
TP6	0-0.1	F: Silty Sand	<4	<0.4	**8**	**13**	**20**	<0.1	**8**	**59**	**1.6**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Detected
TP6	0.3-0.4	F: Silty Sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH7	0-0.1	F: Silty Clay	<4	<0.4	**15**	**20**	**15**	<0.1	**10**	**79**	**0.07**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP8	0-0.1	F: Silty Sandy Clay	<4	**1**	**14**	**15**	**26**	<0.1	**9**	**100**	**5.8**	**0.57**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**110**	**140**	**250**	<0.2	<0.5	<1	<1	Not Detected
TP8 - [LAB_DUP]	0-0.1	F: Silty Sandy Clay	<4	**0.5**	**15**	**15**	**25**	<0.1	**9**	**110**	**6.2**	**0.65**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**120**	**140**	**260**	<0.2	<0.5	<1	<1	NA
TP8	0.4-0.5	F: Silty Gravelly Clay	<4	<0.4	**5**	**19**	**5**	<0.1	**18**	**57**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH9	0-0.1	Fill: Silty Sand	<4	<0.4	**8**	**9**	**13**	<0.1	**4**	**33**	<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
TP10	0-0.1	F: Silty Sand	<4	<0.4	**11**	**10**	**14**	<0.1	**8**	**55**	**24**	**1.6**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP10	0.4-0.5	F: Silty Sandy Clay	<4	<0.4	**24**	**10**	**9**	<0.1	**20**	**62**	**9.6**	**0.91**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH11	0.0-0.1	Fill: Silty Sand	<4	<0.4	**7**	**12**	**11**	<0.1	**7**	**47**	**1.2**	**0.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH12	0-0.2	F: Silty Clay	<4	<0.4	**9**	**6**	**11**	<0.1	**4**	**54**	<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
BH13	0-0.1	F: Silty Clay	<4	<0.4	**17**	**12**	**17**	<0.1	**10**	**63**	**6.1**	**0.65**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP14	0-0.1	F: Silty Sand	<4	<0.4	**12**	**22**	**25**	**0.1**	**9**	**220**	<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
TP14	0.9-1	Sandy Clay	<4	<0.4	**32**	**14**	**6**	<0.1	**30**	**64**	**0.3**	**0.05**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH15	0-0.1	F: Silty Sandy Gravel	**5**	<0.4	**10**	**15**	**9**	<0.1	**8**	**44**	<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
TP16	0-0.1	F: Silty Sand	<4	<0.4	**11**	**14**	**10**	<0.1	**14**	**64**	<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
TP16 - [LAB_DUP]	0-0.1	F: Silty Sand	<4	<0.4	**12**	**14**	**11**	<0.1	**13**	**61**	<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
TP16	0.4-0.5	F: Silty Clay	<4	<0.4	**20**	**15**	**37**	<0.1	**22**	**81**	**17**	**2.5**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP16	1.0-1.2	Silty Clay	<4	<0.4	**24**	**15**	**9**	<0.1	**14**	**23**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP17	0-0.1	F: Silty Sand	<4	<0.4	**11**	**14**	**13**	<0.1	**11**	**71**	**0.56**	**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
TP17	0.3-0.4	F: Silty Sandy Clay	<4	<0.4	**34**	**19**	**30**	<0.1	**25**	**81**	**8.6**	**0.86**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP18	0-0.1	F: Silty Clayey Sand	<4	<0.4	**17**	**15**	**14**	<0.1	**11**	**85**	**0.3**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**140**	**140**	<0.2	<0.5	<1	<1	Not Detected
TP18	0.4-0.5	F: Silty Clay	<4	<0.4	**26**	**16**	**14**	<0.1	**18**	**66**	**3.3**	**0.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH19	0-0.1	F: Silty Sand	<4	<0.4	**5**	**11**	**10**	<0.1	**5**	**46**	<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
BH20	0-0.1	F: Silty Clay	<4	<0.4	**9**	**9**	**10**	<0.1	**5**	**31**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH20	0.3-0.4	F: Silty Gravel	**7**	<0.4	**9**	**15**	**11**	<0.1	**9**	**44**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH21	0-0.1	F: Silty Sand	<4	<0.4	**12**	**8**	**9**	<0.1	**7**	**38**	<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
TP22	0-0.1	F: Silty Sand	<4	<0.4	**10**	**9**	**10**	<0.1	**5**	**39**	<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
TP22	0.3-0.4	F: Silty Sandy Clay	<4	<0.4	**19**	**22**	**38**	<0.1	**16**	**120**	**5.4**	**0.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH23	0-0.1	F: Silty Sand	<4	<0.4	**9**	**10**	**12**	<0.1	**6**	**56**	**0.4**	**0.08**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH23 - [LAB_DUP]	0-0.1	F: Silty Sand	<4	<0.4	**9**	**12**	**26**	<0.1	**6**	**59**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**110**	**110**	<0.2	<0.5	<1	<1	NA
