REPORT TO

HEALTH INFRASTRUCTURE

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED MOREE HOSPITAL REDEVELOPMENT

AT

35 ALICE STREET, MOREE, NSW

Date: 3 November 2023
Ref: E35092UPDrpt3-RAP

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Executive Summary

Health Infrastructure ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed Moree Hospital Redevelopment at 35 Alice Street, Moree, NSW. The site location is shown on Figure 1 and the RAP applies to the land within the nominated site boundaries as shown on Figure 2 in Appendix A. The site is limited to the proposed development area based on consultation with the client and the client's representatives.

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

JKE has previously completed a Preliminary Site Investigation (PSI), a Detailed Site Investigation (DSI) and a Hazardous Building Materials Survey (HBMS) for the proposed hospital development. The investigations identified sporadic occurrences of bonded/non-friable Asbestos Containing materials (ACM) on the ground surface and in fill, however, the asbestos concentrations in fill were below the human health Site Assessment Criteria (SAC). Preparation of a RAP was recommended to further assess the extent of ACM and other data gaps identified in the DSI, and to provide contingencies for remediating the site. Key information from the PSI, DSI and HBMS is summarised in Section 2 and throughout this report where relevant.

The goal of the remediation is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level. The objectives of the RAP are to:

- Provide a framework for further investigation of the site, to be implemented when access is available;
- Provide a methodology/contingency plan to remediate and validate the site based on the information available at the date of this report;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

Prior to the commencement of remediation, and following establishment of a contractor works area and demolition of the required buildings, an investigation is to occur to further characterise the soil and groundwater conditions to assess the requirement for remediation. The additional pre-remediation investigation requirements are outlined in Section 5. If the pre-remediation investigation identifies contamination and confirms there is a need for remediation, the remediation contingencies outlined in Section 8 of this RAP will be triggered and a Remedial Works Plan (RWP) is to be prepared to provide specific details of the remedial works involved.

Based on the available data and the Conceptual Site Model (CSM), the contingency remediation strategies provided in Section 8 include 'excavation and off-site disposal' and 'cap and contain'.

An interim Asbestos Management Plan (AMP) must be prepared and implemented by the hospital so that potential human-health risks from asbestos remain low and acceptable during continued use of the hospital. The outcome of the pre-remediation investigation and any remediation/validation must be evaluated to establish the validity of the interim AMP and then need for any revision or update to the plan post-construction.

JKE is of the opinion that the site can be made suitable for the proposed development via remediation, should the pre-remediation investigation confirm that remediation is required. Site validation reporting is to occur as specified in this RAP to document that the procedures have been followed and to demonstrate that the site is suitable for the proposed development.

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

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Abbreviations

Above Ground Storage Tank	**AST**
Acute Services Building	**ASB**
Asbestos Fines/Fibrous Asbestos	**AF/FA**
Asbestos Containing Material	**ACM**
Asbestos Management Plan	**AMP**
Asbestos Removal Control Plan	**ARCP**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Construction Environmental Management Plan	**CEMP**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environment Protection Licence	**EPL**
Fibre Cement Fragment	**FCF**
Ground Penetrating Radar	**GPR**
Hazardous Building Material Survey	**HBMS**
Health Investigation Level	**HIL**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
Lab Control Spike	**LCS**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Polychlorinated Biphenyls	**PCB**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Remediation Works Plan	**RWP**
Review of Environmental Factors	**REF**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Salinity Management Plan	**SMP**

Source, Pathway, Receptor	**SPR**
Standing Water Level	**SWL**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
Underground Storage Tank	**UST**
Validation Assessment Criteria	**VAC**
Virgin Excavated Natural Material	**VENM**
Work Health and Safety	**WHS**

Units

Metres BGL	**mBGL**
Metres	**m**
Millilitres	**ml or mL**
Milligrams per Kilogram	**mg/kg**
Decibels	**dBA**
Percentage	**%**
Percentage weight for weight	**%w/w**

1 INTRODUCTION

Health Infrastructure ('the client') commissioned JK Environments (JKE) to prepare a Remediation Action Plan (RAP) for the proposed Moree Hospital Redevelopment at 35 Alice Street, Moree, NSW. The site location is shown on Figure 1 and the RAP applies to the land within the nominated site boundaries as shown on Figure 2 in Appendix A. The site is limited to the proposed development area based on consultation with the client and the client's representatives.

This report has been prepared to support the Review of Environmental Factors (REF) for the proposed hospital redevelopment, with regards to Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021[1] (formerly known as SEPP55).

JKE has previously completed a Preliminary Site Investigation (PSI)[2], a Detailed Site Investigation (DSI)[3] and a Hazardous Building Materials Survey[4] for the proposed hospital development. The investigations identified sporadic occurrences of bonded/non-friable Asbestos Containing materials (ACM) on the ground surface and in fill, however, the asbestos concentrations in fill were below the human health Site Assessment Criteria (SAC). Preparation of a RAP was recommended to further assess the extent of ACM and other data gaps identified in the DSI, and to provide contingencies for remediating the site. Key information from the PSI, DSI and HBMS is summarised in Section 2 and throughout this report where relevant.

1.1 Proposed Development Details

JKE understands that the proposed development includes:

- Demolition of the administration building No2 and other ancillary hospital infrastructure including the incinerator, medical waste storage, helipad, shade shelters, water tanks, car parks etc. We also understand that the Glennie building No5 located in the central section of the site may also be demolished;
- A new two-level building situated over the south-eastern section of the site. The building will be utilised as an Acute Services Building (ASB), and will comprise a steel frame structure with either a floor slab suspended between pad or pile footings or a stiffened raft slab. A subfloor section is proposed, with bulk excavations to an approximate depth of 0.6m Below Ground Level (BGL) required. Due to the hospital being located in a flood plain, a flood wall is proposed, with a fill embankment with paved surface to the cover the wall;
- A new public carpark immediately to the north of the new ASB;
- A new loading bay is proposed to the west of the ASB, along with an ambulance entry on the eastern part of the southern side of the ASB; and

[1] State Environmental Planning Policy (Resilience and Hazards) 2021 (NSW) (referred to as SEPP Resilience and Hazards 2021)
[2] JKE, (2022a). *Report to NSW Health Infrastructure on Preliminary (Stage 1) Site Investigation for Proposed Hospital Redevelopment at 35 Alice Street, Moree, NSW*. (Report ref: E35092UPDrpt, dated 18 August 2022) (referred to as PSI)
[3] JKE, (2023b). *Report to NSW Health Infrastructure on Detailed Site Investigation for Proposed Moree Hospital Redevelopment at 35 Alice Street, Moree, NSW. (Report ref: E35092UPDrpt2, dated 20 September 2023)* (referred to as DSI)
[4] JK Environments, (2023a). *Report to Health Infrastructure on Hazardous Building Materials Survey for Moree Hospital Redevelopment at Moree Hospital, Alice Street, Moree, NSW*. (Report ref: E35092BTrpt_Rev1-HAZ, dated 23 January 2023) (referred to as HBMS)

- Landscaping works will be conducted around the proposed new structures, including footpaths, new seating, external paved areas and new plants. Some tree removal will also occur, predominantly in the eastern area of the site.

It is understood that the development will be staged in order to minimise disruption to the hospital operations.

Selected proposed development plans are attached in Appendix B.

1.2 Remediation Goal, Aims and Objectives

The goal of the remediation is to render the site suitable for the proposed development from a contamination viewpoint. The primary aim of the remediation at the site is to reduce the human health and environmental risks posed by site contamination to an acceptable level.

The objectives of the RAP are to:

- Provide a framework for further investigation of the site, to be implemented when access is available;
- Provide a methodology/contingency plan to remediate and validate the site based on the information available at the date of this report;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

1.3 Scope of Work

The RAP was prepared generally in accordance with a JKE proposal (Ref: EP58804UPD Rev1) of 14 July 2023 and written acceptance from the client of 14 July 2023. The scope of work included a review of the PSI, DSI, HBMS and the Conceptual Site Model (CSM), review of the proposed development details, consultation with the client/client's representatives, and preparation of the RAP.

The RAP was prepared with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[5], SEPP Resilience and Hazards 2021 Resilience and Hazards 2021 and other guidelines made under or with regards to the Contaminated Land Management Act (1997)[6], including the Consultants Reporting on Contaminated Land (2020)[7] guidelines.

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

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

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

[7] NSW EPA, (2020). *Consultants reporting on contaminated land, Contaminated Land Guidelines.* (referred to as Consultants Reporting Guidelines)

2 SITE INFORMATION

2.1 Summary of JKE Previous Reports

2.1.1 PSI

The PSI included all land within the wider hospital boundary and was designed to make a preliminary assessment of site contamination. A geotechnical investigation was undertaken in conjunction with the PSI by JK Geotechnics (JKG). The results of the geotechnical investigation were presented in a separate report (Ref: 35092URrpt). The geotechnical report must be read in conjunction with this RAP.

The primary aims of the PSI were to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil and groundwater contamination conditions. The PSI included a review of historical information and sampling from six boreholes and five test pits, which were nominated by the client.

The identified Areas of Environmental Concern (AEC) included: fill material; use of pesticides; hazardous building materials; new diesel generator; old generator building and potential fuel Underground Storage Tank (UST); electrical substation; HAZCHEM storage; an Incinerator; and an offsite ambulance station. The locations of these AEC are shown on Figure 2 in Appendix A.

All of the PSI results were below the SAC. However, in relation to the identified AEC and contaminants of potential concern (CoPC), and in review of the CSM, we noted that:

- Fill (i.e. historically imported soil) was identified at most locations, confirming this as a potential source of contamination;
- The fill was found to contain fibre cement fragments (FCF) at one location (TP2 0.3-0.4), confirming impacts from building materials existed. However, the FCF did not contain asbestos in the samples that were analysed under the scope of the PSI;
- Traces of pesticides were detected in one sample (BH3 0-0.1m), confirming the use of pesticides, or the potential occurrence of pesticides in fill, as potential sources of contamination;
- Volatile hydrocarbons were not detected;
- The potential point sources of contamination (new diesel generator/old generator building and suspected UST, electrical substation, HAZCHEM storage and incinerator) were not investigated under the scope of the intrusive investigation;
- The investigation was constrained by the client nominated sampling locations. Sampling was limited in the proposed development area due to the existing buildings; and
- The potential for groundwater contamination from onsite and offsite AEC has not been assessed.

Based on the findings of the PSI, JKE was of the opinion that the site can be made suitable for the proposed development. However, the PSI noted that a DSI will be required to establish whether remediation is necessary.

JKE recommend the following:

- *"Undertake DSI to address the data gaps identified by the PSI. The extent of 'the site' for the DSI should be confirmed by the client as it is noted that not all areas of the hospital are being redeveloped. In JKE*

view, it would be reasonable to limit the DSI to broadly capture the proposed development footprint; and

- *If the DSI identifies a need for remediation, a Remediation Action Plan (RAP) prepared and implemented".*

The PSI sampling locations are shown on the Figures attached in Appendix C and the PSI laboratory results tables are also attached Appendix C.

2.1.2 DSI

The DSI was limited to the proposed development footprint which was defined as 'the site' for the purpose of the investigation. It is noted that the DSI site area varies slightly compared to the site area defined for the RAP. Notably, the westernmost extent of the DSI area no longer forms part of the proposed development and is not defined as the site for the purpose of the RAP.

The primary aim of the DSI was to further characterise the soil and groundwater contamination conditions in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim was to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during the proposed development works. The objectives were to: assess the soil and groundwater contamination conditions via implementation of the Sampling Analysis and Quality Plan (SAQP); assess the potential risks posed by contamination to the receptors identified in the CSM; provide a preliminary waste classification for the in-situ soil; assess whether the site is suitable or can be made suitable (via remediation) for the proposed development, from a contamination viewpoint; and assess whether further intrusive investigation and/or remediation is required.

The investigation included a review of historical information presented in the PSI and soil sampling from 26 boreholes or testpits, and attempted groundwater sampling from four groundwater monitoring wells. The AEC identified in the DSI included: fill material; use of pesticides; hazardous building materials; an incinerator; off-site new diesel generator, old generator and potential former UST; an off-site electrical substation; off-site HAZCHEM storage and an off-site ambulance station. The location of these AEC are shown on Figure 2 in Appendix A.

The PSI and DSI identified: zinc and nickel concentrations in the soil above the ecological SAC; and ACM in fill in and on the soil, although ACM concentrations were below the human health SAC.

Based on the findings of the PSI and DSI, JKE indicated that remediation of soil contamination may be required. We stated that "*relatively straight-froward soil remediation processes such as 'excavation/disposal' and 'cap and contain'*" may be suitable remedial approached should remediation be necessary.

JKE recommend the following:

- *"Preparation and implementation of an interim Asbestos Management Plan (AMP) for asbestos in soil to be implemented until remediation occurs, and preparation and implementation of an AMP during the proposed development works;*

- *Preparation and implementation of a Remediation Action Plan (RAP) for the site that provides a robust framework to address the data gaps identified in [the DSI], prior to proceeding with remediation, and contingencies to remediate the site should the overall dataset confirm that remediation is required; and*
- *Validation of the site in accordance with the RAP.*

The DSI sampling locations are shown on the Figures attached in Appendix C and the DSI laboratory results tables are also attached Appendix C.

2.1.3 Hazardous Building Material Survey

JKE has previously undertaken a HBMS for the proposed Moree Hospital redevelopment. The survey identified both friable and non-friable asbestos in building materials, lead in paint and potential polychlorinated biphenyls (PCB) containing electrical equipment.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Health Administration Corporation
Site Address:	58 Victoria Terrace, Moree, NSW (site address commonly referred to as 35 Alice Street, Moree, NSW)
Lot & Deposited Plan:	Part of Lot 11 in DP1113157
Current Land Use:	Hospital and associated facilities
Proposed Land Use:	Continued hospital and associated facilities
Local Government Area:	Moree Plains Shire Council
Current Zoning:	R1: General Residential
Site Area (m^2) (approx.):	11,700
RL (AHD in m) (approx.):	208
Geographical Location (decimal degrees) (approx.):	Latitude: -29.470680 Longitude: 149.839882

2.3 Site Location, Topography and Regional Setting

The site is located generally in the south-eastern portion of the wider hospital grounds. The site is located in a predominantly residential and recreational area of Moree and is bound by Alice Street to the south, Victoria Terrace to the east and north-east, and the wider hospital grounds to the north-west and west.

The regional topography slopes slightly towards the north towards the Mehir River, which is located approximately 35m to the north of the eastern section of the site. The site topography is consistent with its surrounds and has a gentle slope towards the north at approximately 1°-2°.

2.4 Summary of Site Inspection

A walkover inspection of the DSI site area was undertaken by JKE on 15 August 2023 under the scope of the DSI. At the time of the inspection, the site formed part of the Moree District Hospital and Community Health Service Centre. The administration building No2, Crane and Glennie building No5, an ambulance parking bay/patient transfer and helipad were generally located in the central section of the site. An asphaltic concrete car park was located in the north-east east section of the site.

An incinerator and medical waste storage area were located in the south-west section of the site. Other areas of the site were paved or grassed. Pertinent features (including the DSI identified AEC) at the site and in the wider hospital and surrounds are shown on Figure 2 in Appendix A.

During the DSI, grass cover in the south section of the site was limited and two FCF/suspected ACM were identified and sampled (ref: FCF201 and FCF202). The surface FCF sampling locations are shown on the DSI Figure 2 attached in the Appendix C. The FCF were analysed and were found to contain asbestos.

Landscaped and grassed areas were observed in areas of the site not covered by hardstand/buildings. These areas were mainly located within the east and south sections of the site. Native trees up to approximately 5m high were observed within the east and in other landscaped areas of the site. No obvious indicators of plant stress or dieback were observed.

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not observed on site. Mehi River was located approximately 35m to 50m to the north of the site. The river is considered to be a potential receptor.

Signage on the external fibre cement sheeting on some of main hospital building identified that the fibre cement sheeting was an ACM.

2.5 Summary of Geology, Soils and Hydrogeology

2.5.1 Regional and On-site Geology

Regional geological information reviewed for the DSI indicated that the site is underlain is underlain by Marra Creek Formation – meander plain facies (dominant silty lithology) and Colluvial sheetwash (dominant clastic sediment lithology), with Marra Creek formation – meander plain facies (dominant clay lithology) located approximately 70m to the north of the site.

The PSI and DSI boreholes and test pits generally encountered fill ranging in depths from approximately 0.1-0.9mBGL. It should be noted, however, that the vertical extent of fill was unable to be confirmed in TP212 as the test pit had to be terminated in the fill due to the potential of an underground irrigation pipe being

present. Natural alluvium silty clays and sands were encountered beneath the fill material. The silty clays extended to the termination depth of most of the boreholes and test pits. Bedrock and groundwater were not encountered during the DSI. A copy of the borehole and testpit logs from the PSI and DSI are attached in Appendix C.

2.5.2 Hydrogeology and Receiving Water Bodies

Hydrogeological information reviewed for the PSI and DSI indicated that the regional aquifer on-site and in areas immediately surrounding the site includes porous, extensive aquifers of high productivity. There were a significant number of registered bores within the report buffer of 2km of the site. The majority of the bores were registered for monitoring purposes. None of the water supply bores appeared to be located down gradient of the site, between the northern site boundary and Mehi River (located approximately 35-50m north of the site).

There were no abstraction and use of groundwater at the site or in the vicinity, and the use of groundwater is not proposed as part of the development. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur.

Groundwater was not encountered during the DSI, including boreholes BH201, BH202, BH209 and BH224 which were terminated at 8mBGL and converted to groundwater monitoring wells. However, groundwater seepage was previously encountered during drilling at BH6 at approximately 5.5mBGL during the PSI field work in June 2022. We note that the June PSI field works were undertaken a few months after a significant rain event and the August DSI field works were undertaken following a relatively dry period in comparison. JKE is of the opinion that the groundwater levels at the site fluctuate with rain fall.

Considering the local topography and surrounding land features, JKE anticipated groundwater to flow towards the Mehi River, located towards the north. However, this was not confirmed within the scope of the DSI.

3 REVIEW OF CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on a review of information and the results from the PSI/DSI.

3.1 Summary of Contamination (Site Characterisation)

The primary potential contamination-related risks at the site are associated with historical importation of fill (soil), and historical demolition of former buildings containing potentially containing hazardous building materials including asbestos.

As discussed previously, the PSI and DSI generally encountered fill ranging in depths from approximately 0.1mBGL to 0.9mBGL, however the vertical extent of fill was unbale to be confirmed at TP212 due to a suspected underground service. The fill typically comprised silty clay, sandy clay and sandy gravel, gravelly sand and gravelly clay with inclusions of gravels, sand and roots. Traces of anthropogenic materials (e.g. were encountered within the fill at some of the borehole/testpit locations, as summarised below:

- Concrete fragments in BH202, BH203, BH204;
- Concrete, metal, ceramic slag fragments and coal in BH205;
- Brick fragments in TP207;
- Concrete, glass, brick, tile, terracotta and FCF/ACM fragments in TP208;
- Concrete, brick, metal fragments and ash in BH209;
- Concrete and asphalt fragments in BH210 and BH216;
- Concrete fragments and ash in TP220;
- Concrete and glass fragments in TP221;
- Ceramic fragments in TP221;
- Concrete fragments in TP223; and
- Glass fragments in TP227.

The asbestos in ACM concentration in the fill profile from TP208 (0-0.1m) was below the human health SAC. Suspected ACM was also identified in the surficial (top 100mm) of JKG geotechnical borehole BH102 during additional JKG Geotechnical investigation in July 2023 (JKG project ref: 35092UR2). ACM fragments (ref: FCF201 and FCF202) were identified on the surface in the south section of the site. The asbestos detections are shown on Figure 3 attached in Appendix C.

The lead above the SAC and the nickel and zinc above the SAC were assessed not to pose an unacceptable risk during the DSI and do not require remediation at this stage.

Overall, the PSI/DSI did not identify an immediate trigger for remediation. However, additional data is required and the requirements for this data collection form part of this RAP. The overall dataset will be reassessed in order to establish whether the remedial actions/contingencies in this RAP need to be implemented. The pre-remediation investigation requirements are outlined in Section 5.

