REPORT TO

NSW HEALTH INFRASTRUCTURE

ON

DETAILED (STAGE 2) SITE INVESTIGATION

FOR

PROPOSED GUNNEDAH HOSPITAL REDEVELOPMENT

AT

MARQUIS STREET, GUNNEDAH, NSW

Date: 28 February 2023
Ref: E35091UPDrpt2

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Executive Summary

NSW Health Infrastructure ('the client') commissioned JK Environments (JKE) to undertake a Detailed (Stage 2) Site Investigation (DSI) for the proposed Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW. The investigation was limited to the proposed development footprint which has been defined as 'the site' for the purpose of the investigation. The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2.

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

The primary aim of the DSI was to further characterise the soil and groundwater contamination conditions in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during 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 Conceptual Site Model (CSM); provide a preliminary waste classification for the in-situ soil; assess whether the site is suitable or can be made suitable (via remediation) for the proposed development, from a contamination viewpoint; and assess whether further intrusive investigation and/or remediation is required.

The investigation included a review of historical information presented in the Preliminary Site Investigation (PSI) and soil sampling from 30 boreholes or testpits and groundwater sampling from three groundwater monitoring wells. The identified Areas of Environmental Concern (AEC) include: The AEC include: fill material; use of pesticides; hazardous building materials; an electrical transformer; a diesel generator; an incinerator and a potential off-site diesel Underground Storage Tank (UST). We note that the potential UST is located within the hospital wider area to the south of the maintenance/engineering building and outside of the proposed redevelopment area (i.e. outside the site).

The PSI and DSI identified: nickel concentrations in the fill samples TP4 (0-0.1m), BH201 (0.5-0.8m) and BH205 (0-0.1m) marginally above the ecological Site Assessment Criteria (SAC); Asbestos Containing Materials (ACM) in fill in TP2, TP234 and TP226; and Organochloride Pesticides (OCPs) aldrin and dieldrin in the fill samples TP216 (0-0.1m) and TP220 (0-0.1m) above the human health SAC.

The DSI identified copper in the groundwater sample MW205, and a mercury concentration for duplicate sample GW-DUPB-1 (MW205) that were above the ecological SAC. The chromium, copper and zinc concentrations for the groundwater sample MW219 were also above the ecological SAC.

Based on the findings of the PSI and DSI, remediation of soil contamination will be required and we consider that the site could be made suitable via relatively straight-forward soil remediation processes such as 'excavation/disposal' and 'cap and contain'. We consider that groundwater remediation will not likely be required, however, the RAP will include provisions to further investigate the groundwater.

We recommend the following:

- Preparation and implementation an Asbestos Management Plan (AMP) for asbestos in soil;
- Preparation and implementation of a Remediation Action Plan (RAP) for the site that provides a suitable framework to manage and remediate the known contamination risks and also provides a robust framework to address the data gaps identified in Section 8.4, prior to proceeding with remediation;
- Validation of the site in accordance with the RAP; and
- Preparation and implementation of a Long-Term Environmental Management Plan (LETMP), if needed.

At this stage, JKE consider that, provided the above recommendations are addressed, there is no requirement to report any site contamination to the NSW EPA under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the Contaminated Land Management Act 1997 (2015).

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

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Attachments

Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Dial Before You Dig	**DBYD**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
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Environmental Site Assessment	**ESA**
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Hazardous Building Materials Survey	**HBMS**
Health Investigation Level	**HILs**
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Health Screening Level-Site Specific Assessment	**HSL-SSA**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
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Per-and Polyfluoroalkyl Substances	**PFAS**
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Site Assessment Criteria	**SAC**
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Site Audit Statement	**SAS**
Site Audit Report	**SAR**
State Environmental Planning Policy	**SEPP**
Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

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

1 INTRODUCTION

NSW Health Infrastructure ('the client') commissioned JK Environments (JKE) to undertake a Detailed (Stage 2) Site Investigation (DSI) for the proposed Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW. The investigation was limited to the proposed development footprint which has been defined as 'the site' for the purpose of the investigation. The site location is shown on Figure 1 and the investigation was confined to the site boundaries as shown on Figure 2.

This report has been prepared to support the lodgement of a Development Application (DA) 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 have previously undertaken a Preliminary (Stage 1) Site Investigation (PSI)[2] for the proposed hospital development. A summary of relevant information from the PSI is presented in Section 2.

1.1 Proposed Development Details

JKE understands that the proposed development includes alterations and additions to the existing hospital which will be carried out in three stages: Early Works; Main Works; and Refurbishment Works. Following partial demolition required for each of the stages, the proposed alterations and additions will include:

- A new single level inpatient unit building situated over the central portion of the hospital grounds, an extension to the existing kitchen building and a new emergency access situated respectively to the south-west and to the east of the new inpatient unit building. The ground floor concrete slab will be suspended between bored piers with the floor slab either supported by sacrificial formwork or formed over a subgrade comprising engineered fill and natural ground, in which case where necessary design surface levels would need to be raised (by placing fill), or lowered (by excavation) by approximately 0.25-0.75m Below Ground Level (BGL);
- The existing ward building to the east of the new inpatient unit building will be reconfigured and will include works to occupy the existing under croft space. Minor excavation works may be required to approximately 0.25-0.5mBGL to accommodate the new concrete slab;
- Additional car parking areas and access roads will be provided over the north-western, north-eastern, southern and south-eastern portions of the site. In the main, the new parking areas will involve extending existing parking areas. We have assumed excavations to a maximum depth of approximately 1mBGL will be required to achieve design surface levels; and
- Landscaping of sections of the site including but not limited to the regarding of the link between the new main entry to the inpatient unit building north-eastwards to the rear (south-eastern side) of the Rural Health Centre. The access ramp will require raising of site surface levels by a maximum of approximately 1.4m.

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

[2] JK Environments, (2022a). *Report to NSW Health Infrastructure on Preliminary (Stage 1) Site Investigation for Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW*. (Report ref: E35091UPDrpt, dated 1 August 2022) (referred to as PSI)

We understand that the existing day care centre in the south-east section of the site will be demolished as part of the development and a new day care centre is not proposed.

1.2 Aims and Objectives

The primary aim of the DSI was to further characterise the soil and groundwater contamination conditions in order to assess site risks in relation to contamination and establish whether remediation is required. A secondary aim is to provide preliminary waste classification data for off-site disposal of soil waste which may be generated during 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)[3];
- Assess the potential risks posed by contamination to the receptors identified in the Conceptual Site Model (CSM);
- Provide a preliminary waste classification for the in-situ soil;
- Assess whether the site is suitable or can be made suitable (via remediation) for the proposed development, from a contamination viewpoint; and
- Assess whether further intrusive investigation and/or remediation is required.