TP24	0-0.1	F: Silty Sand	**4**	<0.4	**4**	**14**	**14**	<0.1	**7**	**44**	<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
TP24	0.3-0.4	F: Silty Gavelly Clay	<4	<0.4	**14**	**7**	**3**	<0.1	**5**	**21**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH25	0-0.1	F: Silty Clay	<4	<0.4	**26**	**16**	**8**	<0.1	**24**	**61**	**1.2**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**190**	**190**	**380**	<0.2	<0.5	<1	<1	Not Detected
BH25	0.3-0.4	F: Gravelly Clay	<4	<0.4	**42**	**18**	**15**	<0.1	**55**	**78**	**1.2**	**0.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH25	0.4-0.5	F: Sandy Clay	<4	<0.4	**33**	**16**	**440**	<0.1	**29**	**72**	**4.8**	**0.5**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH25	0.8-0.9	Silty Clay	<4	<0.4	**26**	**17**	**10**	<0.1	**11**	**20**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SS26	0-0.1	F: Sandy Gravel	<4	**1**	**14**	**16**	**15**	<0.1	**7**	**85**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS27	0-0.1	F: Silty Clay	<4	<0.4	**13**	**17**	**8**	<0.1	**13**	**100**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS28	0-0.1	F: Silty Sand	**18**	**2**	**27**	**24**	**16**	<0.1	**11**	**130**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS29	0-0.1	F: Silty Sand	<4	**0.9**	**12**	**19**	**16**	<0.1	**14**	**120**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS30	0-0.1	F: Silty Sand	**7**	<0.4	**7**	**28**	**17**	<0.1	**11**	**84**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS31	0-0.1	F: Silty Sand	<4	<0.4	**18**	**17**	**12**	<0.1	**14**	**140**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS32	0-0.1	F: Silty Sand	<4	<0.4	**9**	**13**	**9**	<0.1	**10**	**98**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS33	0-0.1	F: Silty Clay	<4	<0.4	**11**	**10**	**10**	<0.1	**8**	**84**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS34	0-0.1	F: Silty Sand	<4	<0.4	**13**	**11**	**7**	<0.1	**6**	**45**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS35	0-0.1	F: Silty Clay	<4	<0.4	**24**	**16**	**22**	<0.1	**19**	**280**	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP1	BH11 (0-0.1m)	F: Silty Sand	<4	<0.4	**8**	**14**	**12**	<0.1	**9**	**55**	**0.3**	**0.06**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP1 - [LAB_DUP]	BH11 (0-0.1m)	F: Silty Sand	<4	<0.4	**9**	**12**	**11**	<0.1	**9**	**47**	**1.2**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP2	BH23 (0-0.1m)	F: Silty sand	<4	<0.4	**7.9**	**9.1**	**6.8**	<0.1	**5.7**	**46**	**0.051**	**0.051**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP3	BH19 (0-0.1m)	F: Silty Sand	<4	<0.4	**13**	**9**	**8**	<0.1	**6**	**49**	<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
SDUP4	BH21 (0-0.1m)	F: Silty sand	<4	<0.4	**14**	**11**	**9.3**	<0.1	**9.3**	**42**	**0.47**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
FCF1	Surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
FCF2-TP8	0-0.2	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF3-TP6	0-0.1	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF4-TP16	0.4-0.5	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF5-TP17	0.2-0.4	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF6	Surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
Total Number of Samples			61	61	61	61	61	61	61	61	51	51	43	43	43	43	33	51	51	51	51	51	51	51	51	51	31
Maximum Value			18	2	42	28	440	0.1	55	280	24	2.5	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	54	290	780	1070	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																											
Number of Fill Samples			NC	NC	NC	NC	**48**	NC	**48**	NC	NC	**38**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	**24.19**	NC	**12.42**	NC	NC	**0.301**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	**61.91**	NC	**8.92**	NC	NC	**0.494**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	**95**	NC	**95**	NC	NC	**95**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	**63.14**	NC	**14.62**	NC	NC	**0.65**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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