3.2 Review of CSM

The table below includes a review of the CSM and this CSM has been used to design the remediation strategy. The CSM will require further review as additional pre-remediation site data becomes available.

Table 3-1: CSM Review

Contaminant source(s) and contaminants of potential concern	Further detailed site characterisation is required to confirm if remediation is necessary. The remedial strategy/contingency provided in this RAP is based on the possibility that the soil is contaminated with bonded ACM. The primary CoPC requiring further characterisation in soil is asbestos (bonded ACM). The following CoPC will also be considered in areas that were previously inaccessible for sampling, and/or to address other data gaps: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs) and Polychlorinated Biphenyls (PCBs). The CoPC in groundwater include: TRHs; BTEX and naphthalene (BTEXN); PAHs; and heavy metals.
Affected media	Soil/fill has been identified as the potentially affected medium requiring further assessment to confirm if remediation is necessary. The potential for groundwater remediation is considered low, however this will also need to be further assessed by a pre-remediation investigation.
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, recreational water users within the Mehi River. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in the Mehi River.
Exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all CoPC) and vapours (volatile TRHs and BTEXN). Primary and secondary contact with groundwater is also a potential exposure pathway. The potential for exposure would typically be associated with and off-site use of groundwater and recreational waters. Potential exposure pathways for ecological receptors include primary/direct contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings.
Evaluation of data gaps	Additional data is required following prior to and following demolition to assess if remediation is required and attempt to delineate and characterise the nature and extent of contamination. The primary data gaps include: • Due to the identification of asbestos, the DSI sampling density did not meeting the Guidelines for the Assessment, Remediation and Management of Asbestos-

	Contaminated Sites in Western Australia (2021)[8] (endorsed by NEPM). The DSI identified ACM in fill and therefore in accordance with Table 4 of the WA DoH (2021) guidelines, further assessment should be undertaken at a higher sampling given that the occurrence of asbestos is *"Likely"* or *"known"*; • Due to the presence of buildings and existing active hospital use sampling was unable to be undertaken in some areas; • The vertical extent of fill was unbale to be fully assessed at TP212 due to the presence of an underground service; • Endosulfan (an OCP) was encountered in surficial fill sample at BH208. Although the concentration was below the SAC the result is not consistent with the remaining soil data. Additional sampling of the soils is to occur in this area; and • The groundwater monitoring wells installed for the DSI were dry. Groundwater sampling should be attempted again from the existing monitoring wells in case groundwater levels fluctuate over time. An investigation framework is provided in Section 5 to address these gaps.

3.3 Remediation Extent

The requirement for remediation and the remediation extent is to be further assessed by the pre-remediation investigation outlined in Section 5.

However, based on the PSI, DSI and review of the CSM, this RAP has been prepared on the basis that:

- ACM is present in the surficial soil (top 100mm) and in fill sporadically across site. The reported concentrations to date do not exceed the HSLs and have not triggered a need for remediation. However, the potential for asbestos contamination exists and the RAP includes a strategy/contingency to be implemented in the event that asbestos contamination is encountered;
- Risks from ACM will be mitigated in accordance with the statutory requirements during the on-going hospital use and also during construction;
- The pre-remediation investigation (Section 5) will ultimately inform whether remediation occurs, and will inform the extent of remediation and facilitate re-evaluation and re-design (where necessary) of the preferred remedial strategies; and
- Groundwater contamination risks have not and will not be identified.

[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)

4 INTERIM SITE CONTAMINATION MANAGEMENT

Due to the detection of ACM in the fill soil and on the surface of the site, an AMP is required under the Work Health and Safety Regulation 2017 (NSW)[9].

An interim AMP must be prepared and implemented by the hospital so that potential human-health risks from asbestos remain low and acceptable during continued use of the hospital. The outcome of the pre-remediation investigation and any remediation/validation must be evaluated to establish the validity of the interim AMP and then need for any revision or update to the plan post-construction.

[9] NSW Government, (2017). *Work Health and Safety Regulation 2017 (NSW).* (referred to as WHS Regulation 2017)

5 PRE-REMEDIATION DATA GAP INVESTIGATION REQUIREMENTS

A construction-phase AMP must be prepared by a suitably qualified consultant prior to the commencement of any demolition activities or soil disturbance.

Prior to the commencement of remediation, and following establishment of a contractor works area and demolition of the required buildings, an investigation is to occur to further characterise the soil and groundwater conditions and facilitate a more comprehensive and complete assessment of the risks driving the potential for remediation.

The primary objectives of this investigation are to: assess the requirement for remediation; confirm the extent of soil remediation; confirm the contaminants of concern being remediated; confirm whether the assessment of groundwater contamination risks remains valid; and facilitate the preparation of a Remedial Works Plan (RWP) for the proposed development where necessary. If it is more appropriate to align with the development staging, a separate RWP can be prepared for each stage.

A SAQP is to be prepared for the investigation following consultation with the client and project manager. The investigation is to include the following (as a minimum):

- Soil sampling from the 26 sampling locations shown on Figure 2 attached in Appendix A. The locations have been selected to address the following:
  - To complete the grid-based (probabilistic) sampling plan proposed by the DSI and meet the minimum sampling density outlined in the NSW EPA Sampling Design Part 1 – Application (2022)[10] with an increased grid-based (probabilistic) sampling plan proposed in the south-east section of the site proposed to meet the WA DoH 2021 guidelines for sites where there is a "*known*" or "*Likely*" asbestos impacts;
  - The grid-based sampling plan will also target the areas beneath the buildings once demolished (sampling locations 302, 303 and 312) and beneath the incinerator once demolished (sampling location 301); and
  - A targeted sampling location (326) is to be placed adjacent to the former DSI test pit location TP212 to further assess the extent and potential for contamination at previous sampling location where the vertical extent of fill was unable to assessed due to the presence of underground services.
- Soil sampling is be undertaken though the vertical extent of the fill and at least 0.5m into the underlying natural soil;
- Field asbestos quantification of bulk (10L) samples as specified in NEPM (2013) is required at all sampling locations. Soil sampling for laboratory analysis is proposed for sampling locations 301, 304, 307, 310, 313, 312 and 326;
- Attempt to sample groundwater from monitoring wells MW201, MW202, MW209 and MW224 shown on Figure 2 attached in Appendix A, if groundwater is present in the wells;
- Further assessment of groundwater directional flow at the site by way of survey and preparation of a groundwater contour plan, if groundwater is present in the wells;

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

- Analysis of one sample per distinct fill profile for soil samples from locations 301, 302, 303, 312 and 326 for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); TRH/BTEX; PAHs; OCP/OPP and PCBs;
- Analysis one sample per distinct fill profile and one from the underlying natural soil profile at each of the following locations for OCPs: 304; 307; and 310;
- Analysis of any FCF identified in/on soil for asbestos;
- Where groundwater is encountered, analysis for the groundwater sampling locations is to include: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); TRH/BTEXN and PAHs; and
- Appropriate quality assurance/quality control (QA/QC) analysis in accordance with NEPM (2013) requirements, including inter- and intra-laboratory duplicates, trip blanks, trip spikes and rinsate samples.

Soil sampling from the proposed sampling locations is preferably to be undertaken from test pits. However, underground services may limit the potential use of an excavator for test pit soil sampling unless the contractors can accurately pinpoint all underground services and/or if disconnection/removal of underground services is necessary to facilitate the proposed development works. If this is the case, borehole sampling is to be adopted (boreholes must be drilled using augers no narrower than 150mm in diameter, and preferably using a much wider diameter auger to facilitate adequate field asbestos quantification). Geotechnical advice must be sought regarding procedures for backfilling of test pits so that unfavourable ground conditions such as potential soft spots etc are not created.

On completion of the pre-remediation data gap investigation, a report is to be prepared in accordance with Consultants Reporting Guidelines. The report will need to confirm if remediation is required or not. Should remediation be required, a RWP is to be prepared.

In the event that the remedial approach differs to the strategies/contingencies outlined in this RAP, the client's expert planner must assess whether there is a need for any additional planning approvals or modifications to the REF.

6 REMEDIATION OPTIONS

6.1 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 WA DoH 2021 guidelines 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)[11] 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.

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

6.2 Soil Remediation Options Assessment

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

Table 6-1: Consideration of 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, thermal desorption and physical removal of bonded ACM fragments from surface soil. 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.	According the NSW EPA position statement[12] on the WA DoH 2021, physical removal of ACM is not a remedial approach to 'clean' asbestos contaminated soils or stockpiles for reuse. Removal of surface ACM via picking might be a valid approach for surficial ACM impacts, where the surface ACM has been attributed to onsite building demotion impacts and ACM is not present within the fill soil.
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.	Treatment of fill with ACM impacts is not viable remediation option 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, or capping contaminated soils in-situ beneath appropriate clean capping materials (such as pavement and/or clean soil) to reduce the potential for future exposure. The capping and/or containment must be appropriate for the specific contaminants of concern. A Long-Term Environmental Management Plan (LTEMP) would be required and an LTEMP 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).	This option is suitable should the pre-remediation data investigation encounter ACM at concentrations greater than the HSL-based SAC, and provided that sufficiently robust capping solutions are implemented. This option is sustainable as it minimises waste disposal to landfill. This option is not preferred if contaminated fill quantities are small, where the costs for construction of the capping system are higher than the

[12] NSW EPA https://www.epa.nsw.gov.au/your-environment/contaminated-land/other-contamination-issues/managing-asbestos-in-and-on-land/position-statement-wa-managment-of-asbestos-sites Visited 17 April 2023

Option	Discussion	Assessment/Applicability
		landfill disposal fees or where the site owner does not want to manage the capped contamination under a LTEMP.
Option 4 **Removal of contaminated material 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.	Applicable where excavations are necessary as part of the proposed development, and surplus materials require off-site disposal. Applicable for isolated minor areas of contamination. Not applicable for contamination beneath buildings that are not being demolished. Not the preferred option if contaminated fill quantities are significant and large and disposal costs are substantial, to the extent that remediation becomes unviable.
Option 5 **Implementation of management strategy**	Contaminated soils would be managed in such a way to reduce risks to the receptors. This may include monitoring of the conditions over time so that there is an on-going minimisation of risk, potentially involving capping systems and management procedures to be implemented likely under the framework of a LTEMP/AMP.	The implementation of a management strategy to restrict access and potential exposure to contaminated soils is a suitable remediation option. A LTEMP/AMP would be required, which should include WHS and PPE requirements for potential future disturbance of soils in these areas.

6.3 Rationale for the Preferred Option for Soil Remediation

Where remediation is confirmed to be necessary following the completion of the works outlined in Section 5 of this RAP, we anticipate that remediation Option 3 and/or Options 4/5 will be preferred. We have documented the associated strategies as contingencies at this stage, within Section 8.

Following completion of the pre-remediation data gap investigation, and if contamination is encountered, the contingency remediation options outlined in Section 8 must be assessed and integrated into the RWP.

6.4 Roles and Responsibilities

Table 6-2: Roles and Responsibilities

Role	Responsibility
Client and Project Manager	The client and their nominated representatives. The client/project manager is required to appoint the project team for the remediation and must provide all investigation reports including this RAP to the remediation contractor, determining authority and any other relevant parties involved in the project. The project manager is required to 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). Further details are outlined in the sections below.
Remediation Contractor	To be appointed. The remediation contractor is required to review all documents prepared for the project, apply for any relevant removal licences or permits and implement the remediation requirements outlined in this RAP. The remediation contractor is required to collect all necessary documentation associated with the remediation activities and forward this documentation onto the validation consultant, client and project manager as they become available. Further details are outlined in the sections below.
Validation Consultant	To be appointed. The validation consultant[13] provides consulting advice and validation services in relation to the remediation. This includes carrying out the pre-remediation investigations, preparing the RWP if necessary and preparing the site validation report. The validation consultant is required to review any deviation to this RAP or in the event of unexpected finds if and when encountered during the site work. The validation consultant is required to liaise with the client, project manager and remediation contractor on all matters pertaining to the site contamination, remediation and validation. The validation consultant must have a Licensed Asbestos Assessor (LAA) on staff so that any asbestos impacted fill can be appropriately managed under the purview of the site validation assessment.

[13] The consultant must be a certified practitioner (specialising in site contamination), under one of the NSW EPA endorsed certification schemes

6.5 Pre-commencement

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 project manager and remediation contractor, and appropriate steps are to be taken to ensure the adequate implementation of the plan.

6.6 Summary of Remediation, Validation and Associated Tasks

The following general sequence of works is anticipated:

- Site establishment;
- Demolition/removal of structures;
- Completion of pre-remediation investigation sampling/analysis and associated reporting; and
- Remediation (and validation) of the site via the preferred remediation options and validation of this process, as required.

6.6.1 Construction-Phase AMP

As indicated in Section 5, a construction-phase AMP is to be prepared and implemented during the proposed construction and remediation works.

6.6.2 Site Establishment

The remediation contractor is to establish on site as required to facilitate the remediation. 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 remediation works.

The validation consultant must be advised if any soil, gravel or engineering materials (e.g. DGB, roadbase etc) are to be imported for the site establishment works. These must be validated by the validation consultant in accordance with Section 7 of this RAP to confirm they are suitable to be imported to site.

6.6.3 Demolition/Removal of Structures and Surface ACM Clearance

Demolition of buildings/structures is to occur with regards to the findings of the HBMS and must be undertaken in accordance with the relevant codes, standards, guidelines and regulations. All structures and materials are to be removed from the site and clearance certificates are to be provided for the removal of all hazardous materials.

Following demolition works an ‘emu pick’ of the demolition areas for any visible surface fragments of FCF/ACM should be undertaken by a licensed Class B asbestos contractor.

On completion of the pick, a SafeWork NSW LAA or competent person is to undertake a surface clearance inspection for ACM and prepare a clearance certificate.

6.6.4 Remediation

The following must be implemented:

- Completion of the pre-remediation data gap investigation (outlined in Section 5). Any requirements for remediation as a result of the investigation findings are to be implemented in accordance with the RAP and RWP (a RWP can be prepared for separate stages of the proposed development where appropriate);
- Validation of soil waste transported from the site (outlined in Section 6.7.1);
- Validation of material imported to the site (outlined in Section 7.2); and
- Preparation and implementation of a LTEMP/AMP (outlined in Section 7.4).

6.7 Remediation Documentation

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

- Waste disposal dockets;
- Asbestos management documentation, including all relevant notifications, licences, clearance certificates and air monitoring reports (additional details in this regard are to be outlined in the AMP);
- Survey information relating to capped areas as applicable;
- Photographs of remediation works, including evidence of installed restricted access signage;
- Waste tracking documentation (see below and the example waste tracking form in Appendix D);
- Imported materials documentation (see below and the example imported material tracking form in Appendix D); and
- Any other documentation specified in a RWP.

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

6.7.1 Waste

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).

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.

A review of the disposal facility's Environment Protection Licence (EPL) issued under the Protection of the Environment Operations (POEO) Act (1997)[14] 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.

A soil volume analysis must be undertaken and reconciled with the actual quantities shown on the soil disposal dockets. This information is to be reviewed by the validation consultant on completion of the works and an assessment of the quantities of soil disposed off-site (e.g. comparison with the estimated and actual volumes).

6.7.2 Imported Materials

The remediation 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). 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.

The above information is to be provided to the validation consultant for inclusion in the validation report. The register 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.

[14]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 described in the RAP (and RWP where applicable) 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.

Additional validation sampling may be required based on the outcome of the pre-remediation data gap investigation and/or observations made during remediation, however, that would be reflected in the RWP where necessary.

7.1 Validation Inspections and Sampling

The following relates to the validation requirements for imported materials validation only. Validation requirements relating to the remediation contingencies are discussed in Section 8 and will be confirmed in the RWP as required.

A minimum of three samples from each imported material type must be collected and analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCP/OPPs, PCBs and asbestos (500ml NEPM 2013 analysis). Additional analysis may be required depending on the material type and/or history of the material/source site, at the validation consultant's discretion.

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. A minimum of one inspection must occur for each imported material type from each different source.

Where applicable, documentation must be supplied to the validation consultant to confirm the material has been classified with reference to a relevant Resource Recovery Order/Exemption.

The Validation Assessment Criteria (VAC) for imported materials are outlined in Section 7.2 below.

7.2 Validation Assessment Criteria and Data Assessment

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

Table 7-1: Validation Assessment Criteria (VAC)

Validation Aspect	VAC
Imported materials	Material imported as general fill must only be VENM or ENM. VENM is defined in the Protection of the Environment Operations Act (1997)[15] 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

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

Validation Aspect	VAC
	• 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. ENM and 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 URPOS 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. 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 will be assessed as above or below the VAC.

For imported materials, further assessment of risk can be considered in relation to site specific circumstances/application and available documentation for each material type, although such assessment and importation/use of materials on site should not be contrary to waste exemptions/orders or waste definitions.

7.3 Overarching Validation Sampling, Analysis and Quality Plan (SAQP)

Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) should be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and are to 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 land use described in Section 1.1. This validation plan largely addresses the imported materials validation component. Specific plans relating to the remedial contingencies will be provided in the RWP, as required.

7.3.2 Step 2 - Identify the Decisions of the Study

The remediation goal, aims and objectives are defined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Was the remediation undertaken in accordance with this RAP, or subsequent 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;
- Site information, including site observations and inspections;
- Pre-remediation investigation data;
- Survey data;
- Laboratory analysis of soils where applicable; and
- Field and laboratory QA/QC data.

7.3.4 Step 4 - Define the Study Boundary

The remediation and validation will be confined to the site boundaries as shown in Figure 2 in appendix A. The extent of remediation will be further assessed by the pre-remediation investigation outlined in Section 5.

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

7.3.5.1 VAC

The validation data will be collected and assessed in accordance with Section 7.1. Data will be assessed as above or below the VAC.

7.3.5.2 Field and Laboratory QA/QC

Appropriate QA/QC samples are to be obtained during the validation (where applicable) and analysed for the same suite of contaminants as the primary samples. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory) and trip blanks. Rinsate samples should be obtained if re-usable sampling equipment is utilised. Trip spikes must also be obtained during the imported materials validation, or if the remediation contaminants of concern are volatile.

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 and Rinsates

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.

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.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. Validation data for imported materials will be assessed as above or below the VAC, therefore statistical analysis and quantitative hypothesis testing is not proposed.

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.

7.3.8 Sampling Plan

The proposed sampling plan for the validation of imported materials is described in Section 7.1. Specific validation sampling associated with the implementation of remedial contingencies will be document in the RWP.

7.4 Validation Report and LTEMP/AMP

As part of the site validation process, a site validation report will be prepared by the validation consultant. The report will present the results of the validation assessment and will be prepared in accordance with the Consultants Reporting Guidelines. Even if the remedial contingencies are not triggered, validation is still required to document overall compliance with this RAP and for imported materials.

Regarding long-term management of the site, if contamination is not identified and does not require remediation via the implementation of the ‘cap and contain’ contingency, then a long-term AMP will still be required to manage the low concentrations of asbestos (bonded ACM) found in soil at the site. This is a requirement under Clause 429 of the WHS Regulation 2017.

If contamination is identified above the human health-based criteria applicable to the site, and if the contaminated soil is remediated via the implementation of the 'cap and contain' contingency, then a LTEMP will be prepared as part of the validation process. The LTEMP will be prepared in accordance with the Consultants Reporting Guidelines and the NSW EPA Practice Note, Preparing Environmental Management Plans for Contaminated Land (2022)[16]. The LTEMP must clearly state:

- Its objectives;
- Who is responsible for implementing it;
- The time frames for completing the actions it specifies, and who will undertake those actions;
- Its key stakeholders, and how they have been engaged in developing it;
- A mechanism for monitoring its implementation; and
- Where it will be recorded and how the public will be made aware of it.

Another key requirement of the LTEMP is that it legally enforceable and is publicly notified.

[16] NSW EPA, (2022). Practice Note: *Preparing Environmental Management Plans for Contaminated Land*

8 CONTINGENCY PLAN

A review of the proposed development and remediation works has indicated that the greatest risks that may affect the success of the remediation/validation approach documented in this RAP include:

- The identification contamination during the pre-remediation data gap investigation, that triggers a need to implement the remediation contingencies for 'excavation and off-site disposal' and/or 'cap and contain';
- Unexpected finds during soil disturbance; and
- Validation failure of imported materials.