1.3 Scope of Work

The investigation was undertaken generally in accordance with a JKE proposal (Ref: EP57443UPD) of 6 October 2022 and written acceptance from the client of 26 October 2022. The scope of work included the following:

- Review of site information, including background and site history information presented in the PSI;
- Refinement of the CSM;
- Implementation of the SAQP;
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

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

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[3] JK Environments, (2022b). *Report to NSW Health Infrastructure on Sampling, Analysis and Quality Plan (SAQP) for Detailed (Stage 2) Site Investigation at Marquis Street, Gunnedah, NSW*. (Report ref: E35091UPDrpt-SAQP, dated 16 November 2022) (referred to as SAQP)

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

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

2 SITE INFORMATION

2.1 PSI

In 2022 the client commissioned JKE to undertake a PSI for the proposed Gunnedah Hospital redevelopment. 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: 35091URrpt).

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 eight boreholes and six testpits, which were nominated by the client.

The identified Areas of Environmental Concern (AEC) included: fill material; use of pesticides; hazardous building materials; electrical transformer; diesel generator; and an Incinerator.

The PSI identified fill at most locations. A marginally elevated concentration of nickel was encountered above the ecological SAC in one sample and asbestos (as bonded asbestos containing material - ACM) was found in the subsurface fill soil in another sample obtained from TP2 located in the south-east section of the site. All asbestos concentration were below the SAC.

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;*
- *Prepare and implement an Asbestos Management Plan (AMP) for asbestos in soil; 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 A and the PSI laboratory results tables are attached Appendix C.

2.2 JKE, HBMS

JKE have previously undertaken a hazardous building materials survey (HBMS)[6] for the proposed Gunnedah 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.

[6] JK Environments, (2022c). *Report to Health Infrastructure on Hazardous Building Materials Survey for Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW*. (Report ref: E35091BTrptRev2-HAZ, dated 7 December 2022) (referred to as HBMS)

2.3 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Health Administration Corporation
Site Address:	10-24 Anzac Parade, Gunnedah, NSW (site address commonly referred to as Marquis Street, Gunnedah, NSW)
Lot & Deposited Plan:	Part of Lot 3 in DP792209
Current Land Use:	Hospital and associated facilities
Proposed Land Use:	Continued hospital and associated facilities
Local Government Authority:	Gunnedah Shire Council
Current Zoning:	R2: Low Density Residential
Site Area (m^2) (approx.):	15,000
RL (AHD in m) (approx.):	280
Geographical Location (decimal degrees) (approx.):	Latitude: -30.983401 Longitude: 150.251313

2.4 Site Location and Regional Setting

The site is located generally in the central section of the wider hospital grounds. The site is located in a predominantly residential and recreational area of Gunnedah and is bound by the wider hospital grounds to the north and west, Anzac Parade to the east and Reservoir Street to the south.

The regional topography slopes slightly towards the north. The site topography is consistent with its surrounds and has a gentle slope towards the north at approximately 1°-2°.

A walkover inspection of the site was undertaken by JKE on 2 June 2022 for the PSI and 12 December 2022 for the DSI. At the time of the DSI inspection, the site formed part of the Gunnedah District Hospital and Community Health Service Centre property. Activities across the wider property included general hospital use, education and a disused day care centre.

The site was generally occupied by several buildings that were largely constructed on-grade. The buildings were used for various purposes including hospital wards, surgery, pathology, admin/recreation, generator/fuel storage and equipment storage. Carparks and internal driveways on site were paved with asphaltic concrete, whilst other open areas were concrete, brick paved or grassed.

Minor area of exposed fill material (i.e. historically imported or disturbed soils) was observed in raised garden beds and landscaped areas on site. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

An above ground diesel generator and an incinerator were identified in the south section of the site (refer to Figure 2 attached). Additionally, what appeared to be a breather vent pipe possibly associated with a petroleum Underground Storage Tank (UST) was observed by JKE from Reservoir Street protruding from the roof of the hospital maintenance/engineering building located to the south of the site (within the wider hospital grounds). There we no other indicators of a potential UST (e.g. gatic cover, fuel bowser etc) there were no visible (e.g. spills, staining) indicators of contamination associated with these features.

Numerous Fibre Cement Fragment (FCF)/suspected ACM were identified on the surface in the north/central section of the site below/adjacent to elevated covered walk way connecting two hospital buildings. A representative surface FCF sample (ref: FCF-Surface1) was collected from this area (refer to Figure 2 attached). Signage on the external fibre cement wall at the southern end of the main hospital building in the central section of the site identified that the fibre cement sheeting was ACM.

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds.

Landscaped and grassed areas were observed in areas of the site not covered by hardstand. Native trees up to approximately 5m high were observed along the southern site boundary and in other landscaped areas. Small shrubs were observed adjacent to some of the hospital buildings. No obvious indicators of plant stress or dieback were observed.

2.5 Surrounding Land Use

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

- North – Wider hospital grounds and Alkira Nursing Home;
- East – Anzac Parade with Gunnedah Aquatic Centre and residential properties beyond;
- South – Reservoir Street with residential properties beyond; and
- West – Wider hospital grounds and Gunnedah High School beyond Marquis Street.

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

2.6 Underground Services

The 'Before You Dig' (BYD) plans were reviewed for the investigation in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration. Local services (i.e. those not shown on the BYD plans) exist and could act as preferential pathways for contamination migration.

2.7 Interview with Site Personnel

A discussion was held between JKE and a hospital employee from the maintenance/engineering department. Based on JKE observation of a potential UST breather vent pipework, JKE queried the hospitals employee if there were any potential USTs in this area of the hospital. It was suggested there was a former UST located to the south of the maintenance/engineering building (refer to Figure 2) and the UST was formerly used to store diesel which powered the former boiler heating system. The hospital's employee suggested that the boiler systems and UST were decommissioned approximately 30 years ago, however details if the decommissioning were unknown.

The hospital's employee indicated to their knowledge that no major fires/firefighting activities had occurred at the hospital.

2.8 Hydrogeology and Groundwater

Hydrogeological information reviewed for the PSI indicated that the regional aquifer on-site and in areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There was a total of 196 registered bores within the report buffer of 2km of the site. The majority of the bores were registered for monitoring purposes. There were a number of bores registered for dewatering purposes to the north of the site.

There is 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.

Considering the local topography and surrounding land features, JKE anticipate groundwater to flow towards the Namoi River, which is located approximately 1.2km to the north. This water body is a potential receptor of groundwater and excess surface water flows from the site.

2.9 Summary of Site History

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

Table 2-2: Summary of Historical Land Uses/Activities

Year(s)	On-site - Potential Land Use / Activities	Off-site - Potential Land Use / Activities
At least 1956 - current	• Hospital grounds; • Demolition of small buildings in the west and east sections of the site, sometime between approximately 1956 and1975; and • Likely earthworks including filling during construction works between approximately 1956 and 2012.	• Extended hospital grounds and nursing home to the north-west, maintenance workshop to the south (with a potential former UST) and an ambulance station to the east which was constructed between approximately 2005 and 2012; • School to the west; and • Low density residential to the further to the east and south.