Standard deviation exceeds data assessment criteria — **VALUE**

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

			Lead	Nickel	B(a)P
PQL - Envirolab Services			0.03	0.02	0.001
TCLP1 - General Solid Waste			5	2	0.04
TCLP2 - Restricted Solid Waste			20	8	0.16
TCLP3 - Hazardous Waste			>20	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**			
TP10	0-0.1	F: Silty Sand	NA	NA	<0.0001
TP10	0.4-0.5	F: Silty Sandy Clay	NA	NA	<0.0001
TP16	0.4-0.5	F: Silty Clay	NA	NA	<0.0001
TP17	0.3-0.4	F: Silty Sandy Clay	NA	NA	<0.0001
BH25	0.3-0.4	F: Gravelly Clay	<0.03	<0.02	NA
BH25	0.4-0.5	F: Sandy Clay	0.1	NA	NA
Total Number of samples			0	1	4
Maximum Value			NA	<PQL	<PQL

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

Detailed Site Investigation (DSI)
69-79 Kyogle Street, Lismore South, NSW
E36310PT

JKEnvironments

TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD		25	50	100	100	0.2	0.5	1	2	1
	PQL Envirolab VIC		25	50	100	100	0.2	0.5	1.0	2.0	1.0
Intra	SDUP1	BH11 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH11	0.0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP3	BH19 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH19	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP2	BH23 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH23	0-0.1	<25	<50	100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	75	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	67%	nc	nc	nc	nc	nc	nc
Inter	SDUP4	BH21 (0-0.1m)	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	BH21	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Field Blank	TB 19/09/24	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
Trip Spike	TS 19/09/24	-	-	-	-	-	98%	99%	99%	99%	98%
Field Rinsate	FR-SPT-1 24/09/24	µg/L	<10	<50	<100	<100	<1	<1	<1	<2	<1
Field Rinsate	FR-HA-1 27/09/24	µg/L	13	<50	<100	<100	<1	1	<1	<2	<1

			Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.1	0.1
	PQL Envirolab VIC		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Intra	SDUP1	BH11 (0-0.1m)	<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	BH11	0.0-0.1	<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
duplicate	MEAN		nc	nc	nc	nc	0.075	nc	0.15	0.15	0.075	0.075	0.15	0.08	nc	nc	nc
	RPD %		nc	nc	nc	nc	67%	nc	67%	67%	67%	67%	67%	50%	nc	nc	nc
Intra	SDUP3	BH19 (0-0.1m)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	BH19	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	SDUP2	BH23 (0-0.1m)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	0.051	<0.1	<0.1	<0.1
laboratory	BH23	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.2	0.08	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	0.125	0.075	nc	nc	nc	0.0655	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	120%	67%	nc	nc	nc	44%	nc	nc	nc
Inter	SDUP4	BH21 (0-0.1m)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	0.19	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
laboratory	BH21	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	0.115	0.12	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	113%	117%	nc	nc	nc	nc	nc	nc	nc
Field Blank	TB 19/09/24	-	<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
Trip Spike	TS 19/09/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Rinsate	FR-SPT-1 24/09/24	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
Field Rinsate	FR-HA-1 27/09/24	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1

			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	SDUP1	BH11 (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
laboratory	BH11	0.0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	SDUP3	BH19 (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
laboratory	BH19	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
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	SDUP2	BH23 (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
laboratory	BH23	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
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	SDUP4	BH21 (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
laboratory	BH21	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
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 Blank	TB 19/09/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip Spike	TS 19/09/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Rinsate	FR-SPT-1 24/09/24	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Rinsate	FR-HA-1 27/09/24	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

			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	SDUP1	BH11 (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	8	14	12	<0.1	9	55
laboratory	BH11	0.0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	7	12	11	<0.1	7	47
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	7.5	13	11.5	nc	8	51
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	13%	15%	9%	nc	25%	16%
Intra	SDUP3	BH19 (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	9	8	<0.1	6	49
laboratory	BH19	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	5	11	10	<0.1	5	46
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	9	10	9	nc	5.5	47.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	89%	20%	22%	nc	18%	6%
Inter	SDUP2	BH23 (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	7.9	9.1	6.8	<0.1	5.7	46
laboratory	BH23	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	9	10	12	<0.1	6	56
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	8.45	9.55	9.4	nc	5.85	51
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	13%	9%	55%	nc	5%	20%
Inter	SDUP4	BH21 (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	14	11	9.3	<0.1	9.3	42
laboratory	BH21	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	12	8	9	<0.1	7	38
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	13	9.5	9.15	nc	8.15	40
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	15%	32%	3%	nc	28%	10%
Field Blank	TB 19/09/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<4	<0.4	<1	<1	<1	<0.1	<1	<1
Trip Spike	TS 19/09/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Rinsate	FR-SPT-1 24/09/24	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.01	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.02
Field Rinsate	FR-HA-1 27/09/24	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.01	<0.01	<0.01	<0.03	<0.0005	<0.02	<0.02

Result outside of QA/QC acceptance criteria (highlighted)

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 MW2
Inorganic Compounds and Parameters			
pH		6.5 - 8.5	7.3
Electrical Conductivity (µS/cm)	1	NSL	**4600**
Metals and Metalloids			
Arsenic (As lll)	1	24	<1
Cadmium	0.1	0.2	<0.1
Chromium (SAC for Cr III adopted)	1	3.3	<1
Copper	1	1.4	<1
Lead	1	3.4	<1
Total Mercury (inorganic)	0.05	0.06	<0.05
Nickel	1	11	**9**
Zinc	1	8	**72**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)			
Benzene	1	950	<1
Toluene	1	180	<1
Ethylbenzene	1	80	<1
m+p-xylene	2	75	<2
o-xylene	1	350	<1
Total xylenes	2	NSL	<2
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	0.2	16	<0.1
Acenaphthylene	0.1	NSL	<0.1
Acenaphthene	0.1	NSL	<0.1
Fluorene	0.1	NSL	<0.1
Phenanthrene	0.1	0.6	<0.1
Anthracene	0.1	0.01	<0.1
Fluoranthene	0.1	1	<0.1
Pyrene	0.1	NSL	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1
Chrysene	0.1	NSL	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1