A contingency discussion for each of the above aspects is provided below.

8.1 Contingency Soil Remediation Options

8.1.1 Excavation of Impacted Soil and Off-site Disposal

The pre-remediation data gap investigation results must be utilised to inform a revision of the CSM and the identification of the extent of remediation. Where the project team (including the client) agrees that the excavation and off-site disposal remedial contingency is the preferred option, a RWP is to be prepared to document the specific works involved.

The excavation and off-site disposal contingency remediation approach would require:

- Contaminated soils to be classified in accordance with NSW EPA guidelines for waste disposal;
- A waste classification letter to be prepared;
- The remediation area to be delineated and for appropriate measures to be undertaken to mitigate WHS risks during excavation works and address any stability issues from an engineering perspective;
- Contaminated soil to be excavated and disposed of off-site to a licensed landfill; and
- For the resulting excavation to be validated by sampling and analysis to confirm contamination does not remain at the base and walls of the excavation.

8.1.2 Consolidation and Isolation of Impacted Soil by Cap and Containment

If consolidation and capping the contaminated soil is preferred and is assessed to be applicable in conjunction with and/or as an alternative to off-site disposal of soil according to the NSW EPA and NEPM 2013 remediation hierarchy, the rationale for this must be outlined in the RWP and it must be recognised that the contamination will be managed under a LTEMP. This remediation option would also be applicable by default where contamination cannot be removed from the site for physical or practical reasons (e.g. if the contamination extends beneath buildings that are to remain, or where there are tree protection zones etc).

In the event this contingency is triggered, a RWP must be prepared by the validation consultant outlining the remedial methodology and validation requirements.

The cap and contain contingency remediation approach would require:

- Details for the earthworks, including geotechnical requirements (including but not limited to compaction capping layers, batter requirements, and consideration of root-affected/organic content in root-affected soils to be excavated), and materials management practices to minimise the potential for cross contamination with the remediation areas;
- Careful execution of the earthworks and consolidation of impacted soils;
- Consideration of any structural requirements or other constraints for the development, including but not limited to piling through the capped material, flooding etc;
- Survey plans including survey coordinates showing the horizontal extent of the capped material. Preferably the contaminated soils should be capped beneath the proposed hardstand areas wherever possible, rather than in landscaped areas;
- A barrier system is to be installed over the capered material, including a hi visibility marker layer (e.g. geofabric) and potentially a physical barrier (e.g. geogrid) in accessible soil areas.
- Clean layers are to be installed over the capped material and barrier system. The materials used for the clean layers must validated by the validation consultant;
- The project team must discuss the capping requirements so that the cap is robust and fit for purpose. Generally, JKE would accept concrete hardstand capping directly over the marker layer for paved areas, at least 0.5m of clean soil capping over the marker layer for landscaped areas, and all new services to be installed in trenches lined with a marker layer and backfilled with clean material. Alternative capping thicknesses (e.g. a reduced depth of capping) could be considered where 0.5m of clean soil capping is not practicable. However, a robust rational for implementing such an approach needs to be documented in the RWP; and
- The thickness of the clean capping layer above the barrier system must be confirmed via survey of relative levels (RLs) prior and post installed of the clean capping layer. The horizontal extent of the marker layers must also be documented by survey.

For capping in tree zones and landscaped areas, advice must be sought from an expert (e.g. an arborist) to confirm suitability of geofabric/marker layer(s) and capping materials.

8.2 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 odorous or stained hydrocarbon impacted soils, underground infrastructure such as tanks, or suspected friable asbestos etc. 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 must cease and the remediation contractor must contact the validation consultant and the client/project manager;
- Temporary barricades should be erected to isolate the area from access to workers;
- The validation consultant is to attend the site, adequately characterise the potential contamination and provide advice in relation to site management and remediation. Where contamination is identified, a RWP must be prepared in consultation with the project stakeholders and any relevant approvals must be sought; and

- Contamination must be remediated and validated in accordance with the advice provided, and the results must be included in the validation report.

8.3 Importation Failure for VENM or other Imported Materials

Where material to be imported onto the site does not meet the importation VAC, the material should not be imported. Alternative material must be sourced that meets the importation requirements.

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 contractors must make reference to the REF for specific site management requirements for the overall development of the site.

9.1 Interim Site Management/Asbestos Management Plan

As discussed in Section 4, an interim AMP must be prepared and implemented so that potential human-health risks from asbestos remain low and acceptable until further investigation and potential remediation occurs. The interim AMP will need to be updated to a LTEMP (or long term AMP) based on the results of the pre-remediation data gap investigation. Refer back to Section 7.4 for further information in this regard.

A construction-phase AMP must also be prepared and implemented as noted previously.

9.2 Project Contacts

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. The contact details of key project personnel are summarised in the following table:

Table 9-1: Project Contacts

Role	Company	Contact Details
Principal Contractor's Project Manager	To be appointed	-
Remediation Contractor	To be appointed	-
Validation Consultant	To be appointed	-
Certifier	To be appointed	-
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

9.3 Security

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

9.4 Timing and Sequencing of Remediation Works

The anticipated sequence of remediation works is outlined in Section 6.6. This must be reflected in the REF and be acceptable to the determining authority so that the remediation can occur as outlined in these steps.

9.5 Site Soil and Water Management Plan

The remediation contractor must prepare a detailed soil and water management plan prior to the commencement of site works and this should consider the requirements of the construction-phase AMP. Silt fences must 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/consent authority. Reference should be made to the REF for further details.

All stockpiled materials are to 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.

No stockpiles of soil or other materials shall be placed on footpaths.

Vehicle access to the site shall be stabilised to prevent the tracking of sediment onto the roads and footpath. Soil, earth, mud or similar materials must be removed from the roadway by sweeping, shovelling, or a means other than washing, on a daily basis or as required. Soil washings from wheels shall be collected and disposed of in a manner that does not pollute waters.

9.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)[17] should be adopted. Other measures specified in the REF should also be complied with. Noise producing machinery and equipment should only be operated between the hours approved by the determining authority (refer to REF).

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.

9.7 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;

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

- 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;
- 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/geotextile 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. Reference is also to be made to the construction-phase AMP in this regard.

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.

9.8 Dewatering

Dewatering is not expected to be required under the scope of remediation and is therefore not applicable under the RAP.

Groundwater must not be pumped to sewer or stormwater without obtaining prior approval from the relevant authorities.

9.9 Air Monitoring

Reference is to be made to the construction-phase AMP for details regarding asbestos air fibre monitoring. 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.

9.10 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 and hard hats. Additional asbestos-related PPE will be required for works where asbestos may be encountered and this will be specified in the construction-phase AMP. Washroom and lunchroom facilities must 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 or recycling plan to minimise the amount of waste produced from the site.

9.13 Incident Management Contingency

The validation consultant must be contacted if any unexpected contamination-related 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, 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

The remediation contractor should provide details for managing community consultation and complaints under their Construction Environmental Management Plan (CEMP) or similar document ed procedure.

10 CONCLUSION

Investigations at the site by JKE have identified that ACM is present in the south and east section of the site and remediation may be required to address human health risks. The asbestos concentrations identified in soil to date have not exceeded the HSL-based assessment criteria.

Prior to the commencement of remediation, and following establishment of a contractor works area and demolition of the required buildings, an investigation is to occur to further characterise the soil and groundwater conditions to assess the requirement for remediation. The additional pre-remediation investigation requirements are outlined in Section 5. If the pre-remediation investigation identifies contamination and confirms there is a need for remediation, the remediation contingencies outlined in Section 8 of this RAP will be triggered and an RWP is to be prepared to provide specific details of the remedial works involved.

Based on the available data and the CSM, the contingency remediation strategies provided in Section 8 include 'excavation and off-site disposal' and 'cap and contain'.

JKE is of the opinion that the site can be made suitable for the proposed development via remediation, should the pre-remediation investigation confirm that remediation is required. Site validation reporting is to occur as specified in this RAP to document that the procedures have been followed and to demonstrate that the site is suitable for the proposed development.

The RAP has met the objectives outlined in Section 1.2.

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
SEPP Resilience and Hazards 2021	The client's planning expert has advised if remediation works are required, they would "*likely be classified as Category 1 Remediation under Clause 4.8 of State Environmental Planning Policy (Resilience and Hazards) 2021 as the works would be undertaken in an area that is identified as a 'place of Aboriginal cultural significance' under the Moree Local Environmental Plan 2011 which would constitute an area for conservation or heritage conservation. Category 1 Remediation would require development consent from Moree Plains Shire Council requiring the preparation of a development application and associated Statement of Environmental Effects".* Under Section 4.14 of SEPP Resilience and Hazards 2021, a notice of completion of remediation work is to be given to council within 30 days of completion of the work regardless of whether the remediation is classed as Category 1 or Category 2 remediation work. The notice of completion of remediation works must be in accordance with Section 4.15 of SEPP Resilience and Hazards 2021.
POEO Act 1997	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

Guideline / Legislation / Policy	Applicability
	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 is required for all waste that is disposed off-site. Activities should be carried out in a manner which does not result in the pollution of waters.
POEO (Waste) Regulation 2014	Waste must be classified and disposed of lawfully in accordance with the regulation. 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 WasteLocate.
Work Health and Safety Regulation (2017)	Sites with asbestos become a 'workplace' when work is carried out there and require a register and AMP. This would apply to the demolition activities in the event that the hazardous building materials survey identifies asbestos in the structures, or in the event of an unexpected find in fill. Appropriate SafeWork NSW notification will be required for licensed (e.g. Class A or Class B) asbestos removal works or handling. The asbestos identified in soil to date was non-friable and therefore could be removed by a Class B licensed contractor.
NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997	The requirement to notify the 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 assessment and interpretation of this report.

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

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

JKE will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the 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.

Assessment Limitations
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment 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 Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment 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 Assessment Report

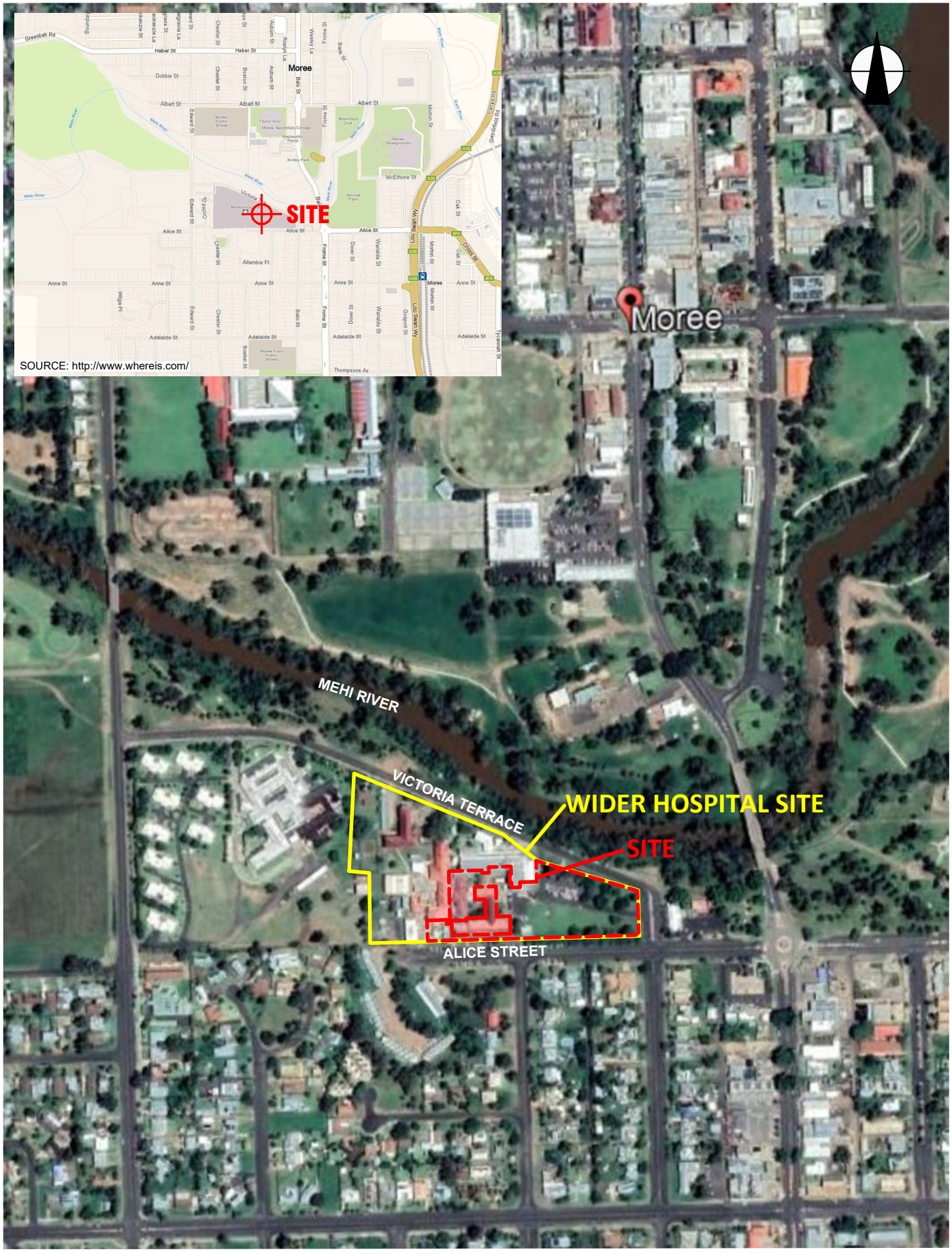
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other 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 assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

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

Appendix A: Report Figures



AERIAL IMAGE SOURCE: EARTH.GOOGLE.COM

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

Title: **SITE LOCATION PLAN**

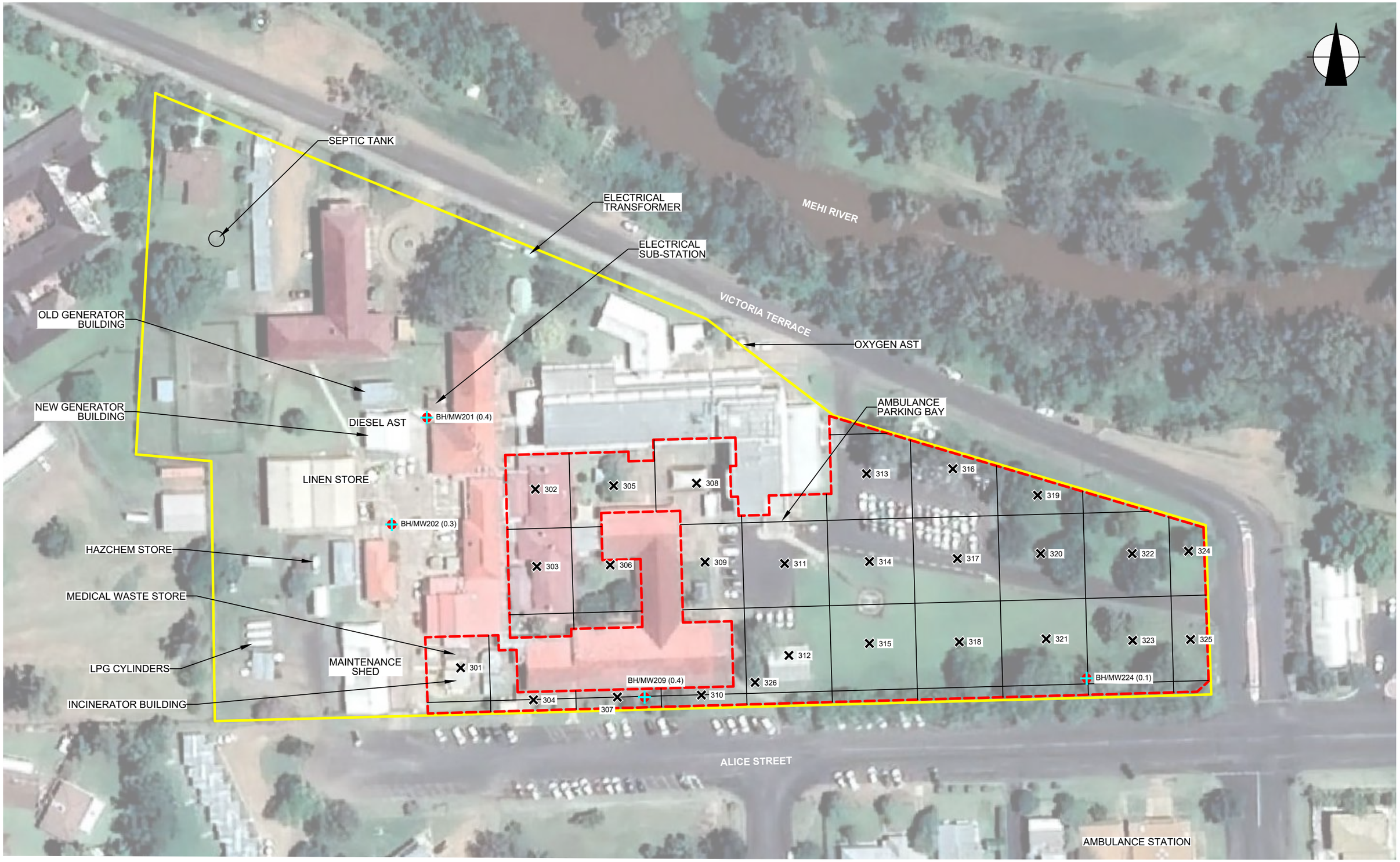
Location: MOREE HOSPITAL,
35 ALICE STREET, MOREE, NSW

Project No: E35092UPD

Figure No: 1

JKEnvironments

PLOT DATE: 1/11/2023 1:25:55 PM DWG FILE: K:\SC EIS JOBS\35000'S\E35092UPD MOREE\CAD\E35092UPD.DWG



LEGEND

– – –	APPROXIMATE SITE BOUNDARY
———	APPROXIMATE WIDER HOSPITAL BOUNDARY
BH/MW201	JKE, DSI 2023 BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
✕ 301	PROPOSED SOIL SAMPLE LOCATION

AERIAL IMAGE SOURCE: EARTH.GOOGLE.COM

0 10 20 30 40 50

SCALE 1:1000 @A3 METRES

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

Title: **PRE-REMEDIATION INVESTIGATION LOCATION PLAN**

Location: MOREE HOSPITAL, 35 ALICE STREET, MOREE, NSW

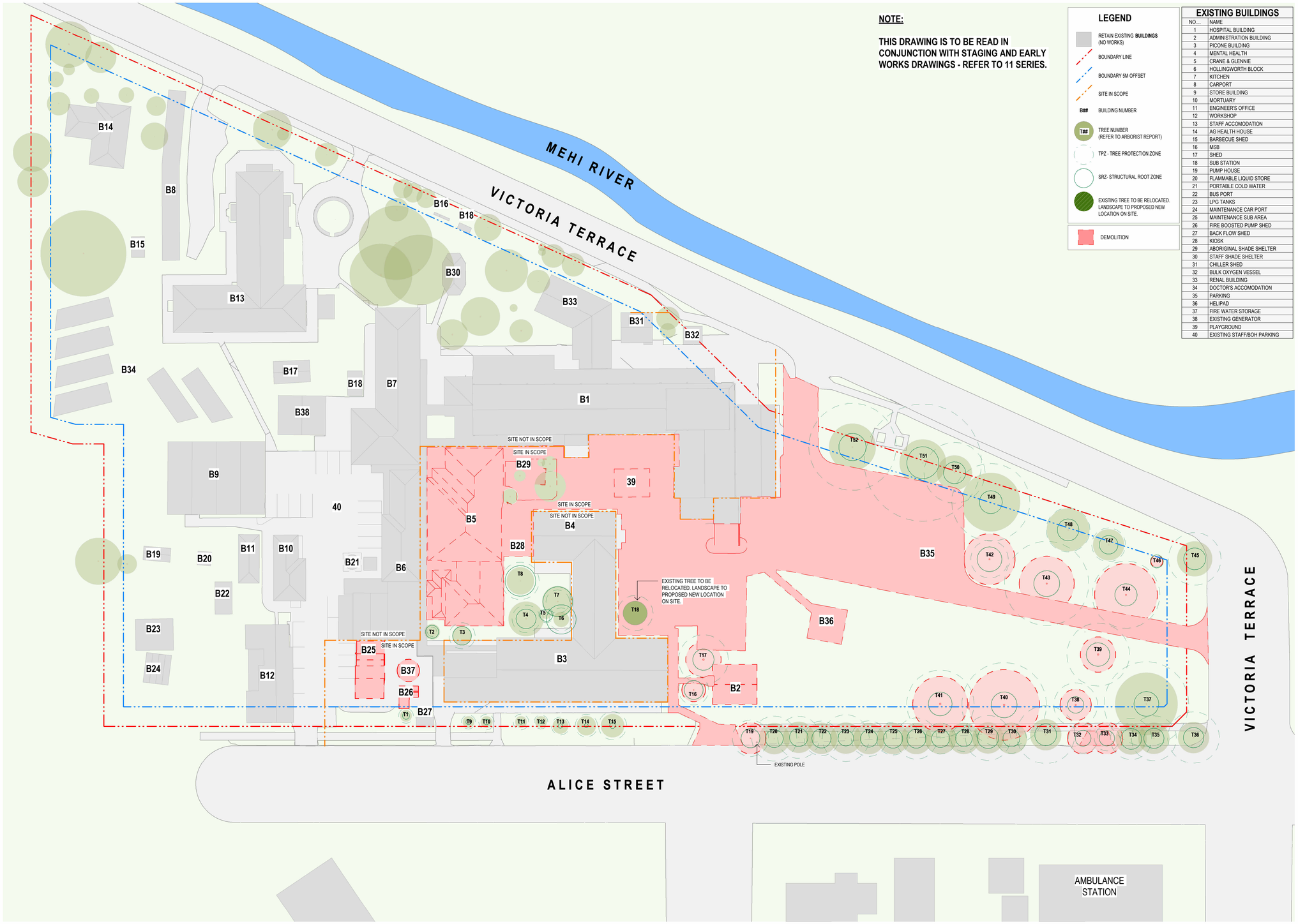
Project No: E35092UPD

Figure No: 2

JKEnvironments

PLOT DATE: 1/11/2023 1:26:13 PM DWG FILE: K:\5C EIS JOBS\35000'S\E35092UPD MOREE\CAD\E35092UPD.DWG

Appendix B: Selected Proposed Development Plans



NOTE:

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH STAGING AND EARLY WORKS DRAWINGS - REFER TO 11 SERIES.