3 CONCEPTUAL SITE MODEL

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

A review of the CSM in relation to source, pathway and receptor (SPR) linkages has been undertaken as part of the Tier 1 risk assessment process, as outlined in Section 8.

3.1 Potential Contamination Sources/AEC and CoPC

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

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

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. The fill depths encountered during the PSI ranged from approximately 0.4m to 1.6mBGL. Asbestos, as bonded ACM, was encountered in fill in TP2. This was below the human health SAC. Some of the heavy metals concentrations were above background concentrations, however were below the SAC.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site. Detectable concentrations of Dieldrin (an OCP) were encountered above the laboratory Practical Quantitation Limit (PQL), but below the SAC, in the surficial fill in BH1 during the PSI.	Heavy metals, OCPs and PCBs.
Hazardous Building Material – Hazardous building materials may be present in or on soil as a result of former building and demolition activities. Signage on the external fibre cement sheeting at the southern end of the main hospital building identified that the fibre cement sheeting was ACM. The JKE HBMS identified both friable and non-friable asbestos in the existing building materials, lead in paint and potential polychlorinated biphenyls (PCB) containing electrical equipment in the existing buildings/structures on site.	Asbestos, lead and PCBs.
Diesel Generator – An Above ground diesel generator is located in the south section of the site and as shown on Figure 2 attached in the appendices. Although the diesel is stored within the generator and evidence of staining was not observed during the site inspection, there is considered to be a potential for	TRHs, BTEX and PAHs.

Source / AEC	CoPC
accidental spills/leaks to have occurred in this area, most likely during refuelling activities.	
Incinerator – An incinerator is located in the south section of the site and as shown on Figure 2 attached in the appendices. There is a potential for localised impacts from spills/leaks when loading waste into the incinerator or from removing waste ash from the incinerator which could have migrated to the soils in the vicinity, and also from atmospheric fallout from the incinerated waste settling on nearby ground surface.	Heavy metals and PAHs.
Off-site UST – Based on the presence of a vent pipe and anecdotal information from a hospital employee, there is likely to be a UST to the south of the maintenance/engineering building (see Figure 2). The UST was understood to have stored diesel associated with former boiler hot water system. The decommissioning details of the UST are unknown and therefore the UST could still contain some form of degraded petroleum. The potential UST is located up-gradient of the site, within the wider hospital property, and is considered to be a potential source of contamination.	TRH, BTEX and naphthalene.

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

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

Table 3-2: CSM

Potential mechanism for contamination	Potential mechanisms for contamination include: • Fill material – importation of impacted material, 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas); • Generator diesel fuel storage – 'top-down', spills (e.g. during filling of the tanks and accidental spillage); • Incinerator – 'top-down' (e.g. spills/leaks when loading waste into the incinerator or from removing waste ash from the incinerator which could have migrated to the soils in the vicinity, and also from atmospheric fallout from the incinerated waste settling on nearby ground surface); and • Off-site UST – 'top-down', spills (e.g. during filling of the tanks and/or dispensing activities), or sub-surface release (e.g. from leaking tank or pipework). Impacts to the site could occur via migration of contaminated groundwater.
Affected media	Soil and groundwater have been identified as potentially affected media.

Receptor identification	Human receptors include site occupants/users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, recreational water users within the Namoi River. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in the Namoi River.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). Primary and secondary contact with groundwater is also a potential exposure pathway. The potential for exposure would typically be associated with the construction and excavation works, future use of the site, and off-site migration of groundwater into 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.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the proposed basement and/or building (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; and • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation.

4 SUMMARY SAMPLING, ANALYSIS AND QUALITY PLAN

JKE prepared a stand-alone SAQP for the DSI which is attached in Appendix J. The SAQP can be summarised as follows:

- Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The Data Quality Assurance/Quality Control (QA/QC) evaluation is summarised in Section 6.1 of this DSI and the detailed evaluation is provided in the appendices;
- The SAQP proposed soil sampling from 26 grid-based locations (locations 201 to 226 inclusive) and an additional nine grid-based locations (locations 201 to 226 inclusive) targeted in the vicinity of TP2 where ACM was encountered in fill during the PSI. The sampling locations are shown on the attached Figure 2;
- Soil samples were obtained using a combination of hand tools, drill rig equipped with spiral flight augers (150mm diameter), and an excavator, between 12 and 15 December 2022;
- Three groundwater monitoring wells were installed in BH205 (MW205), BH206 (MW206), and BH219 (MW219) during the DSI, as shown on Figures 2. The wells were generally positioned to provide site coverage, but also with consideration of the areas that were not accessible with the drill rig;
- The monitoring well construction details are documented on the borehole log for BH205, BH206 and BH219 attached in the Appendices D;
- MW205, MW206 and MW219 were developed on 14 December 2022. MW205 and MW206 were developed using a submersible electrical pump until steady state conditions were achieved. Monitoring well MW219 was developed using a disposable bailer due to the low groundwater volume;
- The monitoring wells was allowed to recharge for one day after development, with groundwater samples from all wells on 15 December 2022; and
- The field monitoring records and calibration data are attached in Appendix H.

4.1 Deviation to the SAQP

The deviations to the SAQP are outlined below:

- The intent was to place the sampling locations on a systematic sampling plan with a grid spacing of approximately 26m and 17m between sampling locations. However, due to onsite obstructions including buildings, structures, buried services, and client requests not to create disruptions in some areas, sampling locations TP213, TP223, TP224, TP226, TP227 and TP232 were slightly moved. Due to the presence of buildings and existing active hospital use sampling was unable to be undertaken at the proposed sampling locations 203, 204, 208, 209 and 212;
- The intent was to complete soil sampling through the fill soil and into the natural soil. However, due to the presence of extensive undetectable underground services (particularly in the south-east section of the site) including the PVC stormwater pipe struck in TP226 by the excavator, the use of an excavator for sampling was abandoned and sampling progressed with hand tools (shovel and bar). The use of hand tools limited the depth of sampling and due to time constraints sampling with hand tools was generally limited to the top 100mm of fill; and
- Bulk samples for asbestos quantification could not be obtained during soil sampling from locations BH201 and BH219 due to the low sample volume return.

Considering the above deviations from the SAQP, the sampling plan was still considered suitable to make an assessment of potential risks associated with the AEC and CoPC identified in the CSM, and assess whether further investigation and/or remediation is warranted.