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

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 MW2
Inorganic Compounds and Parameters			
pH		6.5 - 8.5	7.3
Electrical Conductivity (µS/cm)	1	NSL	**4600**
Metals and Metalloids			
Arsenic (As III)	1	100	<1
Cadmium	0.1	20	<0.1
Chromium (total)	1	500	<1
Copper	1	20000	<1
Lead	1	100	<1
Total Mercury (inorganic)	0.05	10	<0.05
Nickel	1	200	**9**
Zinc	1	30000	**72**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)			
Benzene	1	10	<1
Toluene	1	8000	<1
Ethylbenzene	1	3000	<1
m+p-xylene	2	NSL	<2
o-xylene	1	NSL	<1
Total xylenes	2	6000	<2
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	0.2	NSL	<0.1
Acenaphthylene	0.1	NSL	<0.1
Acenaphthene	0.1	NSL	<0.1
Fluorene	0.1	NSL	<0.1
Phenanthrene	0.1	NSL	<0.1
Anthracene	0.1	NSL	<0.1
Fluoranthene	0.1	NSL	<0.1
Pyrene	0.1	NSL	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1
Chrysene	0.1	NSL	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1

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

TABLE G3
GROUNDWATER LABORATORY RESULTS COMPARED TO HSLs
All data in µg/L unless stated otherwise

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	
PQL - Envirolab Services				10	50	1	1	1	2	1	PID
NEPM 2013 - Land Use Category				HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MW2	5.3	4m to <8m	Clay	<10	<50	<1	<1	<1	<2	<1	0
Total Number of Samples				1	1	1	1	1	1	1	1
Maximum Value				<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0

Concentration above the SAC **VALUE**
Site specific assesment (SSA) required **VALUE**
Concentration above the PQL **Bold**
The guideline corresponding to the elevated value is highlighted in grey in the Groundwater Assessment Criteria Table below

HSL GROUNDWATER ASSESSMENT CRITERIA

Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
MW2	5.3	4m to <8m	Clay	NL	NL	5000	NL	NL	NL	NL

TABLE G4
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 MW2
Inorganic Compounds and Parameters			
pH		6.5 - 8.5	7.3
Electrical Conductivity (µS/cm)	1	NSL	**4600**
Metals and Metalloids			
Arsenic (As lll)	1	10	<1
Cadmium	0.1	2	<0.1
Chromium (total)	1	50	<1
Copper	1	2000	<1
Lead	1	10	<1
Total Mercury (inorganic)	0.05	1	<0.05
Nickel	1	20	**9**
Zinc	1	3000	**72**
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)			
Benzene	1	1	<1
Toluene	1	800	<1
Ethylbenzene	1	300	<1
m+p-xylene	2	NSL	<2
o-xylene	1	NSL	<1
Total xylenes	2	600	<2
Polycyclic Aromatic Hydrocarbons (PAHs)			
Naphthalene	0.2	NSL	<0.1
Acenaphthylene	0.1	NSL	<0.1
Acenaphthene	0.1	NSL	<0.1
Fluorene	0.1	NSL	<0.1
Phenanthrene	0.1	NSL	<0.1
Anthracene	0.1	NSL	<0.1
Fluoranthene	0.1	NSL	<0.1
Pyrene	0.1	NSL	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1
Chrysene	0.1	NSL	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2
Benzo(a)pyrene	0.1	0.01	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1

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

Borehole Logs

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH1** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 24/9/24 **Datum:** -

Plant Type: JK300 **Logged/Checked by:** V.R./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel and root fibres.	M			GRASS COVER SCREEN: 10.70kg 0-0.2m, NO FCF
	■		■				0.5		CH	Silty CLAY: high plasticity, dark brown, trace of fine to medium grained sand, ash and root fibres.	w>PL			ALLUVIAL
	■						1			Silty CLAY: high plasticity, dark grey mottled brown, trace of fine to medium grained gravel, and root fibres.	w≈PL			
	■		■				1.5							
	■						2							
	■		■				2.5							
							3			END OF BOREHOLE AT 3.0m				
							3.5							

JKGeotechnics

BOREHOLE LOG

Borehole No. 2

1 / 1

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.5 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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									-	BITUMINOUS SURFACE: 3mm.t	w>PL			
									CH	FILL: Silty sandy gravel, fine to medium grained, dark grey, igneous, angular, fine to medium grained sand.	w>PL	St		ALLUVIAL
				■	N = 4 1,2,2	10				Silty CLAY: high plasticity, dark grey, brown and light brown, trace of fine to medium grained rounded gravel, and root fibres.			110 110 120	
		■					1							
				■	N = 6 1,2,4	9							130 110 110	
						8	2			Silty CLAY: high plasticity, grey mottled brown, trace of fine to medium grained rounded gravel.	w~PL	VSt		
				■	N = 15 5,8,7	7	3						360 340 370	
						6	4							GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 1.5m TO 6.0m. CASING 0.1m TO 1.5m. 2mm SAND FILTER PACK 1.4m TO 6.0m. BENTONITE SEAL 0.3m TO 1.4m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
▽ ON 15/10/24						5	5							
						4	6			END OF BOREHOLE AT 6.00 m				