LEGEND

- RETAIN EXISTING **BUILDINGS** (NO WORKS)
- BOUNDARY LINE
- BOUNDARY 5M OFFSET
- SITE IN SCOPE
- B## BUILDING NUMBER
- T## TREE NUMBER (REFER TO ARBORIST REPORT)
- TPZ - TREE PROTECTION ZONE
- SRZ- STRUCTURAL ROOT ZONE
- EXISTING TREE TO BE RELOCATED. LANDSCAPE TO PROPOSED NEW LOCATION ON SITE.
- DEMOLITION

EXISTING BUILDINGS

NO....	NAME
1	HOSPITAL BUILDING
2	ADMINISTRATION BUILDING
3	PICONE BUILDING
4	MENTAL HEALTH
5	CRANE & GLENNIE
6	HOLLINGWORTH BLOCK
7	KITCHEN
8	CARPORT
9	STORE BUILDING
10	MORTUARY
11	ENGINEER'S OFFICE
12	WORKSHOP
13	STAFF ACCOMODATION
14	AG HEALTH HOUSE
15	BARBECUE SHED
16	MSB
17	SHED
18	SUB STATION
19	PUMP HOUSE
20	FLAMMABLE LIQUID STORE
21	PORTABLE COLD WATER
22	BUS PORT
23	LPG TANKS
24	MAINTENANCE CAR PORT
25	MAINTENANCE SUB AREA
26	FIRE BOOSTED PUMP SHED
27	BACK FLOW SHED
28	KIOSK
29	ABORIGINAL SHADE SHELTER
30	STAFF SHADE SHELTER
31	CHILLER SHED
32	BULK OXYGEN VESSEL
33	RENAL BUILDING
34	DOCTOR'S ACCOMODATION
35	PARKING
36	HELIPAD
37	FIRE WATER STORAGE
38	EXISTING GENERATOR
39	PLAYGROUND
40	EXISTING STAFF/BOH PARKING

WORK IN PROGRESS

KEY PLAN

REV	DESCRIPTION	DRN	DATE
A	ISSUED FOR TENDER	NM	13/10/2023

GENERAL NOTES

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PRINCIPAL
NSW GOVERNMENT Health Infrastructure

ISSUED FOR INFORMATION

PROJECT

MOREE HOSPITAL REDEVELOPMENT

35 Alice St, Moree NSW 2400

DRAWING TITLE

MANDATORY OPTION - DEMO PLAN

SCALE	DRAWN BY	CHECKED
1 : 500 @ A1	Author	Checker

DOCUMENT NUMBER: MHR-STH-AR-DR-SW-13XX01 — REVISION: A

INTERNAL REFERENCE ONLY: STH PROJECT NO: 10649 | STH SHT NO: 13XX01

LEGEND

- RETAIN EXISTING **BUILDINGS** (NO WORKS)
- BOUNDARY LINE
- BOUNDARY 5M OFFSET
- SITE IN SCOPE
- B## BUILDING NUMBER
- T## TREE NUMBER (REFER TO ARBORIST REPORT)
- TPZ - TREE PROTECTION ZONE
- SRZ- STRUCTURAL ROOT ZONE
- EXISTING TREE TO BE RELOCATED. LANDSCAPE TO PROPOSED NEW LOCATION ON SITE.

EXISTING BUILDINGS

NO....	NAME
1	HOSPITAL BUILDING
2	ADMINISTRATION BUILDING
3	PICONE BUILDING
4	MENTAL HEALTH
5	CRANE & GLENNIE
6	HOLLINGWORTH BLOCK
7	KITCHEN
8	CARPORT
9	STORE BUILDING
10	MORTUARY
11	ENGINEER'S OFFICE
12	WORKSHOP
13	STAFF ACCOMODATION
14	AG HEALTH HOUSE
15	BARBECUE SHED
16	MSB
17	SHED
18	SUB STATION
19	PUMP HOUSE
20	FLAMMABLE LIQUID STORE
21	PORTABLE COLD WATER
22	BUS PORT
23	LPG TANKS
24	MAINTENANCE CAR PORT
25	MAINTENANCE SUB AREA
26	FIRE BOOSTED PUMP SHED
27	BACK FLOW SHED
28	KIOSK
29	ABORIGINAL SHADE SHELTER
30	STAFF SHADE SHELTER
31	CHILLER SHED
32	BULK OXYGEN VESSEL
33	RENAL BUILDING
34	DOCTOR'S ACCOMODATION
35	PARKING
36	HELIPAD
37	FIRE WATER STORAGE
38	EXISTING GENERATOR
39	PLAYGROUND
40	EXISTING STAFF/BOH PARKING

NEW BUILDING

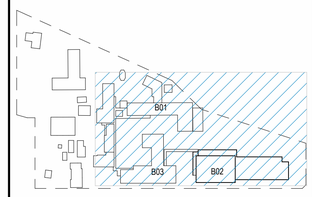
NO.	NAME
2	ACUTE SERVICES BUILDING

NEW EXTERNAL SERVICES

N.	NAME
LD1	FIRE PUMP ROOM
LD2	HYD PUMP ROOM
LD3	MECH ANCILLARY PLANT
A	GENERATOR
B	COLD WATER TANK
C	FIRE WATER TANK
D	COMBINED BOOSTER
E	TEMPORARY GENERATOR STAND
F	SUBSTATION
G	CHILLER

WORK IN PROGRESS

KEY PLAN



REV	DESCRIPTION	DRN	DATE
A	ISSUED FOR TENDER	NM	13/10/2023

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PRINCIPAL
NSW GOVERNMENT Health Infrastructure

ISSUED FOR INFORMATION

PROJECT
MOREE HOSPITAL REDEVELOPMENT
35 Alice St, Moree NSW 2400

DRAWING TITLE
MANDATORY OPTION - PROPOSED SITE PLAN

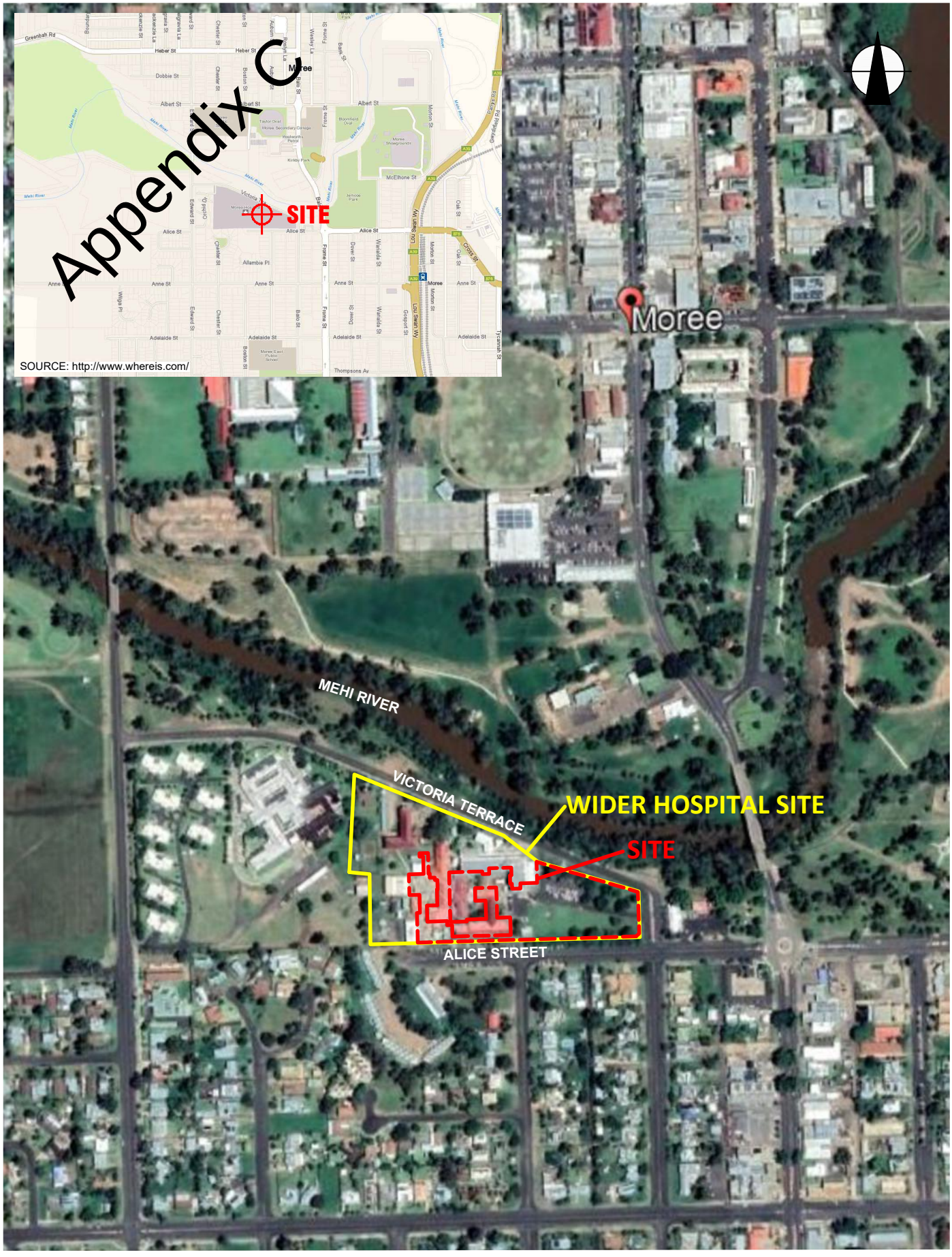
SCALE	DRAWN BY	CHECKED
1 : 500 @ A1	Author	Checker

DOCUMENT NUMBER: MHR-STH-AR-DR-SW-13XX02
REVISION: A

INTERNAL REFERENCE ONLY: STH PROJECT NO: 10649 | STH SHT NO: 13XX02

Appendix C: JKE PSI and DSI Figures and Summary Data Tables

Appendix C



AERIAL IMAGE SOURCE: EARTH.GOOGLE.COM

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

Title: **SITE LOCATION PLAN**

Location: MOREE HOSPITAL, 35 ALICE STREET, MOREE, NSW

Project No: E35092UPD

Figure No: 1

JKEnvironments

PLOT DATE: 13/09/2023 3:09:00 PM DWG FILE: K:\SC EIS \JOBS\35000\SIE35092UPD MOREE\CADE35092UPD.DWG

Appendix C

SEPTIC TANK
ELECTRICAL TRANSFORMER
ELECTRICAL SUB-STATION
OLD GENERATOR BUILDING
NEW GENERATOR BUILDING
DIESEL AST
LINEN STORE
HAZCHEM STORE
MEDICAL WASTE STORE
LPG CYLINDERS
MAINTENANCE SHED
INCINERATOR BUILDING
OXYGEN AST
AMBULANCE PARKING BAY
MEHI RIVER
VICTORIA TERRACE
ALICE STREET
AMBULANCE STATION

BH/MW201 (0.4)
BH/MW202 (0.3)
BH203 (0.4)
BH204 (0.3)
BH205 (0.5)
BH7 (0.2)
BH4 (0.5)
BH3 (0.4)
BH6 (0.0)
BH210 (0.3)
BH211 (0.3)
BH2 (0.0)
BH1 (0.2)
BH101
BH102
BH103
BH104
BH105
BH106
BH107
BH108
BH216 (0.6)
TP206 (0.2)
TP207 (0.1)
TP208 (0.9)
TP4 (0.4)
TP3 (0.1)
TP213 (0.2)
TP214 (0.1)
TP215 (0.1)
TP212 (>0.2)
TP217 (0.1)
TP218 (0.15)
TP219 (0.15)
TP220 (0.3)
TP221 (0.1)
TP222 (0.1)
TP223 (0.3)
TP225 (0.1)
TP226 (0.2)
TP227 (0.1)
TP5 (0.0)
TP2 (0.4)
TP1 (0.0)
BH5 (0.1)
BH/MW209 (0.4)
BH/MW224 (0.1)
FCF202
FCF201

LEGEND

	APPROXIMATE SITE BOUNDARY
	APPROXIMATE WIDER HOSPITAL BOUNDARY
BH(Fill Depth)	JKE, PSI BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
TP(Fill Depth)	JKE, PSI TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
BH203	JKE, DSI 2023 BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW201	JKE, DSI 2023 BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
TP206	JKE, DSI 2023 TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m) (JKE, DSI 2023)
BH101	JKG BOREHOLE LOCATION AND NUMBER

AERIAL IMAGE SOURCE: EARTH.GOOGLE.COM

0 10 20 30 40 50
SCALE 1:1000 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: MOREE HOSPITAL, 35 ALICE STREET, MOREE, NSW

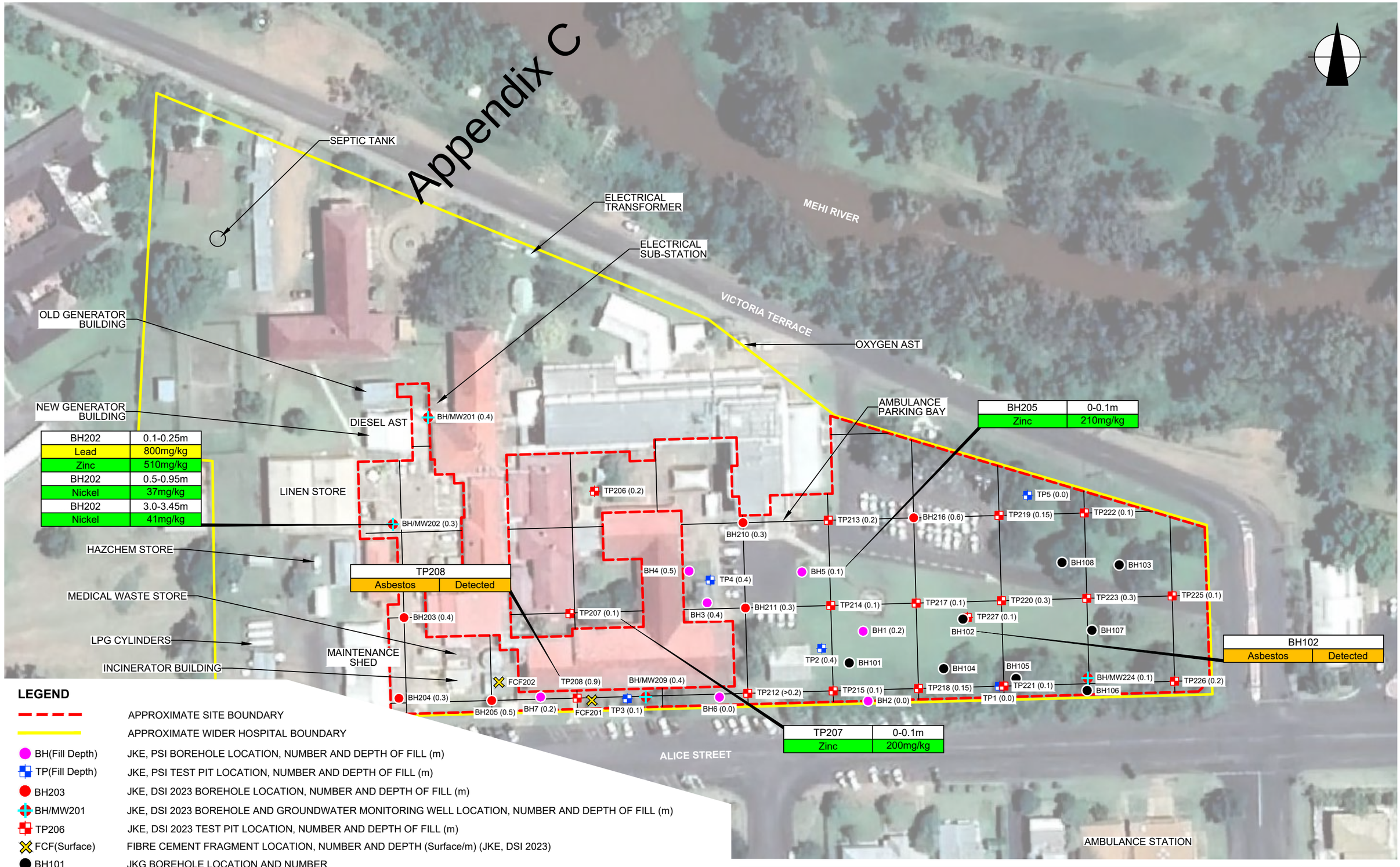
Project No: E35092UPD

Figure No: 2

JKEnvironments

PLOT DATE: 13/09/2023 3:09:17 PM DWG FILE: K:\5C EIS JOBS\35000'S\E35092UPD MOREE\CAD\E35092UPD.DWG

Appendix C



LEGEND

	APPROXIMATE SITE BOUNDARY
	APPROXIMATE WIDER HOSPITAL BOUNDARY
BH(Fill Depth)	JKE, PSI BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
TP(Fill Depth)	JKE, PSI TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
BH203	JKE, DSI 2023 BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
BH/MW201	JKE, DSI 2023 BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
TP206	JKE, DSI 2023 TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m) (JKE, DSI 2023)
BH101	JKG BOREHOLE LOCATION AND NUMBER
SAMPLE ID / CHEMICAL	DEPTH (metres) / CONCENTRATION — SOIL/SURFACE SAMPLE EXCEEDANCE
	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK
	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
	ASBESTOS DETECTED IN FILL

AERIAL IMAGE SOURCE: EARTH.GOOGLE.COM

0 10 20 30 40 50
SCALE 1:1000 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

Location: MOREE HOSPITAL, 35 ALICE STREET, MOREE, NSW

Project No: E35092UPD

Figure No: 3

JKEnvironments

PLOT DATE: 13/09/2023 3:09:28 PM DWG FILE: K:\5C EIS JOBS\35000'S\E35092UPD MOREE\CAD\E35092UPD.DWG

PSI Tables and Borehole/Testpit Logs

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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