4.2 Laboratory Analysis

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

Table 4-1: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, trip spikes and field rinsate samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	313438, 313438-A and 313439
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	35241 and 35242

5 SITE ASSESSMENT CRITERIA (SAC)

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

5.1 Soil

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

5.1.1 Human Health

- Health Investigation Levels (HILs) for a 'public open space, secondary schools and footpaths' exposure scenario (HIL-C). We consider these HILs to be appropriate Tier 1 criteria as the HIL-D (commercial/industrial criteria) do not consider children who are the most sensitive receptors identified in the CSM, HIL-B (residential with limited access to soil) are not protective enough in light of the extent of unpaved areas across the site, and HIL-A (residential with accessible soils) are overly conservative for a hospital land use scenario;
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B). We consider these HSLs are appropriate Tier 1 criteria as HSL-C does not adequately consider the presence of buildings and HSL-D is not protective of children who are the most sensitive receptors identified in the CSM. HSLs were calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- HSLs for direct contact presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[7]; and
- Asbestos was assessed against the HSL-C criteria. A summary of the asbestos criteria is provided in the table below:

Table 5-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-C criteria were adopted for the assessment of asbestos in soil. The SAC adopted for asbestos were derived from the NEPM 2013 and are based on the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2021)[8]. The SAC include the following: • No visible asbestos at the surface/in the top 10cm of soil; • <0.02% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): $\textbf{\% w/w asbestos in soil} = \dfrac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$

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

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

Guideline	Applicability
	However, we are of the opinion that the actual soil volume in a 10L bucket varies considerably due to the presence of voids, particularly when assessing cohesive soils. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows (we note that the units have also converted to grams): $$\text{\% w/w asbestos in soil} = \frac{\text{\% asbestos content x bonded ACM (g)}}{\text{Soil weight (g)}}$$

5.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. These have only been applied to the top 2m of soil as outlined in NEPM (2013). The criterion for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the Canadian Soil Quality Guidelines[9]; and
- EILs for selected metals were calculated based on the most conservative added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013) and published ambient background concentration (ABC) values presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[10].

5.1.3 Management Limits for Petroleum Hydrocarbons

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

5.1.4 Waste Classification

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

Table 5-2: Waste Categories

Category	Description
General Solid Waste (non-putrescible)	• If Specific Contaminant Concentration (SCC) ≤ Contaminant Threshold (CT1) then Toxicity Characteristics Leaching Procedure (TCLP) not needed to classify the soil as general solid waste; and • If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as general solid waste.
Restricted Solid Waste (non-putrescible)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as restricted solid waste; and • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as restricted solid waste.
Hazardous Waste	• If SCC > CT2 then TCLP not needed to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.

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

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

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

Category	Description
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

5.2 Groundwater

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

5.2.1 Human Health

- HSLs for a 'low-high density residential' exposure scenario (HSL-A/HSL-B). HSLs were calculated based on the soil type and the observed depth to groundwater;
- The NEPM (2013) HSLs were not applicable in some instances for this project as the groundwater was recorded at depths shallower than 2m. On this basis, JKE have undertaken a site-specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater. The assessment included selection of alternative Tier 1 criteria that were considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria were based on the following (as shown in the attached report tables):
  - Australian Drinking Water Guidelines 2011 (updated 2021)[13] for BTEX compounds and selected VOCs;
  - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[14] for petroleum hydrocarbons, where applicable;
  - USEPA Region 9 screening levels for naphthalene (threshold value for tap water); and
  - The use of the laboratory PQLs for other contaminants where there were no Australian guidelines.

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

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

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

5.2.2 Environment (Ecological - aquatic ecosystems)

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[15]. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist.

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

6 RESULTS

6.1 Summary of Data (QA/QC) Evaluation

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

6.2 Subsurface Conditions

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

Table 6-1: Summary of Subsurface Conditions

Profile	Description
Pavement	A concrete pavement approximately 125mm thick was encountered at the surface in BH221. An asphaltic concrete pavement approximately 50mm thick was encountered at the surface in BH201, BH202, BH205, BH214, BH219, BH222 and BH225. A gravel layer approximately 50mm thick was encountered at the surface in TP211 and a paver also approximately 50mm thick was encountered at the surface in TP224.
Fill	Fill was encountered at the surface and beneath the pavements and extended to depths of between approximately 0.7mBGL (BH206 and BH225) to 2.2mBGL (BH219). TP210, TP211, TP213, TP215 to TP218, TP220, TP227 to TP233 and TP235 were terminated in the fill at depth of approximately 0.1mBGL. TP223 and TP226 were terminated in the fill at depth of approximately 0.6mBGL and TP224 was terminated in the fill at approximately 0.4mBGL. The fill typically comprised silty sand, silty clayey sand, gravelly silt, silty gravel with inclusions of gravel, ash brick and concrete fragments. Metal and ceramic fragments were encountered in the fill in TP210. The building materials debris within the fill appeared more prevalent in the south-east section of the site. Neither staining nor odours were observed in the fill material during the field work. FCF (later confirmed to be ACM) were encountered in the fill material in TP234 and in the testpit fill spoil at TP226.
Natural Soil	Natural silty clay and sandy clay alluvial soils were encountered beneath the fill extended to depths to the termination of the boreholes/testpits and to a maximum depth of 8.0mBGL in borehole BH219. Neither staining nor odours were observed in the natural soils during the field work.
Bedrock	Not encountered.
Groundwater	Groundwater seepage was encountered at approximately 4.0mBGL during drilling of BH205 and BH206. All remaining boreholes and test pits remained dry on completion of drilling or excavation.

6.3 Field Screening

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

Table 6-2: Summary of Field Screening

<table>
<tr><th>Aspect</th><th>Details</th></tr>
<tr><td>PID Screening of Soil Samples for VOCs</td><td>PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. All results were <1.3ppm isobutylene equivalents which indicates a general lack of PID detectable VOCs.</td></tr>
<tr><td>Bulk Screening for Asbestos</td><td>The bulk field screening results are summarised in the attached report Table S5. The asbestos in ACM concentration of 0.0161%w/w in the fill sample TP234 (0-0.1m) was below the human health SAC of 0.02%w/w. However, as the ACM was in the top 100mm, the occurrence of ACM in this sample was deemed to be an exceedance of the SAC.

ACM was not encountered in the remainder of the boreholes/testpits and therefore all other bulk screening results were also below the SAC.</td></tr>
<tr><td>Groundwater Depth & Flow</td><td>Groundwater seepage was encountered in boreholes BH205 and BH206 during drilling at depths of approximately 4mBGL. The remaining boreholes were dry during and a short time after completion of drilling.