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP3** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, organic material, plastic and root fibres.	M			LEAF LITTER COVER SCREEN: 11.90kg 0-0.1m, NO FCF
										FILL: Bitumen/Asphaltic Concrete layer				
	■		■		■		0.5			FILL: Sand, medium to coarse grained, yellow orange.	D			SCREEN: 4.85kg (<10L) 0.5-0.6m, NO FCF
										FILL: Asphaltic concrete				
									CH	Silty CLAY: high plasticity, dark grey mottled orange.	w≈PL			ALLUVIAL
	■				■		1							SCREEN: 8.15kg (<10L) 1.2-1.4m, NO FCF
										END OF TEST PIT AT 1.4m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP4** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 27/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of fine to medium grained igneous gravel, plastic and metal fragments and root fibres.	M			TOPSOIL / LEAF COVER SCREEN: 11.40kg 0-0.1m, NO FCF
										FILL: Silty clay, medium to high plasticity, dark brown, trace of fine to medium grained igneous gravel, brick fragments and root fibres.	w≈PL			SCREEN: 8.95kg (<10L) 0.3-0.5m, NO FCF
							0.5				D			
									CH	FILL: Silty gravel, fine to coarse grained, igneous, and asphaltic concrete.	w<PL			ALLUVIAL
										Silty CLAY: high plasticity, dark brown, trace of roots and root fibres.				
							1							
										END OF TEST PIT AT 1.2m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP5** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 27/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, light brown, trace of igneous gravel, plastic fragments and rootlets.	M			GRASS COVER / TOPSOIL
	■		■		■					FILL: Silty sandy clay, medium to high plasticity, dark brown, trace of igneous gravel and root fibres.	w<PL			SCREEN: 12.40kg 0-0.1m, NO FCF
	■		■		■		0.5		CH	Silty CLAY: high plasticity, dark brown, trace of roots and root fibres.	w≈PL			SCREEN: 11.60kg 0.3-0.5m, NO FCF
	■		■											ALLUVIAL
										END OF TEST PIT AT 0.9m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP6** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel, brick and plastic fragments, FCF, ash and root fibres.	M			GRASS COVER / TOPSOIL SCREEN: 12.05kg 0-0.1m, FCF-3
							0.5		CH	Silty CLAY: high plasticity, dark brown, trace of fine to medium grained gravel.	w<PL			SCREEN: 14.55kg 0.2-0.4m, NO FCF ALLUVIAL
	■		■		■		1							SCREEN: 10.05kg 1.0-1.2m, NO FCF
										END OF TEST PIT AT 1.2m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. BH7 1/1

SDUP5: 0.4-0.6m

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 25/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clay, medium to high plasticity, dark brown, trace of plastic fragments and root fibres.	w≈PL			GRASS COVER TOPSOIL SCREEN: 11.25kg 0-0.2m, NO FCF
	■						0.5		SM	Silty SAND: medium to coarse grained, yellow orange.	D			ALLUVIAL
	■								CH	Silty CLAY: high plasticity, dark grey.	w<PL			
							1			END OF BOREHOLE AT 1.1m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. TP8 **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** SHOVEL / HAND TOOLS **R.L. Surface:** N/A

Date: 25/9/24 **Datum:** -

Plant Type: SHOVEL **Logged/Checked by:** V.R./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sandy clay, medium plasticity, dark brown, trace of fine to medium grained sand, FCF, igneous gravel, slag and root fibres.	w<PL			SCREEN: 13.65kg 0-0.2m, FCF-2
	■		■				0.5			FILL: Silty gravelly clay, medium plasticity, dark brown, with igneous gravel.	w<PL			SCREEN: 12.60kg 0.3-0.6m, NO FCF
							1			END OF TEST PIT AT 0.8m				REFUSAL ON INFERRED COBBLES
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH9** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, plastic and root fibres.	M			LEAF LITTER COVER SCREEN: 11.60kg 0-0.1m, NO FCF
	■						0.5			FILL: Silty sand, fine to medium grained, orange, trace of fine to medium grained gravel.	M			INSUFFICIENT RETURN FOR BULK SCREENING SAMPLE
										as above, but brown.				
										END OF BOREHOLE AT 0.74m				REFUSAL ON INCLUSIONS IN FILL
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. TP10 **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 27/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, plastic fragments and root fibres.				GRASS COVER / TOPSOIL SCREEN: 11.60kg 0-0.1m, NO FCF
	■		■				0.5			FILL: Silty sandy clay, medium to high plasticity, dark brown, trace of igneous gravel.	w≈PL			
							1		CH	Silty CLAY: high plasticity, dark brown.	w>PL			ALLUVIAL
							1.5			END OF TEST PIT AT 1.2m				
							2							
							2.5							
							3							
							3.5							