Waste Classification and TCLP Table:

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

QA/QC Table:

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

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

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
TP1	0-0.1	Silty Clay	<4	<0.4	**26**	**24**	**12**	<0.1	**24**	**47**	**1.5**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP1 (lab replicate)	0-0.1	Silty Clay	<4	<0.4	**25**	**24**	**11**	<0.1	**23**	**44**	**1.5**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP2	0-0.1	Fill: Sandy Clay	**4**	<0.4	**15**	**14**	**6**	<0.1	**15**	**29**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP2	0.3-0.4	Fill: Sandy Gravel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP3	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**22**	**21**	<0.1	**23**	**58**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP4	0-0.1	Fill: Silty Clay	**5**	<0.4	**26**	**26**	**21**	<0.1	**24**	**53**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP5	0-0.1	Silty Clay	<4	<0.4	**24**	**22**	**12**	<0.1	**25**	**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
BH1	0-0.2	Fill: Sandy Clay	<4	<0.4	**18**	**16**	**7**	<0.1	**16**	**36**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH2	0-0.2	Fill: Silty Clay	<4	<0.4	**22**	**19**	**10**	<0.1	**21**	**36**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH3	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**24**	**11**	<0.1	**21**	**45**	<0.05	<0.5	<0.1	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**23**	**12**	<0.1	**20**	**47**	<0.05	<0.5	<0.1	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH4	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**23**	**15**	<0.1	**23**	**51**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH5	0-0.1	Fill: Silty Clay	<4	<0.4	**19**	**18**	**8**	<0.1	**19**	**36**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH6	0-0.2	Fill: Silty Clay	<4	<0.4	**22**	**19**	**48**	<0.1	**21**	**76**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH7	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**22**	**18**	<0.1	**22**	**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
SDUP3	-	Fill: Silty Clay	<4	<0.4	**21**	**19**	**10**	<0.1	**19**	**48**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP4	-	Fill: Silty Clay	**4**	<0.4	**24**	**120**	**28**	<0.1	**23**	**81**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP4 (lab replicate)	-	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	NA
FCF1-TP2	0.3-0.4	Fibre Cement Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
FCF2-TP2	0.3-.4	Fibre Cement Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	Not Detected
Total Number of Samples			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	18	16	13
Maximum Value			5	<PQL	26	120	48	<PQL	25	81	1.5	<PQL	<PQL	<PQL	<PQL	0.3	<PQL	<PQL	<PQL	<PQL	<PQL	Not Detected

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

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

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
TP1	0-0.1	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP1 (lab replicate)	0-0.1	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP2	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP3	0-0.1	Fill: Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP4	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP5	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH1	0-0.2	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH2	0-0.2	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH2	1.0-1.2	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.4
BH3	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH4	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH5	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH6	0-0.2	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH7	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP3	-	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP4	-	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples					17	17	17	17	17	17	17	17
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	5.4

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
TP1	0-0.1	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP1 (lab replicate)	0-0.1	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP2	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP3	0-0.1	Fill: Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP5	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1	0-0.2	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	0-0.2	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	1.0-1.2	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH3	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH4	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH5	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH6	0-0.2	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH7	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP3	-	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP4	-	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3

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

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE**			
Sample Reference	**Sample Depth**	**Soil Texture**				
TP1	0-0.1	Coarse	<25	<50	<100	<100
TP1 (lab replicate)	0-0.1	Coarse	<25	<50	<100	<100
TP2	0-0.1	Coarse	<25	<50	<100	<100
TP3	0-0.1	Coarse	<25	<50	<100	<100
TP4	0-0.1	Coarse	<25	<50	<100	<100
TP5	0-0.1	Coarse	<25	<50	<100	<100
BH1	0-0.2	Coarse	<25	<50	<100	<100
BH2	0-0.2	Coarse	<25	<50	<100	<100
BH2	1.0-1.2	Coarse	<25	<50	<100	<100
BH3	0-0.1	Coarse	<25	<50	<100	<100
BH3 (lab replicate)	0-0.1	Coarse	<25	<50	<100	<100
BH4	0-0.1	Coarse	<25	<50	<100	<100
BH5	0-0.1	Coarse	<25	<50	<100	<100
BH6	0-0.2	Coarse	<25	<50	<100	<100
BH7	0-0.1	Coarse	<25	<50	<100	<100
SDUP3	-	Coarse	<25	<50	<100	<100
SDUP4	-	Coarse	<25	<50	<100	<100
Total Number of Samples			17	17	17	17
Maximum Value			<PQL	<PQL	<PQL	<PQL

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

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
TP1	0-0.1	Coarse	700	1000	2500	10000
TP1 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
TP2	0-0.1	Coarse	700	1000	2500	10000
TP3	0-0.1	Coarse	700	1000	2500	10000
TP4	0-0.1	Coarse	700	1000	2500	10000
TP5	0-0.1	Coarse	700	1000	2500	10000
BH1	0-0.2	Coarse	700	1000	2500	10000
BH2	0-0.2	Coarse	700	1000	2500	10000
BH2	1.0-1.2	Coarse	700	1000	2500	10000
BH3	0-0.1	Coarse	700	1000	2500	10000
BH3 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
BH4	0-0.1	Coarse	700	1000	2500	10000
BH5	0-0.1	Coarse	700	1000	2500	10000
BH6	0-0.2	Coarse	700	1000	2500	10000
BH7	0-0.1	Coarse	700	1000	2500	10000
SDUP3	-	Coarse	700	1000	2500	10000
SDUP4	-	Coarse	700	1000	2500	10000

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

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		5,100	3,800	5,300	7,400	120	18,000	5,300	15,000	1,900	
Site Use		**RECREATIONAL - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
TP1	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP1 (lab replicate)	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP2	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP3	0-0.1	<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
TP5	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH1	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH2	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH2	1.0-1.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.4**
BH3	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH3 (lab replicate)	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH4	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH5	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH6	0-0.2	<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
SDUP3	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP4	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples		17	17	17	17	17	17	17	17	17	17
Maximum Value		<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	5.4

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

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

FIELD DATA															LABORATORY DATA										
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.02**			**0.001**			**0.001**											**0.02**	**0.001**
6/06/2022	TP1	0-0.1	No	10	10,710	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/06/2022	TP1	0.1-1.0	No	10	10,710	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/06/2022	TP2	0-0.1	No	10	11.950	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	TP2	0-0.1	782.38	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
6/06/2022	TP2	0.1-0.4	No	10	10,820	No ACM observed*	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	TP2	0.3-0.4	779.04	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
6/06/2022	TP2	0.4-0.6	No	10	10,570	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/06/2022	TP3	0-0.1	No	10	10,670	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	TP3	0-0.1	696.14	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
6/06/2022	TP4	0-0.1	No	10	10,270	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	TP4	0-0.1	625.02	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
6/06/2022	TP4	0.1-0.4	No	10	11,020	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6/06/2022	TP5	0-0.1	No	10	10,660	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	TP5	0-0.1	594.05	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	--	--	<0.01	<0.001
6/06/2022	BH1	0-0.2	No	10	10,210	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH1	0-0.2	649.44	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
6/06/2022	BH2	0-0.2	No	10	10,870	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/06/2022	BH3	0-0.1	No	10	10,190	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH3	0-0.1	727.27	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
7/06/2022	BH3	0.1-0.4	No	NA	4,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/06/2022	BH4	0-0.1	No	10	10,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH4	0-0.1	588.28	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
7/06/2022	BH4	0.1-0.5	No	NA	6,110	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7/06/2022	BH5	0-0.1	No	10	11,080	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH5	0-0.1	709.28	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
7/06/2022	BH6	0-0.2	No	10	10,720	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH6	0-0.2	531.75	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
7/06/2022	BH7	0-0.1	No	10	10,010	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297817	BH7	0-0.1	697.42	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
7/06/2022	BH7	0.1-0.2	No	NA	3,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Concentration above the SAC **VALUE**
* Fibre cement fragments were encountered in fill in TP2, however laboratory analysis did not identify asbestos fibres in the fragments (refer to Table S1).

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

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
TP1	0-0.1	Silty Clay	Fine	NA	NA	NA	<4	**26**	**24**	**12**	**24**	**47**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
TP1 (lab replicate)	0-0.1	Silty Clay	Fine	NA	NA	NA	<4	**25**	**24**	**11**	**23**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
TP2	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	**4**	**15**	**14**	**6**	**15**	**29**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP3	0-0.1	Fill: Sandy Gravel	Coarse	NA	NA	NA	<4	**25**	**22**	**21**	**23**	**58**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP4	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**5**	**26**	**26**	**21**	**24**	**53**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP5	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**24**	**22**	**12**	**25**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.05**
BH1	0-0.2	Silty Clay	Fine	NA	NA	NA	<4	**18**	**16**	**7**	**16**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	0-0.2	Fill: Sandy Clay	Fine	NA	NA	NA	<4	**22**	**19**	**10**	**21**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	1.0-1.2	Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	NA
BH3	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**22**	**24**	**11**	**21**	**45**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**22**	**23**	**12**	**20**	**47**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH4	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**25**	**23**	**15**	**23**	**51**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH5	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**19**	**18**	**8**	**19**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH6	0-0.2	Fill: Silty Clay	Fine	NA	NA	NA	<4	**22**	**19**	**48**	**21**	**76**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH7	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**20**	**22**	**18**	**22**	**64**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP3	-	Fill: Silty Clay	Fine	NA	NA	NA	<4	**21**	**19**	**10**	**19**	**48**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP4	-	Fill: Silty Clay	Fine	**8.2**	**20**	**39**	**4**	**24**	**120**	**28**	**23**	**81**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
Total Number of Samples				1	1	1	16	16	16	16	16	16	17	16	17	17	17	17	17	17	17	17	16
Maximum Value				8.2	20	39	5	26	120	48	25	81	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.2

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

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
TP1	0-0.1	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP1 (lab replicate)	0-0.1	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP2	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP3	0-0.1	Fill: Sandy Gravel	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
TP4	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP5	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH1	0-0.2	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH2	0-0.2	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH2	1.0-1.2	Silty Clay	Fine	NA	NA	NA	--	--	--	--	--	--	170	--	180	120	1300	5600	65	105	125	45	--
BH3	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH4	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH5	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH6	0-0.2	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH7	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP3	-	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP4	-	Fill: Silty Clay	Fine	8.2	20	39	100	410	240	1300	280	820	170	180	180	120	1300	5600	65	105	125	45	20

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

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
TP1	0-0.1	Silty Clay	<4	<0.4	**26**	**24**	**12**	<0.1	**24**	**47**	**1.5**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP1 (lab replicate)	0-0.1	Silty Clay	<4	<0.4	**25**	**24**	**11**	<0.1	**23**	**44**	**1.5**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP2	0-0.1	Fill: Sandy Clay	**4**	<0.4	**15**	**14**	**6**	<0.1	**15**	**29**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP2	0.3-0.4	Fill: Sandy Gravel	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
TP3	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**22**	**21**	<0.1	**23**	**58**	<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
TP4	0-0.1	Fill: Silty Clay	**5**	<0.4	**26**	**26**	**21**	<0.1	**24**	**53**	<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
TP5	0-0.1	Silty Clay	<4	<0.4	**24**	**22**	**12**	<0.1	**25**	**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
BH1	0-0.2	Fill: Sandy Clay	<4	<0.4	**18**	**16**	**7**	<0.1	**16**	**36**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH2	0-0.2	Fill: Silty Clay	<4	<0.4	**22**	**19**	**10**	<0.1	**21**	**36**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH2	1.0-1.2	Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH3	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**24**	**11**	<0.1	**21**	**45**	<0.05	<0.05	<0.1	<0.1	<0.1	**0.3**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH3 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**23**	**12**	<0.1	**20**	**47**	<0.05	<0.05	<0.1	<0.1	<0.1	**0.3**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH4	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**23**	**15**	<0.1	**23**	**51**	<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
BH5	0-0.1	Fill: Silty Clay	<4	<0.4	**19**	**18**	**8**	<0.1	**19**	**36**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH6	0-0.2	Fill: Silty Clay	<4	<0.4	**22**	**19**	**48**	<0.1	**21**	**76**	<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
BH7	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**22**	**18**	<0.1	**22**	**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
SDUP3	-	Fill: Silty Clay	<4	<0.4	**21**	**19**	**10**	<0.1	**19**	**48**	<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	-	Fill: Silty Clay	**4**	<0.4	**24**	**120**	**28**	<0.1	**23**	**81**	<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 (lab replicate)	-	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			16	16	16	16	16	16	16	16	16	16	16	17	17	17	16	17	17	17	17	17	17	17	17	17	11
Maximum Value			5	<PQL	26	120	48	<PQL	25	81	1.5	0.2	<PQL	<PQL	<PQL	0.3	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Not Detected

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

TABLE S8
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	BH5	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP3	-	<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	BH7	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP4	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	<0.2	<0.5	<1	<2	<1
Blank	6-7/06/2022										
Trip	TS-S1		-	-	-	-	97%	97%	97%	97%	97%
Spike	6-7/06/2022										
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	<1	<1	<1	<2	<1
Rinsate	7/06/22										

			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	BH5	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP3	-	<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	BH7	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP4	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	6-7/06/2022																
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	6-7/06/2022																
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	7/06/22																

			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	BH5	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP3	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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	BH7	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP4	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	6-7/06/2022																					
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	6-7/06/2022																					
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	7/06/22																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel
	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*
	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*
Intra	BH5	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
laboratory	SDUP3	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH7	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
laboratory	SDUP4	-	<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
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	6-7/06/2022													
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-
Spike	6-7/06/2022													
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	7/06/22													

			Total PCBS
	PQL Envirolab SYD		*0.1*
	PQL Envirolab VIC		*0.1*
Intra	BH5	0-0.1	<0.1
laboratory	SDUP3	-	<0.1
duplicate	MEAN		nc
	RPD %		nc
Inter	BH7	0-0.1	<0.1
laboratory	SDUP4	-	<0.1
duplicate	MEAN		nc
	RPD %		nc
Field	TB-S1	-	NA
Blank	6-7/06/2022		
Trip	TS-S1		-
Spike	6-7/06/2022		
Field	FR-S1-SPT	µg/L	NA
Rinsate	7/06/22		

			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		*4*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*
	PQL Envirolab VIC		*4.0*	*0.4*	*1.0*	*1.0*	*1.0*	*0.1*	*1.0*	*1.0*
Intra	BH5	0-0.1	<4	<0.4	19	18	8	<0.1	19	36
laboratory	SDUP3	-	<4	<0.4	21	19	10	<0.1	19	48
duplicate	MEAN		nc	nc	20	18.5	9	nc	19	42
	RPD %		nc	nc	10%	5%	22%	nc	0%	29%
Inter	BH7	0-0.1	<4	<0.4	20	22	18	<0.1	22	64
laboratory	SDUP4	-	4	<0.4	24	120	28	<0.1	23	81
duplicate	MEAN		3	nc	22	71	23	nc	22.5	72.5
	RPD %		67%	nc	18%	138%	43%	nc	4%	23%
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA
Blank	6-7/06/2022									
Trip	TS-S1		-	-	-	-	-	-	-	-
Spike	6-7/06/2022									
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	7/06/22									

Result outside of QA/QC acceptance criteria

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BOREHOLE LOG

Borehole No. **1** 1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 209.0m

Date: 6/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Sandy clay, low plasticity, dark brown, fine to coarse grained sand, with fine to coarse grained gravel, and roots.				SCREEN: 10.21kg 0-0.2m NO FCF
								CH	Silty CLAY: high plasticity, dark grey brown.	w>PL	Hd		ALLUVIAL
										w<PL			
					N = 25 7,10,15	1						>600	
						2							
					N = 20 10,11,9							>600	
						3							
					N = 18 7,8,10	4		ML	Sandy SILT: low plasticity, brown, fine grained sand.	w<PL	Hd		
						5							
					N = 25 7,14,11			SP	SAND: fine to coarse grained, brown, trace of silt and clay fines.	D	D-VD		
						6			END OF BOREHOLE AT 5.95m				
						7							

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BOREHOLE LOG

Borehole No. 2 1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.5m

Date: 6/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			TOPSOIL: Silty clay, low plasticity, dark brown, with roots.	w>PL			SCREEN: 10.81kg 0-0.2m NO FCF
								CH	Silty CLAY: high plasticity, dark grey brown.	w<PL	Hd		ALLUVIAL
					N = 28 5,12,16	1						>600	
						2							
					N = 20 10,9,11				as above, but trace of fine grained sand.			>600	
						3							
					N = 33 10,14,19	4						>600	
						5							
					N = 28 4,12,16				as above, but grey.				
						6			END OF BOREHOLE AT 5.95m				
						7							

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BOREHOLE LOG

Borehole No. 3 1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.8m

Date: 7/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Silty clay, medium plasticity, dark brown, trace of fine to medium grained gravel.	w>PL			GRASS COVER TOP 100mm ROOT AFFECTED
								CH	Silty CLAY: high plasticity, dark grey brown.	w>PL	VSt	210	SCREEN: 10.19kg 0-0.1m NO FCF
						1							SCREEN: 4.15kg 0.1-0.4 NO FCF
													ALLUVIAL
					N = 18 5,7,11						VSt- Hd	500	
						2							
					N = 20 8,9,11	3						450	
						4							
					N = 18 8,8,10							380 410	
						5							
					N = 24 12,12,12	6		SP	SAND: fine to coarse grained, brown, trace of fine to medium grained, sub-rounded, gravel, and silt and clay fines.	M	MD		
									END OF BOREHOLE AT 6.45m				
						7							

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BOREHOLE LOG

Borehole No. 4 1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.8m

Date: 7/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■			0			FILL: Silty clay, medium plasticity, dark brown, trace of fine to medium grained gravel.	w>PL			GRASS COVER TOP 100mm ROOT AFFECTED
								CI-CH	Silty CLAY: medium to high plasticity, dark grey brown.	w<PL	Hd		SCREEN: 10.15kg 0-0.1m NO FCF
	■			■	N = 34 11,15,19	1						>600	SCREEN: 6.11kg 0.1-0.5m NO FCF
													ALLUVIAL
				■	N = 42 11,15,27	2						>600	
						3							
				■	N = 22 8,9,13	4			as above, but with fine grained sand.			460	
						5							
				■	N = 18 10,9,9			SP	SAND: fine to medium grained, brown, trace of silt fines.	M	MD		
						6			END OF BOREHOLE AT 5.95m				
						7							

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BOREHOLE LOG

Borehole No. 5 1/1

SDUP3: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.8m

Date: 7/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION	■		■			0		CH	FILL: Silty clay, medium plasticity, dark brown, with fine to medium grained sand, and roots.	w>PL	Hd	250	SCREEN: 11.08kg 0-0.1m NO FCF
									Silty CLAY: high plasticity, dark grey brown.	w<PL			ALLUVIAL
			■		N = 34 13,17,17	1						>600	
						2							
			■		N = 41 12,17,24							>600	
						3							
			■		N = 18 6,7,11	4		CL-CI	Sandy silty CLAY: low to medium plasticity, brown, fine to medium grained sand, with fine to medium grained sand lenses			>600	
						5							
			■		N = 22 14,11,11			SP	SAND: fine to coarse grained, brown, with fine to medium grained, sub-rounded, gravel, and clay fines.	M	MD		
						6			END OF BOREHOLE AT 5.95m				
						7							

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BOREHOLE LOG

Borehole No. 6 1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.8m

Date: 7/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■			0			TOPSOIL: Silty clay, medium plasticity, brown, with roots.	w>PL			SCREEN: 10.72kg 0-0.2m NO FCF
								CH	Silty CLAY: high plasticity, dark grey brown.	w>PL	Hd		ALLUVIAL
	■		■		N = 32 7,13,19	1						>600	
						2							
			■		N = 41 11,17,24							>600	
						3							
			■		N = 14 7,7,7	4		CI	Sandy CLAY: medium plasticity, brown, fine to medium grained sand.		VSt	350	
						5							
▶			■		N = 26 6,13,13			SP	SAND: fine to coarse grained, brown, trace of clay fines.	M	MD		
						6			END OF BOREHOLE AT 5.95m	W			
						7							