SWLs measured in the monitoring wells installed at the site prior to sampling ranged from approximately 1.1mBGL (MW206) to 7.34mBGL. Groundwater RLs calculated on these measurements ranged from approximately 277.43mAHD (MW205) to 273.26mAHD (MW219). The data is summarised below:

<table><tr><th>MW reference</th><th>Ground Surface Reduced Level (mAHD)</th><th>Groundwater Standing Water Level (SWL) (mBGL)</th><th>SWL (mAHD)</th></tr><tr><td>MW205</td><td>279.27</td><td>1.84</td><td>277.43</td></tr><tr><td>MW206</td><td>277.60</td><td>1.10</td><td>276.50</td></tr><tr><td>MW219</td><td>280.60</td><td>7.34</td><td>273.26</td></tr></table>
A contour plot was prepared for the groundwater levels using AutoCAD as shown on Figure 4. Groundwater flow generally occurs in a down gradient direction perpendicular to the groundwater elevation contours. The contour plot indicates that groundwater generally flows from west to the east. This was not consistent with expectations based on the topography and location of the nearest down-gradient water body. This may be a result of the limited data that was available and the occurrence of different aquifers present.</td></tr>
<tr><td>Groundwater Field Parameters</td><td>Field measurements recorded during sampling were as follows:
- pH ranged from 7.18 to 7.73;
- EC ranged from 1,326µS/cm to 5,117µS/cm;
- Eh ranged from 113.4mV to 155.2mV; and
- DO ranged from 1.5ppm to 5.3ppm.</td></tr>
<tr><td>LNAPLs petroleum hydrocarbons</td><td>Phase separated product (i.e. LNAPL) was not detected using the interphase probe during groundwater sampling.</td></tr>
</table>

6.4 Soil Laboratory Results

The soil laboratory results were assessed against the SAC presented in Section 5.1. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

6.4.1 Human Health and Environmental (Ecological) Assessment

Table 6-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	34	<PQL	0	0	-
Cadmium	34	<PQL	0	NSL	-
Chromium (total)	34	46	0	0	-
Copper	34	68	0	0	-
Lead	34	54	0	0	-
Mercury	34	0.6	0	NSL	-
Nickel	34	54	0	2	The nickel concentrations for the fill samples BH201 (0.5-0.8m) of 54mg/kg and BH205 (0-0.1m) of 48mg/kg exceeded the calculated ecological SAC of 35mg/kg.
Zinc	34	69	0	0	-
Total PAHs	34	0.85	0	NSL	-
Benzo(a)pyrene	34	<PQL	NSL	0	-
Carcinogenic PAHs (as BaP TEQ)	34	<PQL	0	NSL	-
Naphthalene	34	<PQL	0	0	-
DDT+DDE+DDD	24	<PQL	0	NSL	-
DDT	24	<PQL	NSL	0	-
Aldrin and dieldrin	24	23.7	2	NSL	The Aldrin and Dieldrin concentrations for the fill samples TP216 (0-0.1m) of 11.7mg/kg and TP220 (0-0.1m) of 20.3mg/kg exceeded the human health SAC of 10mg/kg. The maximum concentration of 23.7mg/kg was identified in the laboratory duplicate from TP220.

Analyte	N	Max. (mg/kg)	N> Human Health SAC	N> Ecological SAC	Comments
Chlordane	24	0.8	0	NSL	-
Heptachlor	24	<PQL	0	NSL	-
Chlorpyrifos (OPP)	24	<PQL	0	NSL	-
Other OPPs	24	1	NSL	NSL	Parathion was detected in the TP216 (0-0.1m) of and TP220 (0-0.1m) samples.
PCBs	24	<PQL	0	NSL	-
TRH F1	34	<PQL	0	0	-
TRH F2	34	<PQL	0	0	-
TRH F3	34	<PQL	0	0	-
TRH F4	34	<PQL	0	0	-
Benzene	34	<PQL	0	0	-
Toluene	34	<PQL	0	0	-
Ethylbenzene	34	<PQL	0	0	-
Xylenes	34	<PQL	0	0	-
Asbestos (in soil) (%w/w)	5	ACM AF/FA	0	NA	Asbestos was not detected in the soil samples analysed at the laboratory.
Asbestos in fibre cement	2	NA	NA	NA	Asbestos was detected in the FCF (sample ref: TP226-spoil) that was identified on top of the fill spoil of TP226. Asbestos was detected in the FCF (sample ref: FCF-Surface1) that was identified on the ground surface in the central section of the site. Both FCF were assessed to be bonded ACM.

Notes:

N: Total number (primary samples)

NSL: No set limit

NL: Not limiting

6.4.2 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Section 5.1.4. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 6-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	N	N > CT Criteria	N > SCC Criteria	Comments
Arsenic	34	0	0	-
Cadmium	34	0	0	-
Chromium	34	0	0	-
Copper	34	0	0	-
Lead	34	NSL	NSL	-
Mercury	34	0	0	-
Nickel	34	2	0	The nickel concentrations for the fill samples BH201 (0.5-0.8m) of 54mg/kg and BH205 (0-0.1m) of 48mg/kg exceeded the CT1 Criterion of 40mg/kg.
Zinc	34	NSL	NSL	-
TRH (C_6-C_9)	34	0	0	-
TRH (C_{10}-C_{36})	34	0	0	-
BTEX	34	0	0	-
Total PAHs	34	0	0	-
Benzo(a)pyrene	34	0	0	-
OCPs & OPPs	24	0	0	-
PCBs	24	0	0	-
Asbestos	5	-	-	Asbestos was not detected in the samples analysed. Asbestos was detected in the FCF (sample ref: TP226-spoil) that was identified on top of the fill spoil of test pit TP226. Asbestos was detected in the FCF (sample ref: FCF-Surface1) that was identified on the ground surface in the central section of the site.

Notes:
N: Total number (primary samples)
NSL: No set limit

Table 6-5: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	N	N > TCLP Criteria	Comments
Nickel	2	0	The fill samples BH201 (0.5-0.8m) and BH205 (0-0.1m) were analysed for TCLP nickel. The result was below the TCLP criterion.

Notes:
N: Total number (primary samples)

6.4.3 Statistical Analysis

Statistical calculations for the total Aldrin and Dieldrin fill data obtained for the PSI and DSI were undertaken using Open UCL (Beta Ver 3.02)[16]. The UCL output is attached in in the appendices. The results are summarised below:

- The standard deviation (SD) of the Aldrin and Dieldrin fill results was 3.931mg/kg and less than 50% of human health SAC of 10mg/kg;
- JKE has adopted the Chebyshev 95% UCL on the mean Aldrin and Dieldrin result of 3.997mg/kg. The UCL value was less than human health SAC; and
- The highest Aldrin and Dieldrin concentration of 20.3mg/kg for the fill soil sample TP220 (0-0.1m) was less than 250% of the human health SAC.

Notwithstanding the above, we note that OCPs above the SAC only occurred at two locations and the CSM for these occurrences is that they are likely to be due to pesticide applications beneath buildings. On this basis, the calculation and application of UCLs using data from across the site as a whole is not considered to be appropriate for decision-making purposes as the data from outside the building footprints generally reported non-detects for pesticides, and hence there are dilution effects on the UCL. Consequently, further statistical analysis to test the decision errors has not occurred.