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BOREHOLE LOG

Borehole No. 11

1 / 1

SDUP1: 0-0.1m

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.8 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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 AND ON 15/10/24										FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, metal fragments and root fibres.	M			GRASS COVER
				■	N = 8 2,4,4	10	1		CH	Silty CLAY: high plasticity, dark brown, trace of fine to medium grained sand.	w>PL	St	120 130 130	ALLUVIAL NO SPT SAMPLE RECOVERY
				■	N = 5 2,2,3	9	2			Silty CLAY: high plasticity, grey and dark brown, trace of ash and root fibres.	w~PL	VSt	215 220 220	
				■	N = 14 5,7,7	8	3						350 380 390	
				■		7	4			as above, but brown.				GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 6.0m. CASING 0.04m TO 2.0m. 2mm SAND FILTER PACK 1.5m TO 6.0m. BENTONITE SEAL 0.3m TO 1.5m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						6	5							
						5	6			END OF BOREHOLE AT 6.00 m				
						4								

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ENVIRONMENTAL LOG

Log No. **BH12** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 25/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clay, medium to high plasticity, dark brown, trace of plastic and metal fragments and root fibres.	w≈PL			GRASS COVER / TOPSOIL SCREEN: 10.10kg 0-0.1m, NO FCF
	■		■				0.5		CH	Silty CLAY: high plasticity, dark grey.	w<PL			ALLUVIAL
										END OF BOREHOLE AT 0.9m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH13** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 25/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clay, medium to high plasticity, dark brown, trace of igneous gravel and root fibres.	w<PL			SCREEN: 11.65kg 0-0.1m, NO FCF
	■		■						CH	Silty CLAY: high plasticity, dark grey.	w≈PL			ALLUVIAL
							0.5		SP	Silty GRAVEL: medium to coarse grained, igneous, dark grey.	M			
										END OF BOREHOLE AT 0.55m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP14** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty sand, fine to medium grained, trace of ironstone gravel, plastic fragments, ash and root fibres.	M			GRASS COVER / TOPSOIL SCREEN: 11.95kg 0-0.1m, NO FCF
									CI-CH	Sandy CLAY: medium to high plasticity, dark grey.	w≈PL			ALLUVIAL SCREEN: 12.60kg 0.8-1.0m, NO FCF
							0.5							
							1			END OF TEST PIT AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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BOREHOLE LOG

Borehole No. 15

1 / 1

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.6 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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									-	BITUMINOUS SURFACE: 3mm.t FILL: Silty sandy gravel, fine to medium grained, dark grey, igneous, angular, fine to medium grained sand, trace of brick fragments.	M			
					N=SPT 5/ 0mm REFUSAL	10			CH	Silty CLAY: high plasticity, grey mottled brown and light brown, trace of fine to medium grained rounded gravel, and root fibres.	w>PL	St - VSt		ALLUVIAL
				■			1							
					N = 8 3,4,4	9							190 230 200	
				■			2							
						8								
							3			END OF BOREHOLE AT 3.00 m				
						7								
							4							
						6								
							5							
						5								
							6							
						4								

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP16** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, and root fibres.	M			GRASS COVER / TOPSOIL SCREEN: 11.60kg 0-0.1m, NO FCF
	■		■		■					FILL: Silty clay, low to medium plasticity, brown, trace of fine to medium grained igneous gravel, FCF and root fibres.	w>PL			SCREEN: 11.90kg 0.3-0.5m, FCF-4
							0.5		CH	Silty CLAY: high plasticity, brown and grey.	w>PL			ALLUVIAL
	■				■		1							SCREEN: 12.10kg 0.9-1.2m, NO FCF
										END OF TEST PIT AT 1.2m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **TP17** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION							0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel and root fibres.	M			SCREEN: 10.60kg 0-0.1m, NO FCF
										FILL: Silty sandy clay, low to medium plasticity, brown, trace of fine to medium grained igneous and ironstone gravel, metal fragments and root fibres.	w≈PL			SCREEN: 13.45kg 0.2-0.4m, FCF-5
							0.5		CH	Silty CLAY: high plasticity, dark brown and grey, trace of fine to medium grained gravel.	w<PL			ALLUVIAL SCREEN: 10.80kg 0.8-1.0m, NO FCF
							1			END OF TEST PIT AT 1.1m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP18 **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, dark brown, trace of igneous gravel, plastic fragments and root fibres.	M			SCREEN: 11.75kg 0-0.1m, NO FCF
	■		■		■					FILL: Silty clay, low to medium plasticity, dark brown, trace of slag and igneous gravel and root fibres.	w<PL			SCREEN: 10.70kg 0.3-0.5m, NO FCF
							0.5		CH	Silty CLAY: high plasticity, dark grey.	w<PL			ALLUVIAL
	■		■		■		1							SCREEN: 12.05kg 0.8-1.1m, NO FCF
										END OF TEST PIT AT 1.1m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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BOREHOLE LOG