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BOREHOLE LOG

Borehole No. 7 1/1

SDUP4: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: 35092UR **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 208.8m

Date: 7/6/22 **Datum:** AHD

Plant Type: TS350 **Logged/Checked by:** R.G.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Silty clay, medium plasticity, dark brown, trace of fine to coarse grained gravel, and roots.	w>PL			SCREEN: 10.01kg 0-0.1m NO FCF
								CI	Silty CLAY: medium plasticity, dark grey brown.	w>PL	Hd		SCREEN: 3.6kg 0.1-0.2m NO FCF ALLUVIAL
					N = 25 8,12,13	1						>600	
					N = 26 5,12,14	2						>600	
					N = 28 12,12,16	3						>600	
					N = 20 10,10,10	4		SP	SAND: fine to coarse grained, brown, trace of fine to medium grained, sub-rounded, gravel, and clay fines.	D	MD		
						5			END OF BOREHOLE AT 5.95m				
						6							
						7							

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TEST PIT LOG

Test Pit No.
TP1
1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 208.5m

Date: 6/6/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** H.W./M.D.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■			0		CI-CH	Silty CLAY: medium to high plasticity, dark brown, trace of quartz gravel and roots.	w≈PL w<PL			GRASS COVER ALLUVIAL SCREEN: 10.71kg 0-0.1m NO FCF
	■		■			1			END OF TEST PIT AT 1.0m				SCREEN: 10.71kg 0.1-1.0m NO FCF
						2							
						3							
						4							
						5							
						6							
						7							

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TEST PIT LOG

Test Pit No.
TP2
1/1

SDUP1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 208.9m

Date: 6/6/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** H.W./M.D.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■			0			FILL: Sandy clay, low to medium plasticity, fine to medium grained sand, trace of igneous and ironstone gravel and root fibres.	w≈PL			GRASS COVER
	■		■							M			SCREEN: 11.95kg 0-0.1m NO FCF
	■		■					CI-CH	FILL: Sandy gravel, fine to medium grained, brown, igneous gravel, rounded, fine to medium grained sand.				SCREEN: 10.82kg 0.1-0.4m FCF1 AND FCF2 IN TP WALL AT 0.3m DEPTH
	■		■			1			Silty CLAY: medium to high plasticity, dark brown, trace of root fibres.				SCREEN: 10.57kg 0.4-0.6m NO FCF
									END OF TEST PIT AT 1.0m				
						2							
						3							
						4							
						5							
						6							
						7							

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TEST PIT LOG

Test Pit No.
TP3
1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 208.7m

Date: 6/6/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** H.W./M.D.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■			0		CI-CH	FILL: Silty clay, medium to high plasticity, brown, trace of ironstone gravel, sand and root fibres.	w>PL / w<PL			GRASS COVER
	■		■						Silty CLAY: medium to high plasticity, dark brown, trace of root fibres and fine grained sand.				SCREEN: 10.67kg 0-0.1m NO FCF
	■		■			1			END OF TEST PIT AT 1.0m				TERRACOTTA PIPE AT 0.1m
													ALLUVIAL
						2							
						3							
						4							
						5							
						6							
						7							

JKGeotechnics

TEST PIT LOG

Test Pit No.
TP4
1/1

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 208.7m

Date: 6/6/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** H.W./M.D.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■			0			FILL: Silty clay, medium to high plasticity, dark brown, trace of sand, ironstone and quartz gravel, concrete and terracotta pipe fragments.	w≈PL			GRASS COVER
	■		■					CI-CH	Silty CLAY: medium to high plasticity, dark brown, trace of root fibres and ash.	w≈PL			SCREEN: 10.27kg 0-0.1m NO FCF
	■		■			1			END OF TEST PIT AT 1.0m				SCREEN: 11.02kg 0.1-0.4m NO FCF ALLUVIAL

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TEST PIT LOG

Test Pit No.
TP5
1/1

SDUP2: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 208.6m

Date: 6/6/22 **Datum:** AHD

Plant Type: - **Logged/Checked by:** H.W./M.D.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE-TION	■		■			0		CI-CH	Silty CLAY: medium to high plasticity, dark brown, trace of ironstone and quartz gravel and roots.	w≈PL			GRASS COVER ALLUVIAL SCREEN: 10.66kg 0-0.1m NO FCF
	■		■					CL-CI	Silty Sandy CLAY: low to medium plasticity, yellow brown, fine grained sand.	w<PL			
	■		■			1			END OF TEST PIT AT 1.0m				
						2							
						3							
						4							
						5							
						6							
						7							

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
Fine 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:

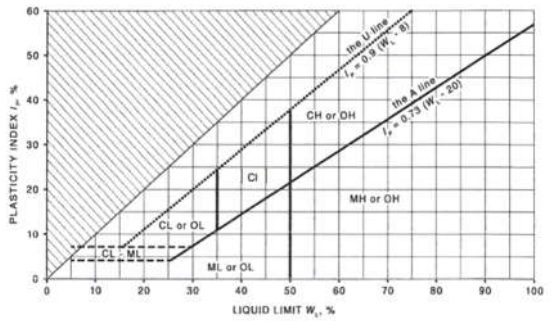
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.

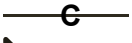
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

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.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	$w > PL$ $w \approx PL$ $w < PL$ $w \approx LL$ $w > LL$	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
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.

Log Column	Symbol	Definition
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.

DSI Tables and Borehole/Testpit Logs

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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

Waste Classification and TCLP Table:

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

QA/QC Table:

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

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

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH201	0.19-0.4	Fill: Silty Clay	**4**	<0.4	**24**	**22**	**23**	<0.1	**29**	**62**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	**4**	<0.4	**24**	**22**	**28**	<0.1	**30**	**69**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201	0.6-1.0	Silty Clay	**4**	<0.4	**36**	**24**	**10**	<0.1	**33**	**46**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH201	3.1-3.45	Silty Clay	<4	<0.4	**34**	**31**	**11**	<0.1	**34**	**62**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH202	0.1-0.25	Fill: Gravelly Sand	**5**	<0.4	**18**	**29**	**800**	<0.1	**22**	**510**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH202	0.5-0.95	Silty Clay	**4**	<0.4	**41**	**31**	**11**	<0.1	**37**	**57**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH202	3.0-3.45	Silty Clay	<4	<0.4	**39**	**31**	**11**	<0.1	**41**	**51**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.15-0.25	Fill: Silty Sandy Clay	**5**	<0.4	**22**	**22**	**37**	**0.2**	**22**	**69**	**2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH204	0.2-0.3	Fill: Silty Clay	**5**	<0.4	**24**	**66**	**19**	<0.1	**21**	**82**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH205	0-0.1	Fill: Silty Clay	**5**	<0.4	**23**	**31**	**54**	**0.4**	**24**	**210**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP206	0-0.1	Fill: Silty Clay	<4	<0.4	**21**	**29**	**52**	<0.1	**20**	**120**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP207	0-0.1	Fill: Silty Clay	**4**	<0.4	**26**	**24**	**63**	<0.1	**22**	**200**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**23**	**62**	<0.1	**21**	**200**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP208	0-0.1	Fill: Silty Clay	<4	<0.4	**23**	**21**	**15**	<0.1	**21**	**67**	<0.05	<0.5	<0.1	**82**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP208	0.4-0.5	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA
TP208	0.9-1.0	Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA
BH209	0-0.1	Fill: Silty Clay	**4**	<0.4	**32**	**26**	**50**	<0.1	**29**	**81**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH209	0.5-0.95	Silty Clay	<4	<0.4	**32**	**28**	**10**	<0.1	**30**	**49**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	4.8-4.95	Sand	<4	<0.4	**10**	**6**	**4**	<0.1	**9**	**15**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0.05-0.2	Fill: Gravelly Sand	<4	<0.4	**11**	**9**	**8**	<0.1	**11**	**22**	**0.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH211	0-0.1	Fill: Silty Sand	<4	<0.4	**12**	**10**	**8**	<0.1	**13**	**34**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH212	0-0.1	Fill: Sandy Clay	**5**	<0.4	**22**	**21**	**20**	<0.1	**24**	**55**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP213	0-0.1	Fill: Sandy Clay	**6**	<0.4	**24**	**25**	**9**	<0.1	**29**	**54**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP214	0-0.1	Fill: Silty Clay	**4**	<0.4	**29**	**23**	**11**	<0.1	**26**	**58**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP215	0-0.1	Fill: Silty Clay	**4**	<0.4	**28**	**22**	**15**	<0.1	**26**	**54**	**1.8**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**31**	**25**	**13**	<0.1	**29**	**49**	**0.77**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH216	0.05-0.2	Fill: Gravelly Sand	**4**	<0.4	**12**	**8**	**4**	<0.1	**10**	**19**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP217	0-0.1	Fill: Silty Clay	**4**	<0.4	**28**	**21**	**14**	<0.1	**26**	**60**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP218	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**13**	<0.1	**20**	**36**	**3.8**	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP219	0-0.1	Fill: Silty Clay	<4	<0.4	**27**	**21**	**14**	<0.1	**26**	**48**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP220	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**15**	**10**	<0.1	**19**	**41**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP221	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**20**	**16**	<0.1	**23**	**49**	**8.1**	**1.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP222	0-0.1	Fill: Silty Clay	<4	<0.4	**26**	**19**	**12**	<0.1	**25**	**53**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP223	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**18**	**15**	<0.1	**23**	**54**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH224	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**22**	**17**	<0.1	**23**	**61**	**5.8**	**0.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH224	3.2-3.45	Sand	<4	<0.4	**13**	**8**	**5**	<0.1	**13**	**19**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH224 (lab replicate)	3.2-3.45	Sand	<4	<0.4	**12**	**7**	**4**	<0.1	**12**	**18**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP225	0-0.1	Fill: Silty Clay	**4**	<0.4	**25**	**20**	**15**	<0.1	**24**	**59**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP226	0-0.1	Fill: Silty Clay	<4	<0.4	**29**	**23**	**27**	<0.1	**28**	**53**	**4.6**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP227	0-0.1	Fill: Silty Clay	<4	<0.4	**32**	**29**	**11**	<0.1	**32**	**49**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
SDUP201	0-0.1	Fill: Silty Clay	**5**	<0.4	**22**	**30**	**55**	**0.5**	**24**	**190**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA
SDUP202	0-0.1	Fill: Silty Clay	<4	<0.4	**28**	**22**	**18**	<0.1	**26**	**80**	**6.6**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP202 (lab replicate)	0-0.1	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	**6.7**	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP205	0-0.1	Fill: Silty Clay	**4**	<0.4	**26**	**22**	**18**	<0.1	**27**	**55**	**4.4**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA
SDUP206	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**17**	**14**	<0.1	**23**	**56**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP207	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**9**	<0.1	**19**	**42**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA
SDUP207 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**10**	<0.1	**19**	**44**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	NA
SDUP208	0-0.1	Fill: Silty Clay	<4	<0.4	**26**	**20**	**16**	<0.1	**25**	**56**	**9.1**	**1.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF201	-	Fibre Cement Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
FCF202	-	Fibre Cement Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
TP208-FCF1	0-0.1	Fibre Cement Fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			45	45	45	45	45	45	45	45	46	46	40	40	40	40	40	36	40	38	38	7
Maximum Value			6	<PQL	41	66	800	0.5	41	510	9.1	1.2	<PQL	82	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																						
Number of Fill Samples			NC	NC	NC	NC	27	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	51	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	153.6	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	95	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	102.556	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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

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

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH201	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.5
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.5
BH201	0.6-1.0	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2
BH201	3.1-3.45	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.4
BH202	0.1-0.25	Fill: Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.2
BH202	0.5-0.95	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.5
BH202	3.0-3.45	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.2
BH203	0.15-0.25	Fill: Silty Sandy Clay	0m to <1m	Sand	<25	**55**	<0.2	<0.5	<1	<1	<1	3.8
BH204	0.2-0.3	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.3
BH205	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.2
TP206	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2.5
TP207	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.1
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.1
TP208	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.8
BH209	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3
BH209	0.5-0.95	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2.2
BH209	4.8-4.95	Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.5
BH210	0.05-0.2	Fill: Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.5
BH211	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.4
BH212	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.3
TP213	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.6
TP214	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.2
TP215	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.1
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.1
BH216	0.05-0.2	Fill: Gravelly Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	4.6
TP217	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.8
TP218	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.1
TP219	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2.5
TP220	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	8.5
TP221	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	5.1
TP222	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.2
TP223	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2.8
BH224	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	2.5
BH224	3.2-3.45	Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	7.1
BH224 (lab replicate)	3.2-3.45	Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	7.1
TP225	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.2
TP226	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.2
TP227	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	6.8
SDUP201	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP202	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP202 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
SDUP205	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP206	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP207	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP207 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP208	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	NA
SDUP208 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	NA	<0.2	<0.5	<1	<1	<1	NA
Total Number of Samples					46	46	46	46	46	46	46	38
Maximum Value					<PQL	55	<PQL	<PQL	<PQL	<PQL	<PQL	8.5

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

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH201	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201	0.6-1.0	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201	3.1-3.45	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH202	0.1-0.25	Fill: Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH202	0.5-0.95	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH202	3.0-3.45	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH203	0.15-0.25	Fill: Silty Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH204	0.2-0.3	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH205	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP206	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP207	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP208	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH209	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH209	0.5-0.95	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH209	4.8-4.95	Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH210	0.05-0.2	Fill: Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH211	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH212	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP213	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP214	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP215	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH216	0.05-0.2	Fill: Gravelly Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP217	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP218	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP219	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP220	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP221	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP222	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP223	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH224	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH224	3.2-3.45	Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH224 (lab replicate)	3.2-3.45	Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP225	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP226	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP227	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP201	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP202	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP202 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	NA	110	NA	NA	NA	NA	NA
SDUP205	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP206	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP207	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP207 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP208	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP208 (lab replicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	NA	0.5	160	55	40	3

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

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH201	0.19-0.4	Coarse	<25	<50	<100	<100
BH201 (lab replicate)	0.19-0.4	Coarse	<25	<50	<100	<100
BH201	0.6-1.0	Coarse	<25	<50	<100	<100
BH201	3.1-3.45	Coarse	<25	<50	<100	<100
BH202	0.1-0.25	Coarse	<25	<50	<100	<100
BH202	0.5-0.95	Coarse	<25	<50	<100	<100
BH202	3.0-3.45	Coarse	<25	<50	<100	<100
BH203	0.15-0.25	Coarse	<25	**55**	**200**	<100
BH204	0.2-0.3	Coarse	<25	<50	<100	<100
BH205	0-0.1	Coarse	<25	<50	<100	<100
TP206	0-0.1	Coarse	<25	<50	<100	<100
TP207	0-0.1	Coarse	<25	<50	**120**	<100
TP207 (lab replicate)	0-0.1	Coarse	<25	<50	**120**	<100
TP208	0-0.1	Coarse	<25	<50	<100	<100
BH209	0-0.1	Coarse	<25	<50	<100	<100
BH209	0.5-0.95	Coarse	<25	<50	<100	<100
BH209	4.8-4.95	Coarse	<25	<50	<100	<100
BH210	0.05-0.2	Coarse	<25	<50	<100	<100
BH211	0-0.1	Coarse	<25	<50	<100	<100
BH212	0-0.1	Coarse	<25	<50	<100	<100
TP213	0-0.1	Coarse	<25	<50	<100	<100
TP214	0-0.1	Coarse	<25	<50	<100	<100
TP215	0-0.1	Coarse	<25	<50	<100	<100
TP215 (lab replicate)	0-0.1	Coarse	<25	<50	<100	<100
BH216	0.05-0.2	Coarse	<25	<50	<100	<100
TP217	0-0.1	Coarse	<25	<50	<100	<100
TP218	0-0.1	Coarse	<25	<50	<100	<100
TP219	0-0.1	Coarse	<25	<50	<100	<100
TP220	0-0.1	Coarse	<25	<50	<100	<100
TP221	0-0.1	Coarse	<25	<50	<100	<100
TP222	0-0.1	Coarse	<25	<50	<100	<100
TP223	0-0.1	Coarse	<25	<50	<100	<100
BH224	0-0.1	Coarse	<25	<50	<100	<100
BH224	3.2-3.45	Coarse	<25	<50	<100	<100
BH224 (lab replicate)	3.2-3.45	Coarse	<25	<50	<100	<100
TP225	0-0.1	Coarse	<25	<50	<100	<100
TP226	0-0.1	Coarse	<25	<50	<100	<100
TP227	0-0.1	Coarse	<25	<50	<100	<100
SDUP201	0-0.1	Coarse	<25	<50	<100	<100
SDUP202 (lab	0-0.1	Coarse	<25	<50	<100	<100
SDUP202	0-0.1	Coarse	NA	<50	<100	<100
SDUP205	0-0.1	Coarse	<25	<50	<100	<100
SDUP206	0-0.1	Coarse	<25	<50	<100	<100
SDUP207	0-0.1	Coarse	<25	<50	<100	<100
SDUP207 (lab	0-0.1	Coarse	<25	<50	<100	<100
SDUP208	0-0.1	Coarse	<25	<50	<100	<100
SDUP208 (lab	0-0.1	Coarse	<25	NA	NA	NA
Total Number of Samples			46	46	46	46
Maximum Value			<PQL	55	200	<PQL

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

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH201	0.19-0.4	Coarse	700	1000	2500	10000
BH201 (lab replicate)	0.19-0.4	Coarse	700	1000	2500	10000
BH201	0.6-1.0	Coarse	700	1000	2500	10000
BH201	3.1-3.45	Coarse	700	1000	2500	10000
BH202	0.1-0.25	Coarse	700	1000	2500	10000
BH202	0.5-0.95	Coarse	700	1000	2500	10000
BH202	3.0-3.45	Coarse	700	1000	2500	10000
BH203	0.15-0.25	Coarse	700	1000	2500	10000
BH204	0.2-0.3	Coarse	700	1000	2500	10000
BH205	0-0.1	Coarse	700	1000	2500	10000
TP206	0-0.1	Coarse	700	1000	2500	10000
TP207	0-0.1	Coarse	700	1000	2500	10000
TP207 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
TP208	0-0.1	Coarse	700	1000	2500	10000
BH209	0-0.1	Coarse	700	1000	2500	10000
BH209	0.5-0.95	Coarse	700	1000	2500	10000
BH209	4.8-4.95	Coarse	700	1000	2500	10000
BH210	0.05-0.2	Coarse	700	1000	2500	10000
BH211	0-0.1	Coarse	700	1000	2500	10000
BH212	0-0.1	Coarse	700	1000	2500	10000
TP213	0-0.1	Coarse	700	1000	2500	10000
TP214	0-0.1	Coarse	700	1000	2500	10000
TP215	0-0.1	Coarse	700	1000	2500	10000
TP215 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
BH216	0.05-0.2	Coarse	700	1000	2500	10000
TP217	0-0.1	Coarse	700	1000	2500	10000
TP218	0-0.1	Coarse	700	1000	2500	10000
TP219	0-0.1	Coarse	700	1000	2500	10000
TP220	0-0.1	Coarse	700	1000	2500	10000
TP221	0-0.1	Coarse	700	1000	2500	10000
TP222	0-0.1	Coarse	700	1000	2500	10000
TP223	0-0.1	Coarse	700	1000	2500	10000
BH224	0-0.1	Coarse	700	1000	2500	10000
BH224	3.2-3.45	Coarse	700	1000	2500	10000
BH224 (lab replicate)	3.2-3.45	Coarse	700	1000	2500	10000
TP225	0-0.1	Coarse	700	1000	2500	10000
TP226	0-0.1	Coarse	700	1000	2500	10000
TP227	0-0.1	Coarse	700	1000	2500	10000
SDUP201	0-0.1	Coarse	700	1000	2500	10000
SDUP202 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
SDUP202	0-0.1	Coarse	NA	1000	2500	10000
SDUP205	0-0.1	Coarse	700	1000	2500	10000
SDUP206	0-0.1	Coarse	700	1000	2500	10000
SDUP207	0-0.1	Coarse	700	1000	2500	10000
SDUP207 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
SDUP208	0-0.1	Coarse	700	1000	2500	10000
SDUP208 (lab replicate)	0-0.1	Coarse	700	NA	NA	NA
FCF202	-		NA	NA	NA	NA