6.5 Groundwater Laboratory Results

The soil laboratory results were assessed against the SAC presented in Section 5.2. Individual SAC are shown in the report tables attached in the appendices. A summary of the results is presented below:

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

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
Arsenic	3	3	0	0	-
Cadmium	3	<PQL	0	0	-
Chromium (total)	3	42	0	1	The chromium concentration of 42µg/L for the groundwater sample MW219 exceeded the ecological SAC of 3.3µg/L.
Copper	3	3	0	2	The copper concentrations of 3µg/L for the groundwater sample MW205 and

[16] https://openstatsonline.shinyapps.io/Open_UCL_V503/ visited on 2 February 2023

Analyte	N ^	Max. (µg/L)	N> Human Health SAC	N> Ecological SAC	Comments
					2µg/L for MW219 exceeded the ecological SAC of 1.4µg/L.
Lead	3	<PQL	0	0	-
Mercury	3	1	0	0	The mercury concentration of 3µg/L for the groundwater sample GWDUPB-1 (MW205) exceeded the ecological SAC of 0.06µg/L.
Nickel	3	4	0	0	-
Zinc	3	9	0	1	The zinc concentration of 9µg/L for the groundwater sample MW219 exceeded the ecological SAC of 8µg/L.
Total PAHs	3	<PQL	0	NSL	-
Benzo(a)pyrene	3	<PQL	0	0	-
Naphthalene	3	<PQL	0	0	-
TRH F1	3	<PQL	0	NSL	-
TRH F2	3	160	0	NSL	The TRH (F2) concentration in MW219 was 160µg/L. This was below the HSL SAC based on the groundwater depth.
TRH F3	3	<PQL	NSL	NSL	-
TRH F4	3	<PQL	NSL	NSL	-
Benzene	3	<PQL	0	0	-
Toluene	3	<PQL	0	0	-
Ethylbenzene	3	<PQL	0	0	-
m+p-Xylene	3	<PQL	NSL	0	-
o-Xylene	3	<PQL	NSL	0	-
Total Xylenes	3	<PQL	0	NSL	-
pH	3	8 pH units	0	0	-
EC	3	6,700 (µS/cm)	NSL	NSL	-

Notes:

^: Primary samples

N: Total number

NSL: No set limit

7 PRELIMIANRY WASTE CLASSIFICATION ASSESSMENT

Based on the results of the preliminary waste classification assessment, and at the time of reporting, the fill material is assigned a preliminary classification of **General Solid Waste (non-putrescible) containing Special Waste (asbestos)**. Asbestos has predominantly been identified in fill in the south-eastern section of the site. However, FCF was also identified at the ground surface in the central northern area, and building/demolition rubble inclusions were identified in the fill which suggests the impacts from asbestos could be more widespread than what has been identified to date.

In our opinion, it would be reasonable to undertake additional confirmatory waste classification assessment in areas where asbestos has not been identified to date, in an attempt to establish whether the preliminary waste classification above can be down-graded. However, in our experience this exercise is not often successful. In any case, the final waste classification(s) for the fill must be supported by robust data and a robust CSM, and must consider the findings of the PSI and this DSI.

Based on the scope of work undertaken for this assessment, a majority of the natural soil and bedrock at the site is likely to meet the definition of **VENM** for off-site disposal or re-use purposes. Further sampling and analysis will be required to confirm this. Classification of VENM in areas where pesticide and asbestos impacts have been identified will require the overlying fill to be removed as the first step, prior to undertaking the required clearances/validation testing.

Further sampling and analysis are required to further assess and confirm the waste classifications prior to off-site disposal of surplus materials from the site.

8 DISCUSSION

8.1 Contamination Sources/AEC and Potential for Site Contamination

Based on the scope of work undertaken for this investigation, JKE identified the following potential contamination sources/AEC:

- Fill material;
- Use of pesticides;
- Hazardous building materials;
- Electrical transformer;
- Diesel generator;
- Incinerator; and
- Off-site UST.

Considering the above, and based on a qualitative assessment of various lines of evidence as discussed throughout this report, JKE is of the opinion that there is a potential for site contamination. The soil and groundwater data collected for the PSI and DSI is discussed further in the following subsection, as part of the Tier 1 risk assessment.

8.2 Tier 1 Risk Assessment and Review of CSM

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

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

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

8.2.1 Soil

8.2.1.1 Asbestos and Human Health Risks

The asbestos in ACM concentrations in the fill profiles from TP2 (0.1-0.3m) and TP234 (0-0.1m) were below the human health SAC. The ACM in TP234 was in the top 10cm and is above the SAC. ACM was identified in the fill spoil during test pit sampling at TP226. An ACM fragment (ref: FCF-Surface1) was identified on the surface in the central section of the site. The ACM results above the human health SAC and other detections of asbestos in fill are shown on Figure 3 attached in the appendices.

Based on the current results there is a possible complete SPR linkage associated ACM in the top 10cm at sampling location TP234 and potential for further ACM adjacent to sampling location FCF-Surface1. However, due to the bonded nature of the ACM and the fact that the site is largely paved or covered with buildings, we consider that the potential for an unacceptable risk to occur whilst the soil remains undisturbed is relatively low and should remain low subject to the implementation of interim management until remediation takes place.

The source of ACM in fill could be associated with imported fill material or historical onsite building demolition activities. The source of surface ACM is likely associated with historical onsite building demolition activities.

The occurrence of ACM, particularly in the south-east section of the site, appears to be heterogenous. Discovery of further ACM during excavation and construction is considered to be highly likely. The extent of ACM contamination requires further assessment and consideration during the proposed redevelopment. This can be captured under the provisions of a Remediation Action Plan (RAP).

Based on the PSI and DSI results, the ACM identified in fill and on the surface of the site is considered to be bonded (non-friable) based on the definitions in NEPM 2013.

An Asbestos Management Plan (AMP) will be required for the proposed redevelopment. An interim AMP must also be developed and implemented until remediation occurs.

8.2.1.2 Pesticides and Human Health Risks

The aldrin and dieldrin concentrations encountered for the fill samples TP216 (0-0.1m) and TP220 (0-0.1m) were above the human health SAC. The aldrin and dieldrin results above the human health SAC are shown on Figure 3 attached in the appendices.

JKE has considered the aldrin and dieldrin UCL statistical results summarised in Section 6.4.3 and although the data pass the statistical analysis calculation criteria, the CSM for the occurrence of pesticides is that the source is from the application of pesticides beneath the buildings. Therefore, use of pesticide data from outside of these areas has the potential to dilute the UCL calculations.

The source of aldrin and dieldrin is associated with the historical application of pesticides to the surface beneath the building. Although the subfloor space area is generally inaccessible to the public, there is a potential risk for maintenance workers and construction contractors to enter these areas, or for soils to be disturbed during the proposed construction works.

There is a potential for further OCP contamination at the site beneath other buildings. The extent of aldrin and dieldrin contamination potential risk to human receptors and requires further assessment and consideration during the proposed development. OCP tend to bind strongly to soils and the potential for leaching impacts to groundwater is considered to be relatively low. However, further assessment of the deeper soils (and possibly groundwater) for OCPs should be undertaken. This can captured under the provisions of the RAP.