Borehole No. 19

1 / 1

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.7 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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, brown, trace of fine grained igneous gravel, plastic fragments and root fibers.				GRASS COVER
					N = 6 2,3,3	10	1		CH	SILTY CLAY: high plasticity, dark brown, trace of root fibres.	w>PL	St	130 100 110	ALLUVIAL
										SILTY CLAY: high plasticity, grey mottled brown.				
					N = 9 3,5,4	9	2						120 120 120	
						8				SILTY CLAY: high plasticity, grey mottled red brown and brown, trace of fine to medium grained rounded gravel, and ash.	w~PL	VSt		
					N = 14 5,7,7		3						370 360 300	
						7				END OF BOREHOLE AT 3.45 m				
							4							
						6	5							
						5								
							6							
						4								

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH20** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 27/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clay, medium to high plasticity, dark brown, trace of fine to medium grained igneous gravel, and root fibres.	w>PL			SCREEN: 10.60kg 0-0.2m, NO FCF
	■		■				0.5			FILL: Silty gravel, medium to coarse grained, dark grey, with igneous gravel.	M			INSUFFICIENT RETURN FOR BULK FIELD SCREENING SAMPLES
							1			END OF BOREHOLE AT 0.7m				REFUSAL ON COARSE GRAVEL
							1.5							
							2							
							2.5							
							3							
							3.5							

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BOREHOLE LOG

Borehole No. 21

1 / 1

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.6 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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, brown, trace of fine to medium grained igneous gravel, clay nodules and root fibres.	M			GRASS COVER
									CH		w>PL	(St)		ALLUVIAL
										Silty CLAY: high plasticity, grey mottled brown, trace of root fibres.		VSt		
					N = 7 2,4,3	10	1						280 310 300	
					N = 9 3,4,5	9	2						370 370 380	
					N = 17 6,9,8	8	3							
						7	4			END OF BOREHOLE AT 3.45 m				
						6	5							
						5	6							
						4								

JK 9.02.4 LIB:GLB Log JK AUGERHOLE - MASTER 36310LT LISMORE.GPJ <<DrawingFile>> 06/11/2024 09:21 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

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP22 **1/1**

SDUP6: 0-0.1m

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of fine to medium grained igneous gravel, and root fibres.	M			GRASS COVER / TOPSOIL
	■		■		■					FILL: Silty sandy clay, medium plasticity, dark brown mottled orange, trace of igneous gravel, brick and glass fragments, ash and root fibres.	w>PL			SCREEN: 10.10kg 0-0.1m, NO FCF
	■		■		■		0.5							SCREEN: 11.05kg 0.3-0.5m, NO FCF
	■		■		■									SCREEN: 13.25kg 0.6-0.8m, NO FCF
	■		■		■		1		CH	Silty CLAY: high plasticity, dark grey.	w>PL			ALLUVIAL
	■		■		■		1.5			END OF TEST PIT AT 1.5m				SCREEN: 12.10kg 1.3-1.5m, NO FCF
							2							
							2.5							
							3							
							3.5							

JKGeotechnics

BOREHOLE LOG

Borehole No. 23

1 / 1

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL REDEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: 36310LT **Method:** SPIRAL AUGER **R.L. Surface:** ~10.8 m

Date: 24/9/24 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** K.R./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES 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 AND ON 15/10/24										FILL: Silty sand, fine to medium grained, brown and light grey, trace of fine to medium grained igneous gravel, roots and root fibres.	w>PL			GRASS COVER
					N = 7 2,3,4	10	1		CH	Silty CLAY: high plasticity, dark grey and brown, trace of root fibres.	w>PL	St	130 110 140	ALLUVIAL
					N = 6 2,2,4	9	2			as above, but grey mottled brown.			150 140 150	
					N = 12 4,6,6	8	3				w~PL	VSt	220 210 220	
						7	4							GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.0m TO 6.0m. CASING 0.11m TO 2.0m. 2mm SAND FILTER PACK 1.5m TO 6.0m. BENTONITE SEAL 0.3m TO 1.5m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
						6	5							
						5	6			END OF BOREHOLE AT 6.00 m				
						4								

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP24** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT **R.L. Surface:** N/A

Date: 26/9/24 **Datum:** -

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

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty sand, fine to medium grained, trace of fine to medium grained igneous gravel, and root fibres.	M			SCREEN: 11.85kg 0-0.1m, NO FCF
					■					FILL: Silty gravelly clay, low to medium plasticity, trace of fine to medium grained sand, and igneous and ironstone gravel.	w>PL			SCREEN: 12.40kg 0.2-0.4m, NO FCF
	■		■				0.5		CL	Sandy CLAY: low plasticity, dark brown mottled orange, with fine grained sand.	w<PL			ALLUVIAL SCREEN: 11.10kg 0.5-0.7m, NO FCF
					■		1		CH	Silty CLAY: high plasticity, dark grey.	w<PL			
										END OF TEST PIT AT 1.1m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH25** **1/1**