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

Analyte		C_6-C_{10}	>C_{10}-C_{16}	>C_{16}-C_{34}	>C_{34}-C_{40}	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services		25	50	100	100	0.2	0.5	1	1	1	
CRC 2011 -Direct contact Criteria		5,100	3,800	5,300	7,400	120	18,000	5,300	15,000	1,900	
Site Use		**RECREATIONAL - DIRECT SOIL CONTACT**									
Sample Reference	**Sample Depth**										
BH201	0.19-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.5**
BH201 (lan replicate)	0.19-0.4	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.5**
BH201	0.6-1.0	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2**
BH201	3.1-3.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.4**
BH202	0.1-0.25	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**4.2**
BH202	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**4.5**
BH202	3.0-3.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.2**
BH203	0.15-0.25	<25	**55**	**200**	<100	<0.2	<0.5	<1	<1	<1	**3.8**
BH204	0.2-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.3**
BH205	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.2**
TP206	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2.5**
TP207	0-0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<1	**4.1**
TP207 (lab replicate)	0-0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<1	**4.1**
TP208	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.8**
BH209	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3**
BH209	0.5-0.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2.2**
BH209	4.8-4.95	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**4.5**
BH210	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.5**
BH211	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.4**
BH212	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.3**
TP213	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.6**
TP214	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.2**
TP215	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.1**
TP215	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.1**
BH216	0.05-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**4.6**
TP217	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**1.8**
TP218	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.1**
TP219	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2.5**
TP220	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**8.5**
TP221	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**5.1**
TP222	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.2**
TP223	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2.8**
BH224	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**2.5**
BH224	3.2-3.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**7.1**
BH224 (lab replicate)	3.2-3.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**7.1**
TP225	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**0.2**
TP226	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**3.2**
TP227	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	**6.8**
SDUP201	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP202	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP202 (lab replicate)	0-0.1	NA	<50	<100	<100	NA	NA	NA	NA	NA	NA
SDUP205	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP206	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP207	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP207 (lab replicate)	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP208	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NA
SDUP208 (lab replicate)	0-0.1	<25	NA	NA	NA	<0.2	<0.5	<1	<1	<1	NA
Total Number of Samples		46	46	46	46	46	46	46	46	46	38
Maximum Value		<PQL	55	200	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	8.5

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

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

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.02**			**0.001**			**0.001**											**0.02**	**0.001**
15/08/2023	BH201	0.19-0.4	NA	NA	3,170	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/08/2023	BH202	0.1-0.3	NA	NA	5,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH203	0.15-0.25	NA	NA	1,870	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH205	0-0.1	No	10	10,480	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	331035	BH205	0-0.1	508.04	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
16/08/2023	BH205	0.1-0.5	NA	NA	3,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP206	0-0.2	No	10	10,220	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP207	0-0.1	No	10	10,360	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP208	0-0.1	Yes	10	11,340	9.3	1.3995	0.0123	No ACM <7mm observed	--	--	No FA observed	--	--	331035	TP208	0-0.1	474.62	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
17/08/2023	TP208	0.4-0.5	NA	10	10,680	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/08/2023	BH209	0-0.1	No	10	10,110	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	331035	TP209	0-0.1	511.88	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
15/08/2023	BH209	0.1-0.4	NA	NA	1,820	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/08/2023	BH210	0.05-0.3	No	NA	3,860	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH211	0-0.1	No	10	11,260	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH211	0.1-0.3	NA	NA	2,470	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP212	0-0.1	No	10	11,470	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP213	0-0.1	No	10	11,370	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP214	0-01	No	10	10,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP215	0-0.1	No	10	10,940	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH216	0.05-0.6	No	NA	3,350	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP217	0-0.1	No	10	10,880	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP218	0-0.1	No	10	10,720	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP219	0-0.15	No	10	10,630	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP220	0-0.1	No	10	11,470	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP220	0.2-0.3	NA	10	11,160	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP221	0-0.1	No	10	10,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP222	0-0.1	No	10	10,130	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP223	0-0.1	No	10	10,930	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP223	0.2-0.3	NA	10	10,570	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	BH224	0-0.1	No	10	10,260	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17/08/2023	TP225	0-0.1	No	10	10,490	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP226	0-0.1	No	10	10,600	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
16/08/2023	TP227	0-0.1	No	10	10,550	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	331035	TP227	0-0.1	477.87	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_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																			
BH201	0.19-0.4	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**24**	**22**	**23**	**29**	**62**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**24**	**22**	**28**	**30**	**69**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201	0.6-1.0	Silty Clay	Fine	NA	NA	NA	**4**	**36**	**24**	**10**	**33**	**46**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201	3.1-3.45	Silty Clay	Fine	NA	NA	NA	<4	**34**	**31**	**11**	**34**	**62**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH202	0.1-0.25	Fill: Gravelly Sand	Coarse	NA	NA	NA	**5**	**18**	**29**	**800**	**22**	**510**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH202	0.5-0.95	Silty Clay	Fine	NA	NA	NA	**4**	**41**	**31**	**11**	**37**	**57**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH202	3.0-3.45	Silty Clay	Fine	NA	NA	NA	<4	**39**	**31**	**11**	**41**	**51**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH205	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**5**	**23**	**31**	**54**	**24**	**210**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**26**	**24**	**63**	**22**	**200**	<1	<0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<0.05
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**25**	**23**	**62**	**21**	**200**	<1	<0.1	<25	<50	**120**	<100	<0.2	<0.5	<1	<1	<0.05
TP208	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**23**	**21**	**15**	**21**	**67**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH209	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**32**	**26**	**50**	**29**	**81**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP208	0.4-0.5	Fill: Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP208	0.9-1.0	Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0.5-0.95	Silty Clay	Fine	NA	NA	NA	<4	**32**	**28**	**10**	**30**	**49**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH209	4.8-4.95	Sand	Coarse	NA	NA	NA	<4	**10**	**6**	**4**	**9**	**15**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH210	0.05-0.2	Fill: Gravelly Sand	Coarse	NA	NA	NA	<4	**11**	**9**	**8**	**11**	**22**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH211	0-0.1	Fill: Silty Sand	Fine	NA	NA	NA	<4	**12**	**10**	**8**	**13**	**34**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH212	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	**5**	**22**	**21**	**20**	**24**	**55**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP213	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	**6**	**24**	**25**	**9**	**29**	**54**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP214	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**29**	**23**	**11**	**26**	**58**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP215	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**28**	**22**	**15**	**26**	**54**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.2**
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**31**	**25**	**13**	**29**	**49**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
BH216	0.05-0.2	Fill: Gravelly Sand	Coarse	NA	NA	NA	**4**	**12**	**8**	**4**	**10**	**19**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP217	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**28**	**21**	**14**	**26**	**60**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP218	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**20**	**16**	**13**	**20**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.3**
TP219	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**27**	**21**	**14**	**26**	**48**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP220	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**20**	**15**	**10**	**19**	**41**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP221	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**22**	**20**	**16**	**23**	**49**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.83**
TP222	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**26**	**19**	**12**	**25**	**53**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP223	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**24**	**18**	**15**	**23**	**54**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH224	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**24**	**22**	**17**	**23**	**61**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.59**
BH224	3.2-3.45	Sand	Coarse	NA	NA	NA	<4	**13**	**8**	**5**	**13**	**19**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH224 (lab replicate)	3.2-3.45	Sand	Coarse	NA	NA	NA	<4	**12**	**7**	**4**	**12**	**18**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP225	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**25**	**20**	**15**	**24**	**59**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP226	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**29**	**23**	**27**	**28**	**53**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
TP227	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**32**	**29**	**11**	**32**	**49**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP201	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**5**	**22**	**30**	**55**	**24**	**190**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP202	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**28**	**22**	**18**	**26**	**80**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.66**
SDUP202 (lab	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	NA	<50	<100	<100	NA	NA	NA	NA	**0.65**
SDUP205	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	**4**	**26**	**22**	**18**	**27**	**55**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.4**
SDUP206	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**24**	**17**	**14**	**23**	**56**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**20**	**16**	**9**	**19**	**42**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**20**	**16**	**10**	**19**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP208	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	<4	**26**	**20**	**16**	**25**	**56**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.86**
SDUP208 (lab	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	<25	NA	NA	NA	<0.2	<0.5	<1	<1	NA
Total Number of Samples				0	0	0	45	45	45	45	45	45	46	40	46	46	46	46	46	46	46	46	46
Maximum Value				NA	NA	NA	6	41	66	800	41	510	<PQL	<PQL	<PQL	55	200	<PQL	<PQL	<PQL	<PQL	<PQL	0.86

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

EIL AND ESL ASSESSMENT CRITERIA

Sample Reference	Sample Depth	Sample Description	Soil Texture	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH201	0.19-0.4	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH201	0.6-1.0	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH201	3.1-3.45	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH202	0.1-0.25	Fill: Gravelly Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH202	0.5-0.95	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH202	3.0-3.45	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH203	0.15-0.25	F: Silty Sandy Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH204	0.2-0.3	F: Silty Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH205	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP206	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
TP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP208	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP208	0.4-0.5	Fill: Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	180	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP208	0.9-1.0	Silty Clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	180	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH209	0.5-0.95	Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	1300	5600	65	105	125	45	20
BH209	4.8-4.95	Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH210	0.05-0.2	Fill: Gravelly Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
BH211	0-0.1	Fill: Silty Sand	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH212	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP213	0-0.1	Fill: Sandy Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP214	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP215	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH216	0.05-0.2	Fill: Gravelly Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	300	2800	50	85	70	105	20
TP217	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP218	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP219	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP220	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP221	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP222	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP223	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH224	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
BH224	3.2-3.45	Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
BH224 (lab replicate)	3.2-3.45	Sand	Coarse	NA	NA	NA	100	200	90	1300	35	190	170	--	180	120	300	2800	50	85	70	105	20
TP225	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP226	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
TP227	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP201	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP202	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP202 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	--	--	--	--	--	--	--	180	--	120	1300	5600	--	--	--	--	20
SDUP205	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP206	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP207	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP208	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	100	200	90	1300	35	190	170	180	180	120	1300	5600	65	105	125	45	20
SDUP208 (lab replicate)	0-0.1	Fill: Silty Clay	Fine	NA	NA	NA	--	--	--	--	--	--	170	--	180	--	--	--	65	105	125	45	--

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

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH201	0.19-0.4	Fill: Silty Clay	**4**	<0.4	**24**	**22**	**23**	<0.1	**29**	**62**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201 (lab replicate)	0.19-0.4	Fill: Silty Clay	**4**	<0.4	**24**	**22**	**28**	<0.1	**30**	**69**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201	0.6-1.0	Silty Clay	**4**	<0.4	**36**	**24**	**10**	<0.1	**33**	**46**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201	3.1-3.45	Silty Clay	<4	<0.4	**34**	**31**	**11**	<0.1	**34**	**62**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH202	0.1-0.25	Fill: Gravelly Sand	**5**	<0.4	**18**	**29**	**800**	<0.1	**22**	**510**	<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
BH202	0.5-0.95	Silty Clay	**4**	<0.4	**41**	**31**	**11**	<0.1	**37**	**57**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH202	3.0-3.45	Silty Clay	<4	<0.4	**39**	**31**	**11**	<0.1	**41**	**51**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH203	0.15-0.25	Fill: Silty Sandy Clay	**5**	<0.4	**22**	**22**	**37**	**0.2**	**22**	**69**	**2**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	**160**	<100	**160**	<0.2	<0.5	<1	<1	NA
BH204	0.2-0.3	Fill: Silty Clay	**5**	<0.4	**24**	**66**	**19**	<0.1	**21**	**82**	<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
BH205	0-0.1	Fill: Silty Clay	**5**	<0.4	**23**	**31**	**54**	**0.4**	**24**	**210**	<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
TP206	0-0.1	Fill: Silty Clay	<4	<0.4	**21**	**29**	**52**	<0.1	**20**	**120**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP207	0-0.1	Fill: Silty Clay	**4**	<0.4	**26**	**24**	**63**	<0.1	**22**	**200**	<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
TP207 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**23**	**62**	<0.1	**21**	**200**	<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
TP208	0-0.1	Fill: Silty Clay	<4	<0.4	**23**	**21**	**15**	<0.1	**21**	**67**	<0.05	<0.05	**82**	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP208	0.4-0.5	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP208	0.9-1.0	Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.1	Fill: Silty Clay	**4**	<0.4	**32**	**26**	**50**	<0.1	**29**	**81**	<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
BH209	0.5-0.95	Silty Clay	<4	<0.4	**32**	**28**	**10**	<0.1	**30**	**49**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH209	4.8-4.95	Sand	<4	<0.4	**10**	**6**	**4**	<0.1	**9**	**15**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH210	0.05-0.2	Fill: Gravelly Sand	<4	<0.4	**11**	**9**	**8**	<0.1	**11**	**22**	**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	NA
BH211	0-0.1	Fill: Silty Sand	<4	<0.4	**12**	**10**	**8**	<0.1	**13**	**34**	<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
BH212	0-0.1	Fill: Sandy Clay	**5**	<0.4	**22**	**21**	**20**	<0.1	**24**	**55**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP213	0-0.1	Fill: Sandy Clay	**6**	<0.4	**24**	**25**	**9**	<0.1	**29**	**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	NA
TP214	0-0.1	Fill: Silty Clay	**4**	<0.4	**29**	**23**	**11**	<0.1	**26**	**58**	<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
TP215	0-0.1	Fill: Silty Clay	**4**	<0.4	**28**	**22**	**15**	<0.1	**26**	**54**	**1.8**	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP215 (lab replicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**31**	**25**	**13**	<0.1	**29**	**49**	**0.77**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH216	0.05-0.2	Fill: Gravelly Sand	**4**	<0.4	**12**	**8**	**4**	<0.1	**10**	**19**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP217	0-0.1	Fill: Silty Clay	**4**	<0.4	**28**	**21**	**14**	<0.1	**26**	**60**	<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
TP218	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**13**	<0.1	**20**	**36**	**3.8**	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP219	0-0.1	Fill: Silty Clay	<4	<0.4	**27**	**21**	**14**	<0.1	**26**	**48**	<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
TP220	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**15**	**10**	<0.1	**19**	**41**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP221	0-0.1	Fill: Silty Clay	<4	<0.4	**22**	**20**	**16**	<0.1	**23**	**49**	**8.1**	**0.83**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP222	0-0.1	Fill: Silty Clay	<4	<0.4	**26**	**19**	**12**	<0.1	**25**	**53**	<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
TP223	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**18**	**15**	<0.1	**23**	**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	NA
BH224	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**22**	**17**	<0.1	**23**	**61**	**5.8**	**0.59**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH224	3.2-3.45	Sand	<4	<0.4	**13**	**8**	**5**	<0.1	**13**	**19**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH224 (lab replicate)	3.2-3.45	Sand	<4	<0.4	**12**	**7**	**4**	<0.1	**12**	**18**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP225	0-0.1	Fill: Silty Clay	**4**	<0.4	**25**	**20**	**15**	<0.1	**24**	**59**	<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
TP226	0-0.1	Fill: Silty Clay	<4	<0.4	**29**	**23**	**27**	<0.1	**28**	**53**	**4.6**	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP227	0-0.1	Fill: Silty Clay	<4	<0.4	**32**	**29**	**11**	<0.1	**32**	**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	Not Detected
SDUP201	0-0.1	Fill: Silty Clay	**5**	<0.4	**22**	**30**	**55**	**0.5**	**24**	**190**	<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
SDUP202	0-0.1	Fill: Silty Clay	<4	<0.4	**28**	**22**	**18**	<0.1	**26**	**80**	**6.6**	**0.66**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP202 (lab replicat	0-0.1	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	**6.7**	**0.65**	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<50	<100	<100	<50	NA	NA	NA	NA	NA
SDUP205	0-0.1	Fill: Silty Clay	**4**	<0.4	**26**	**22**	**18**	<0.1	**27**	**55**	**4.4**	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP206	0-0.1	Fill: Silty Clay	<4	<0.4	**24**	**17**	**14**	<0.1	**23**	**56**	<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
SDUP207	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**9**	<0.1	**19**	**42**	<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
SDUP207 (lab replicat	0-0.1	Fill: Silty Clay	<4	<0.4	**20**	**16**	**10**	<0.1	**19**	**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	NA
SDUP208	0-0.1	Fill: Silty Clay	<4	<0.4	**26**	**20**	**16**	<0.1	**25**	**56**	**9.1**	**0.86**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUP208 (lab replicat	0-0.1	Fill: Silty Clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<25	NA	NA	NA	NA	<0.2	<0.5	<1	<1	NA
FCF201	-	Fibre cement	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
FCF202	-	Fibre cement	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
TP208-FCF1	0-0.1	Fibre cement	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			45	45	45	45	45	45	45	45	46	46	40	40	40	40	38	46	46	46	46	46	46	46	46	46	7
Maximum Value			6	<PQL	41	66	800	0.5	41	510	9.1	0.86	82	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	160	<PQL	160	<PQL	<PQL	<PQL	<PQL	Detected

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

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

			Lead	Nickel	OCP (Endosulfan)	B(a)P
PQL - Envirolab Services			0.03	0.02	0.2	0.001
TCLP1 - General Solid Waste			5	2	3	0.04
TCLP2 - Restricted Solid Waste			20	8	12	0.16
TCLP3 - Hazardous Waste			>20	>8	>12	>0.16
Sample Reference	**Sample Depth**	**Sample Description**				
BH202	0.1-0.25	Fill: Gravelly Sand	**0.55**	NA	NA	NA
BH202	3.0-3.45	Silty sand	NA	<0.02	NA	NA
TP208	0-0.1	Fill: Silty clay	NA	NA	<0.2	NA
TP221	0-0.1	Fill: Silty clay	NA	NA	NA	<0.0001
Total Number of samples			1	1	1	1
Maximum Value			0.55	<PQL	<PQL	<PQL

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

JKEnvironments

TABLE S9
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1*	*2*	*1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.05*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*25*	*50*	*100*	*100*	*0.2*	*0.5*	*1.0*	*2.0*	*1.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH205	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP201	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH224	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	1.2	1.2	0.3	0.4	0.8	0.59	0.3	<0.1	0.7
laboratory	SDUP202	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	1.4	1.4	0.4	0.5	1	0.66	0.4	<0.1	0.5
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.45	nc	1.3	1.3	0.35	0.45	0.9	0.625	0.35	nc	0.6
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	22%	nc	15%	15%	29%	22%	22%	11%	29%	nc	33%
Intra	TP226	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	0.9	0.9	0.3	0.3	0.6	0.4	0.2	<0.1	0.5
laboratory	SDUP205	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	0.9	0.9	0.2	0.3	0.6	0.4	0.2	<0.1	0.5
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.35	nc	0.9	0.9	0.25	0.3	0.6	0.4	0.2	nc	0.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	29%	nc	0%	0%	40%	0%	0%	0%	0%	nc	0%
Inter	TP223	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP206	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	TP220	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUP207	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	TP221	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	1.6	1.6	0.5	0.6	1	0.83	0.4	<0.1	0.8
laboratory	SDUP208	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	0.1	<0.1	<0.1	0.7	0.1	1.8	1.9	0.5	0.6	1.3	0.86	0.5	0.1	0.6
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.075	nc	nc	0.6	0.075	1.7	1.75	0.5	0.6	1.15	0.845	0.45	0.075	0.7
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	67%	nc	nc	33%	67%	12%	17%	0%	0%	26%	4%	22%	67%	29%
Field	TB-S201		<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
Blank	16/08/23																									
Field	FR-201	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	16/08/23																									
Trip	TS-S201		-	-	-	-	91%	91%	91%	91%	90%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	16/08/23																									