It is noted that the OPP compound parathion was detected at concentrations up to 1mg/kg, with the occurrences being co-located with the OCPs. The NEPM (2013) does not present a HIL for this compound, however, the USEPA Regional Screening Level calculator was used to derive an alternative SAC for preliminary risk assessment purposes. The USEPA 'non-cancer' screening level for this compound (with a hazard quotient of 1) is 379mg/kg in a residential land use scenario. On this basis, the concentrations of parathion reported in soil samples collected and analysed for the DSI are not considered to pose an unacceptable risk to human receptors.

8.2.1.3 Heavy Metals and Ecological Risks

The nickel concentrations encountered for the fill soil samples TP4 (0-0.1m), BH201 (0.5-0.8m) and BH205 (0-0.1m) were marginally above the ecological SAC. The nickel results above the ecological SAC are shown on Figure 3 attached in the appendices.

The source of nickel is considered to be associated with the historically imported fill material.

JKE consider that the risk posed by nickel to ecological receptors is negligible considering that the nickel concentrations were only marginally above the adopted SAC. JKE note that the adopted nickel SAC were conservative and the SAC would almost certainly increase significantly after adjusting for physiochemical properties (i.e. CEC). Additionally, the PSI identified that the site is not located in an ecological conservation area and there were no known ecologically sensitive species present.

8.2.2 Groundwater

8.2.2.1 Heavy Metals

The copper concentration encountered for the groundwater sample MW205, and the mercury concentration for duplicate sample GW-DUPB-1 (MW205) were above the ecological SAC. The chromium, copper and zinc concentrations for the groundwater sample MW219 were above the ecological SAC. The heavy metal groundwater results above ecological SAC are shown on Figure 3 attached in the appendices.

The copper concentrations were relatively consistent across all wells and only marginally above the ecological SAC. The mercury concentration in GW-DUPB-1 (MW205) and the zinc concentration in MW219 were marginally above the ecological SAC. The chromium concentration in MW219 of 42µg/L for the groundwater sample MW219 was well above the ecological SAC of 3.3µg/L.

JKE is of the opinion that the copper and zinc concentrations within the groundwater at the site can likely be attributed to regional groundwater background concentrations rather than onsite contamination source. The mercury concentration in GW-DUPB-1 (MW205) is considered to be an anomaly.

Based on the absence of detectable concentrations of chromium in MW205, MW206 and the calculated groundwater directional flow from west to east (see Figure 4), there may be a potential chromium contamination source on-site in the vicinity of MW219. However, there is also a potential that the groundwater aquifer encountered at MW219 is separate to that encountered at MW205 and MW206. Water strike groundwater seepage was encountered in BH205 and BH206 within profiles containing sand at approximately 4.0mBGL, while no sand containing profiles were encountered during drilling of BH219 to approximately 8.0mBGL. Consequently, BH219 was dry on completion of drilling and groundwater yield was significantly less to that encountered MW205 and MW206, as shown by the groundwater development and field sheets attached in the appendices.

Although the risk of chromium contamination to the ecological receptors is considered to be low (considering the distance of Namoi River from the site), further investigation should be undertaken to confirm this hypothesis. The groundwater directional flow should also be further assessed. The additional groundwater investigation can be captured under the provisions of the RAP.

8.2.2.2 Hydrocarbons

All BTEX and TRH soil and groundwater were below the relevant SAC. TRH F2 was only encountered in the groundwater sample obtained from MW219 and a PID of >500ppm was also encountered at MW219 prior to sampling. Hydrocarbon odours, stains or sheens were not observed during installation, development and sampling of MW219.

Based on the calculated groundwater directional flow from west to east (see Figure 4) and the location of the reported former diesel UST to the south of the maintenance/engineering building (see Figure 2) there is a potential for the source of TRH F2 to be associated with diesel from the former UST, associated pipework and/or adjacent impacted soils. The TRH F2 concentration in MW219 was assessed not to pose a vapour intrusion risk to receptors based on the depth to groundwater at this location. Notwithstanding, there is a data gap in the understanding of the source and extent of the impacts, and this can be closed out via further investigation of the potential UST and groundwater impacts. The additional investigation can be captured under the provisions of the RAP.

8.3 Decision Statements

The decision statements outlined in the SAQP are addressed below:

> *Does the additional historical information identify potential contamination sources/areas of environmental concern at the site?*

Yes, a discussion with a hospital employee from the maintenance/engineering department suggested there was a former UST located to the south of the site beyond the maintenance/engineering building (refer to Figure 2 attached).

> *Are any results above the SAC?*

Yes, the nickel concentration encountered for the fill soil samples TP4 (0-0.1m), BH201 (0.5-0.8m) and BH205 (0-0.1m) were marginally above the ecological SAC. ACM was encountered in the top 10cm in TP234. Aldrin and dieldrin concentrations encountered for the fill samples TP216 (0-0.1m) and TP220 (0-0.1m) were above the human health SAC.

The copper concentration encountered for the groundwater sample MW205, and the mercury concentration for duplicate sample GW-DUPB-1 (MW205) were above the ecological SAC. The chromium, copper and zinc concentrations for the groundwater sample MW219 were above the ecological SAC.

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

Potential human health risks were identified in relation to asbestos and aldrin and dieldrin in soil, together with potential risks associated with the identified sources of contamination and CoPC.

Is remediation required?

Yes, remediation of soil is required to address the asbestos, aldrin and dieldrin human health risks and to address the data gaps identified in Section 8.4. The potential for groundwater remediation is considered low, however this will also need to be further assessed.

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

See Section 7.

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

JKE is of the opinion that the site can be made suitable for the proposed developed subject to preparation and implementation of a RAP. We consider that the site could be made suitable via relatively straight-forward remediation processes such as 'excavation/disposal' and 'cap and contain', should remediation be required.

The RAP will include a requirement for a data gap investigation prior to proceeding with actual remediation.

8.4 Data Gaps

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

Table 8-1: Data Gap Assessment

Data Gap	Assessment
Soil sampling density below minimum guideline density due in inaccessible areas Vertical extent of fill unbale to be fully assessed	Due to the presence of buildings and existing active hospital use sampling was unable to be undertaken at the proposed SAQP sampling locations 203, 204, 208, 209 and 212 (see Figure 2). Due to the presence of significant undetectable underground services (particularly in the south-east section of the site) the vertical extent of fill was unbale to be fully assessed, particularly for ACM. The above should be further investigated. The additional investigation can be captured under the RAP as a data gap investigation requirement.
The source and extent of chromium, mercury and TRH in groundwater, and the groundwater flow direction	Further investigation in relation to the extent of TRH and heavy metals in groundwater is required. The additional investigation can be captured under the RAP as a data gap investigation requirement. The data gap investigation should include installation of additional groundwater monitoring wells, another round of groundwater sampling and further assessment of groundwater flow direction.
OCPs	Additional soil sampling and analysis is required to delineate the horizontal and vertical extent of the OCP impacts. This may be used to facilitate further statistical analysis and guide the extent of remediation (and/or long-term site management). This is to be considered within the RAP.