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED SCHOOL DEVELOPMENT

Location: LISMORE SOUTH PUBLIC SCHOOL, 69-79 KYOGLE STREET, SOUTH LISMORE, NSW

Job No.: E36310PT **Method:** TEST PIT / HAND AUGER **R.L. Surface:** N/A

Date: 25/9/24 **Datum:** -

Plant Type: SHOVEL **Logged/Checked by:** V.R./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■		■		0			FILL: Silty clay, low to medium plasticity, dark brown, trace of organic materials, wood chips and root fibres.	w<PL			SCREEN: 10.55kg 0-0.2m, NO FCF
	■		■							FILL: Gravelly clay, high plasticity, yellow and dark brown, trace of ironstone gravel.	w≈PL			INSUFFICIENT RETURN FOR BULK FIELD SCREENING SAMPLE
	■		■				0.5		CH	Sandy CLAY: high plasticity, dark brown, trace of ironstone gravel.	w<PL			HAND AUGER FROM 0.4m DEPTH
	■									Silty CLAY: high plasticity, dark brown and grey.	w<PL			ALLUVIAL
										END OF TEST PIT AT 0.9m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

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

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

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

DESCRIPTION AND CLASSIFICATION METHODS

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

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

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

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

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

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

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

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

INVESTIGATION METHODS

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

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

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

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

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

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

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

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

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

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

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

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

  N > 30
  15, 30/40mm

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

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

LOGS

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

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

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

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

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

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

LABORATORY TESTING

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

SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

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

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

Laboratory Classification Criteria

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

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

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

NOTES:

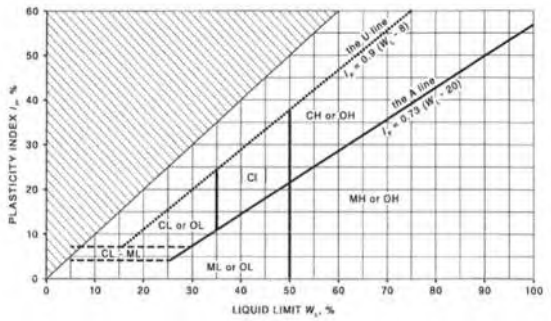
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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

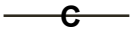
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

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

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



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
		Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
	PFAS	Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	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.
	$w \approx$ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	$w \approx$ 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.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE: ≤ 15 / 0 – 4 LOOSE: > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE: > 35 and ≤ 65 / 10 – 30 DENSE: > 65 and ≤ 85 / 30 – 50 VERY DENSE: > 85 / > 50
	VL	
	L	
	MD	
	D	
	VD	
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

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

Classification of Material Weathering

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

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

Rock Material Strength Classification

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

Appendix D: GPS Co-orindates for DGI Sample Locations

CO-ORDINATES GDA2020

No	E	N
TP101	525529.0559	6813134.573
TP102	525543.8449	6813132.065
TP103	525558.6338	6813129.558
TP104	525573.4228	6813127.051
TP105	525588.2118	6813124.544
TP106	525603.0008	6813122.037
TP107	525617.7898	6813119.529
TP108	525526.5487	6813119.784
TP109	525541.3377	6813117.276
TP110	525556.1266	6813114.769
TP111	525570.9156	6813112.262
TP112	525585.7046	6813109.755
TP113	525600.4936	6813107.248
TP114	525615.2826	6813104.74
TP115	525524.0415	6813104.995
TP116	525538.8305	6813102.487
TP117	525553.6195	6813099.98
TP118	525568.4084	6813097.473
TP119	525583.1974	6813094.966
TP120	525597.9864	6813092.459
TP121	525612.7754	6813089.952
TP122	525521.5343	6813090.206
TP123	525536.3233	6813087.698
TP124	525551.1123	6813085.191
TP125	525565.9012	6813082.684
TP126	525580.6902	6813080.177
TP127	525595.4792	6813077.67
TP128	525610.2682	6813075.163
TP129	525519.0271	6813075.417
TP130	525533.8161	6813072.909
TP131	525548.6051	6813070.402
TP132	525563.3941	6813067.895
TP133	525578.183	6813065.388
TP134	525592.972	6813062.881
TP135	525607.761	6813060.374
TP136	525516.5199	6813060.628
TP137	525531.3089	6813058.121
TP138	525546.0979	6813055.613
TP139	525560.8869	6813053.106
TP140	525575.6759	6813050.599
TP141	525590.4648	6813048.092
TP142	525605.2538	6813045.585

Appendix E: Examples of Imported Materials and Waste Tracking Registers

Imported Materials Register

Supplier	Date	Docket/Invoice #	Product Type	Quantity (specify m3 or tonnes)	Area where Material was Placed

Exported (Waste) Materials Register

Load	Date	Material Type / Classification	Site Area where Waste was Generated	Waste Classification Report Reference	Disposal Facility	Tipping Receipt/Docket Number	Tracking Number (where relevant)	Tonnage

Appendix F: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[15] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[16]. 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;

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

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

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix G: Guidelines and Reference Documents

Contaminated Land Management Act 1997 (NSW)

Lismore City Council, (2007). Regional Policy for the Management of Contaminated Land

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

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)

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