			HCB	alpha- BHC	gamma- BHC	beta- BHC	Heptachlor	delta- BHC	Aldrin	Heptachlor Epoxide	Gamma- Chlordane	alpha- chlordane	Endosulfan I	pp- DDE	Dieldrin	Endrin	pp- DDD	Endosulfan II	pp- DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH205	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP201	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	BH224	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP202	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
Intra	TP226	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP205	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	TP223	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP206	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
Intra	TP220	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP207	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	TP221	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP208	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	TB-S201		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	16/08/23																					
Field	FR-201	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	16/08/23																					
Trip	TS-S201		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	16/08/23																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4.0*	*0.4*	*1.0*	*1.0*	*1.0*	*0.1*	*1.0*	*1.0*
Intra	BH205	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	5	<0.4	23	31	54	0.4	24	210
laboratory	SDUP201	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	5	<0.4	22	30	55	0.5	24	190
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	5	nc	22.5	30.5	54.5	0.45	24	200
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	nc	4%	3%	2%	22%	0%	10%
Inter	BH224	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	24	22	17	<0.1	23	61
laboratory	SDUP202	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	28	22	18	<0.1	26	80
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	26	22	17.5	nc	24.5	70.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	15%	0%	6%	nc	12%	27%
Intra	TP226	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	29	23	27	<0.1	28	53
laboratory	SDUP205	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	26	22	18	<0.1	27	55
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	3	nc	27.5	22.5	22.5	nc	27.5	54
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	67%	nc	11%	4%	40%	nc	4%	4%
Inter	TP223	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	24	18	15	<0.1	23	54
laboratory	SDUP206	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	24	17	14	<0.1	23	56
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	24	17.5	14.5	nc	23	55
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	6%	7%	nc	0%	4%
Intra	TP220	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	20	15	10	<0.1	19	41
laboratory	SDUP207	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	20	16	9	<0.1	19	42
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	20	15.5	9.5	nc	19	41.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	6%	11%	nc	0%	2%
Inter	TP221	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	22	20	16	<0.1	23	49
laboratory	SDUP208	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	26	20	16	<0.1	25	56
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	24	20	16	nc	24	52.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	17%	0%	0%	nc	8%	13%
Field	TB-S201		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	3	<1	2	<0.1	<1	2
Blank	16/08/23																						
Field	FR-201	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	<0.01	<0.01	0.2	<0.03	<0.0005	<0.02	<0.02
Rinsate	16/08/23																						
Trip	TS-S201		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	16/08/23																						

Result outside of QA/QC acceptance criteria

Rinsate metals results in mg/L

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW201** **1/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 209.13m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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			CONCRETE: 190mm.t				
	■		■		■				-	FILL: Silty clay, medium to high plasticity, brown, trace of sand, igneous and quartz gravel.	w≈PL			SCREEN: 3.17kg 0.19-0.4m, NO FCF
							0.5		CH	Silty CLAY: high plasticity, brown, trace of quartz gravel.	w≈PL			ALLUVIAL
	■		■			N = 10 2,5,5	1							
	■		■				1.5							
	■		■			N = 13 5,6,7	2							
							2.5							
	■		■				3							
						N = 20 6,9,11	3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW201** **2/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 209.13m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
						N = 12 4,6,6	4 4.5 5							
							5.5		CI-CH	Silty Sandy CLAY: medium to high plasticity, brown, fine to medium grained sand.	w≈PL			
							6 6.5 7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW201** **3/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 209.13m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
										Silty Sandy CLAY: medium to high plasticity, brown, fine to medium grained sand.	w≈PL			
							7.5			Silty CLAY: medium to high plasticity, brown, trace of sandstone gravel.	w<PL			
										Silty Sandy CLAY: medium to high plasticity, light brown, fine to medium grained sand, trace of sandstone gravel.	w≈PL			ALLUVIAL
							8			END OF BOREHOLE AT 8.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 8.0m TO 2.0m. CASING 2.0m TO 0m. 2mm SAND FILTER PACK 8.0m TO 1.3m. BENTONITE SEAL 1.3m TO 0.3m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							8.5							
							9							
							9.5							
							10							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW202** **1/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.91m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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			CONCRETE: 100mm.t				
									-	FILL: Gravelly sand, fine to medium grained, brown, fine to medium grained, sub-angular igneous gravel, trace of concrete fragments.	M			SCREEN: 5.10kg 0.1-0.3m, NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, brown and grey, trace of quartz gravel.	w≈PL			
						N = 13 5,6,7	0.5								
							1							
						N = 14 5,7,7	1.5							
							2							
							2.5							
						N = 11 4,5,6	3							TRACE OF ASH 3.0-3.5m
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW202** **2/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.91m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
										Silty CLAY: medium to high plasticity, brown and grey, trace of quartz gravel.	w≈PL			
						N = 15 5,7,8	4 4.5 5 5.5 6 6.5 7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW202** **3/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.91m

Date: 15/8/23 **Datum:** AHD

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
							7.5			Silty CLAY: medium to high plasticity, brown and grey, trace of quartz gravel and sand.	w<PL			
							8			Silty CLAY: medium to high plasticity, brown, trace of sand.	w<PL			
							8.5			END OF BOREHOLE AT 8.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 8.0m TO 2.0m. CASING 2.0m TO 0m. 2mm SAND FILTER PACK 8.0m TO 1.3m. BENTONITE SEAL 1.3m TO 0.3m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							9							
							9.5							
							10							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH203** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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			CONCRETE: 150mm.t				
	■		■						-	FILL: Silty sandy clay, medium to high plasticity, brown, fine to medium grained sand, with fine to coarse grained igneous gravel, trace of concrete fragments.	w≈PL			SCREEN: 1.87kg 0.15-0.25m, NO FCF
	■		■								w≈PL			INSUFFICIENT RETURN FOR BULK SCREEN
							0.5		CI-CH	FILL: Silty clay, medium to high plasticity, brown and grey, with fine to medium grained sand, trace of igneous gravel.	w≈PL			ALLUVIAL
	■		■				1			Silty CLAY: medium to high plasticity, brown.				
										END OF BOREHOLE AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Log No. **BH204** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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			CONCRETE: 200mm.t				
	■		■						-	FILL: Silty clay, medium to high plasticity, brown, with fine to medium grained sand and fine to coarse grained igneous gravel, trace of concrete fragments.	w≈PL			INSUFFICIENT RETURN FOR BULK SCREEN
	■		■			N = 10 4,4,6	0.5		CI-CH	Silty CLAY: medium to high plasticity, brown.	w≈PL			ALLUVIAL
							1			END OF BOREHOLE AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH205** **1/1**

SDUP201: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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, brown, trace of sand, brick, tile, metal, concrete and glass fragments, ceramic slag, coal and root fibres.	w<PL			GRASS COVER SCREEN: 10.48kg 0-0.1m, NO FCF SCREEN: 3.60kg 0.1-0.5m, NO FCF
						N = 13 4,7,6	0.5		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of root fibres.	w≈PL			ALLUVIAL
							1			END OF BOREHOLE AT 1.0m				
							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. **TP206** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: **Logged/Checked by:** A.D./M.D.

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, brown, trace of sand, igneous and quartz gravel, concrete fragments and root fibres.	w<PL			GRASS COVER SCREEN: 10.22kg 0-0.2m, NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, brown.	w≈PL			ALLUVIAL
							0.5			END OF TEST PIT AT 0.5m				
							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. TP207 **1/1**

SDUP204: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** A.D./M.D.

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, brown, trace of sand, igneous gravel, brick fragments and root fibres.	w<PL			GRASS COVER
									CI-CH		w≈PL			SCREEN: 10.36kg 0-0.1m, NO FCF
	■		■							Silty CLAY: medium to high plasticity, brown.				ALLUVIAL
									SP		M			
	■		■							SAND: fine to medium grained, brown and grey, trace of quartz gravel.				
							0.5			END OF TEST PIT AT 0.5m				
							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. **TP208** **1/1**

SDUP204: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey, with fine grained sand, trace of glass, bricks, tiles, FCF, terracotta and concrete fragments, and root fibres.	w≈PL			GRASS COVER SCREEN: 11.34kg 0-0.1m, TP208-FCF1
										as above, but high plasticity, trace of fine grained sand.	w≈PL			SCREEN: 10.68kg 0.4-0.5m, NO FCF BURIED TREE TRUNK APPROX. 100mm.t
	■		■		■		0.5							
							1		CH	Silty CLAY: high plasticity,dark grey, trace of fine grained sand.	w≈PL			ALLUVIAL
	■		■				1.5							
										END OF TEST PIT AT 1.6m				
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW209** **1/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.71m

Date: 15/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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, brown, trace of sand, quartz and ironstone gravel, ash, brick, concrete and metal fragments, and root fibres.	w<PL			GRASS COVER SCREEN: 10.11kg 0-0.1m, NO FCF SCREEN: 1.82kg 0.1-0.4m, NO FCF
						N = 15 5,7,8	0.5		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of quartz gravel.	w≈PL			ALLUVIAL
						N = 18 7,8,10	1							
							1.5							
							2							
						N = 22 9,11,11	2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW209** **2/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.71m

Date: 15/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
							4							
						N = 12 4,6,6	4.5							
	■		■				5		SP	SAND: fine to medium grained, brown, trace of clay fines.	M			
							5.5							
							6		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of quartz gravel.	w≈PL			
							6.5							
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW209** **3/3**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.71m

Date: 15/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
							7.5			Silty CLAY: medium to high plasticity, brown and grey, trace of sandstone gravel.	w<PL			
							8			END OF BOREHOLE AT 8.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 8.0m TO 2.0m. CASING 2.0m TO 0m. 2mm SAND FILTER PACK 8.0m TO 1.6m. BENTONITE SEAL 1.6m TO 0.9m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							8.5							
							9							
							9.5							
							10							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH210** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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		-	ASPHALT: 50mm.t FILL: Gravelly sand, fine to medium grained, brown and orange brown, fine to coarse grained igneous gravel, trace of concrete and asphalt fragments, and quartz gravel.	M			SCREEN: 3.86kg 0.05-0.3m, NO FCF
	■		■			N = 17 6,7,10	0.5		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of quartz gravel.	w≈PL			ALLUVIAL
							1			END OF BOREHOLE AT 1.0m				
							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. **BH211** **1/1**

SDUP203: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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 and quartz gravel, clay fines and root fibres.	M			GRASS COVER SCREEN: 11.26kg 0-0.1m, NO FCF
									CI-CH	Silty CLAY: medium to high plasticity, brown, trace of quartz gravel.	w<PL			SCREEN: 2.47kg 0.1-0.3m, NO FCF ALLUVIAL
	■		■			N = 17 5,7,10	0.5							
							1			END OF BOREHOLE AT 1.0m				
							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. TP212

1/1

SDUP204: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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: Sandy clay, low plasticity, brown grey, red and dark grey, fine to medium grained sand, with coarse grained sand and fine to medium grained rounded igneous gravel, trace of coarse grained rounded igneous gravel, root fibres and ash.	w<PL			GRASS COVER SCREEN: 11.47kg 0-0.2m, NO FCF
							0.5			END OF TEST PIT AT 0.2m				TEST PIT TERMINATED AT 0.2m DUE TO POSSIBLE SERVICE
							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. TP213

1/1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: SHOVEL **Logged/Checked by:** C.S./M.D.

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: Sandy clay, medium plasticity, brown and light grey, fine to medium grained sand, trace of coarse grained, rounded ironstone gravel, and root fibres.				GRASS COVER SCREEN: 11.37kg 0-0.2m, NO FCF
	■		■				0.5		CI	Silty CLAY: medium plasticity, dark brown mottled dark grey, trace of fine grained sand.				BRICK/CONCRETE FRAGMENTS FOUND AT SURFACE NEARBY
										END OF TEST PIT AT 0.7m				
							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. TP214

1/1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark brown, with root fibres, trace of coarse grained igneous gravel.	w<PL			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, dark brown, trace of root fibres.	w<PL			SCREEN: 10.25kg 0-0.1m, NO FCF
	■		■				0.5			as above, but no root fibres.				ALLUVIAL
	■		■											
										END OF TEST PIT AT 0.8m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP215** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark brown and grey, trace of fine grained sand, fine grained igneous gravel, concrete, roots and root fibres.	w<PL			GRASS COVER
									CI	Silty CLAY: medium plasticity, dark grey, with roots and fine grained sand.	w<PL			SCREEN: 10.94kg 0-0.1m, NO FCF
	■		■				0.5			as above, but trace of roots.				ALLUVIAL
	■		■							END OF TEST PIT AT 0.8m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH216** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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			ASPHALT: 50mm.t				
									-	FILL: Gravelly sand, fine to medium grained, orange brown, fine to coarse grained igneous gravel, trace of concrete and asphalt fragments, and quartz gravel.	M			SCREEN: 3.35kg 0.05-0.6m, NO FCF
							0.5							
	■		■			N = 16 5,8,8			CI-CH	Silty CLAY: medium to high plasticity, brown.	w<PL			ALLUVIAL
							1							
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP217

1/1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey, with root fibres.	w<PL			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, dark grey, trace of fine grained sand and root fibres.	w<PL			SCREEN: 10.88kg 0-0.1m, NO FCF
	■		■				0.5							ALLUVIAL
	■		■							END OF TEST PIT AT 0.65m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP218** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey and brown, with fine to medium grained sand, fine grained rounded igneous gravel, roots and root fibres.	w<PL			GRASS COVER
									CI	Silty CLAY: medium plasticity, dark grey, with roots and root fibres.	w<PL			SCREEN: 10.72kg 0-0.15m, NO FCF
							0.5			as above, but without roots, trace of root fibres.				ALLUVIAL
										END OF TEST PIT AT 0.8m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP219** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark brown mottled dark grey, trace of fine grained sand, fine to medium grained rounded igneous gravel, and root fibres.	w≈PL			GRASS COVER
									CH		w≈PL			SCREEN: 10.63kg 0-0.15m, NO FCF
	■		■				0.5			Silty CLAY: high plasticity, dark brown and dark grey, with roots.				ALLUVIAL
										END OF TEST PIT AT 0.65m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP220 **1/1**

SDUP207: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark brown and dark grey, with fine to medium grained sand, trace of fine to medium grained rounded igneous gravel, ash, concrete and root fibres.	w<PL			GRASS COVER SCREEN: 11.47kg 0-0.1m, NO FCF
									CH	Silty CLAY: high plasticity, dark grey, trace of fine grained sand, and roots.	w<PL			SCREEN: 11.16kg 0.1-0.3m, NO FCF ALLUVIAL
							0.5			as above, but without roots, trace of root fibres.				
										END OF TEST PIT AT 0.85m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP221** **1/1**

SDUP208: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey, with fine to medium grained sand, and root fibres, trace of fine grained rounded igneous gravel, glass and concrete fragments.	w<PL			GRASS COVER
									CI		w<PL			SCREEN: 10.9kg 0-0.1m, NO FCF
										Silty CLAY: medium plasticity, dark grey brown, with fine grained sand, trace of roots.				ALLUVIAL
	■		■				0.5			as above, but without roots, trace of root fibres.				
										END OF TEST PIT AT 0.6m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP222

1/1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark brown, with roots and root fibres trace of ceramic fragments.	w<PL			GRASS COVER
									CI	Silty CLAY: medium plasticity, dark brown mottled dark grey, with roots.	w<PL			SCREEN: 10.13kg 0-0.1m, NO FCF ALLUVIAL
	■		■				0.5							
										END OF TEST PIT AT 0.6m				
							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. **TP223** **1/1**

SDUP206: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 mottled dark grey, with fine grained sand, and root fibres, trace of fine to medium grained rounded igneous gravel, concrete and roots.	w<PL			GRASS COVER SCREEN: 10.93kg 0-0.1m, NO FCF
									CI	Silty CLAY: medium plasticity, dark grey and brown, trace of fine grained sand, fine grained rounded igneous gravel, and roots.	w<PL			SCREEN: 10.57kg 0.1-0.3m, NO FCF ALLUVIAL
	■		■				0.5			as above, but without tree roots, trace of root fibres.				
										END OF TEST PIT AT 0.8m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW224** **1/3**

SDUP202: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.68m

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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, brown, trace of igneous gravel.	w<PL			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, brown, trace of quartz gravel.	w≈PL			SCREEN: 10.26kg 0-0.1m, NO FCF
														ALLUVIAL
	■		■			N = 20 9,10,10	0.5							
							1							
	■		■			N = 32 13,15,17	1.5							
							2							
							2.5							
							3							
	■		■			N = 16 6,8,8			SP	SAND: fine to medium grained, brown, trace of ironstone and quartz gravel and clay fines.	M			
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW224** **2/3**

SDUP202: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.68m

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
							4							
							4.5		CI-CH	Silty CLAY: medium to high plasticity, brown, trace of ironstone and quartz gravel.	w<PL			
						N = 13 4,7,6	5		SP	SAND: fine to medium grained, brown, trace of ironstone and quartz gravel and clay fines.	M			
							5.5							
							6							
							6.5		CI-CH	Silty CLAY: medium to high plasticity, brown and grey, trace of sandstone gravel.	w<PL			
							7							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH/MW224** **3/3**

SDUP202: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** SPIRAL AUGER **R.L. Surface:** 208.68m

Date: 16/8/23 **Datum:** -

Plant Type: JK305 **Logged/Checked by:** A.D./M.D.

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
							7.5			Silty CLAY: medium to high plasticity, brown and grey, trace of sandstone gravel.	w<PL			
							8			END OF BOREHOLE AT 8.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 8.0m TO 2.0m. CASING 2.0m TO 0m. 2mm SAND FILTER PACK 8.0m TO 1.5m. BENTONITE SEAL 1.5m TO 0.6m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							8.5							
							9							
							9.5							
							10							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP225** **1/1**

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 17/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** A.D./M.D.

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, brown, trace of quartz and ironstone gravel, roots and root fibres.	w≈PL			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, brown, trace of roots.	w≈PL			SCREEN: 10.49kg 0-0.1m, NO FCF
	■		■				0.5							ALLUVIAL
										END OF TEST PIT AT 0.6m				
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP226** **1/1**

SDUP205: 0-0.1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey, with fine grained sand, and root fibres, trace of rounded igneous gravel.	w<PL			GRASS COVER SCREEN: 10.60kg 0-0.1m, NO FCF
									CI	Silty CLAY: medium plasticity, brown, with fine grained sand, and roots.	w<PL			ALLUVIAL
	■		■				0.5							
	■		■				1			as above, but without roots, trace of root fibres.				
										END OF TEST PIT AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP227

1/1

Client: HEALTH INFRASTRUCTURE

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: 35 ALICE STREET, MOREE, NSW

Job No.: E35092UPD **Method:** TEST PIT **R.L. Surface:** N/A

Date: 16/8/23 **Datum:** -

Plant Type: 5T EXCAVATOR **Logged/Checked by:** C.S./M.D.

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 plasticity, dark grey, with root fibres, trace of glass fragments.	w<PL			GRASS COVER
									CI-CH	Silty CLAY: medium to high plasticity, dark grey, trace of roots.	w<PL			SCREEN: 10.55kg 0-0.1m, NO FCF
							0.5			as above, but without roots, trace of root fibres.				ALLUVIAL
										END OF TEST PIT AT 0.75m				
							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
Fine 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:

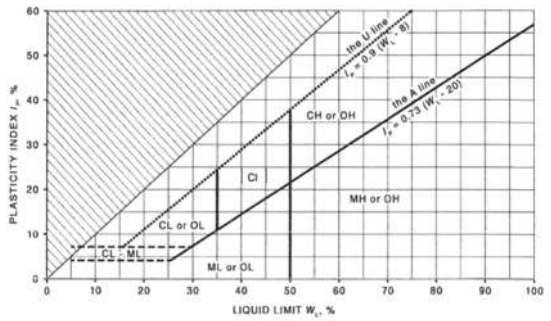
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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.

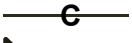
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

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.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	$w > PL$ $w \approx PL$ $w < PL$ $w \approx LL$ $w > LL$	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 / 0 – 4 LOOSE > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE > 35 and ≤ 65 / 10 – 30 DENSE > 65 and ≤ 85 / 30 – 50 VERY DENSE > 85 / > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
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.

Log Column	Symbol	Definition
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: Waste/Materials Tracking Template

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 E: Guidelines and Reference Documents

Contaminated Land Management Act 1997 (NSW)

Environmental Planning and Assessment Act 1979 (NSW)

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

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

Work Health and Safety Regulation 2017 (NSW)

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