9 CONCLUSIONS AND RECOMMENDATIONS

The DSI included a review of project information, a site inspection, soil sampling from 30 borehole/testpits and groundwater sampling from three monitoring wells across the site. The AEC include: fill material; use of pesticides; hazardous building materials; an electrical transformer; a diesel generator; an incinerator and a potential off-site diesel UST.

The PSI and DSI identified: nickel concentrations in the fill samples TP4 (0-0.1m), BH201 (0.5-0.8m) and BH205 (0-0.1m) marginally above the ecological SAC; ACM in fill in TP2, TP234 and TP226; and OCPs aldrin and dieldrin in the fill samples TP216 (0-0.1m) and TP220 (0-0.1m) above the human health SAC.

The DSI identified copper in the groundwater sample MW205, and the mercury concentration for duplicate sample GW-DUPB-1 (MW205) were above the ecological SAC. The chromium, copper and zinc concentrations for the groundwater sample MW219 were also above the ecological SAC.

Based on the findings of the PSI and DSI, remediation of soil contamination will be required and we consider that the site could be made suitable via relatively straight-forward soil remediation processes such as ‘excavation/disposal’ and ‘cap and contain’. We consider that groundwater remediation will not likely be required, however, the RAP will include provisions to further investigate the groundwater.

We recommend the following:

1. Preparation and implementation an Asbestos Management Plan (AMP) for asbestos in soil;
2. Preparation and implementation of a RAP for the site that provides a suitable framework to manage and remediate the known contamination risks and also provides a robust framework to address the data gaps identified in Section 8.4, prior to proceeding with remediation;
3. Validation of the site in accordance with the RAP; and
4. Preparation and implementation of a Long-Term Environmental Management Plan (LETMP), if needed.

At this stage, JKE consider that, provided the above recommendations are addressed, there is no requirement to report any site contamination to the NSW EPA under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[17]

JKE consider that the report objectives outlined in Section 1.2 have been addressed.

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

10 LIMITATIONS

The report limitations are outlined below:

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

Important Information About This Report

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

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

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

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

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

Changes in Subsurface Conditions

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

This Report is based on Professional Interpretations of Factual Data

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

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

Investigation Limitations

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

Misinterpretation of Site Investigations by Design Professionals

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

Logs Should not be Separated from the Investigation Report

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

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

Read Responsibility Clauses Closely

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

Appendix A: Report Figures

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title:	**SITE LOCATION PLAN**
Location:	GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW
Project No:	E35091UPD
Figure No:	1

JKEnvironments

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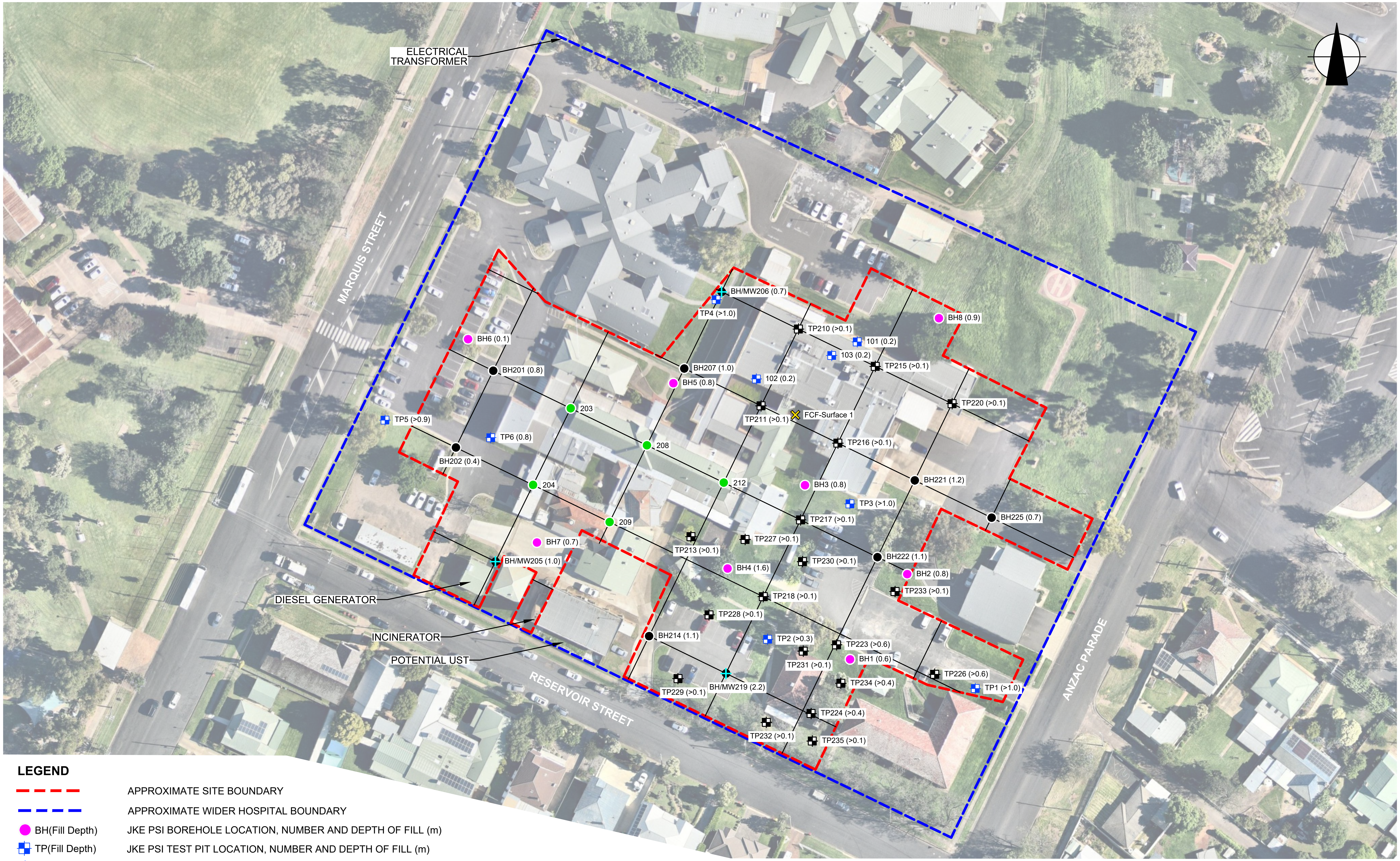


LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(blue dashed line)	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)
TP101(Fill Depth)	JK GEOTECHNICAL TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
201	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
BH/MW205	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
TP210	TEST PIT LOCATION AND NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
203	SAMPLING LOCATION INACCESSIBLE, PROPOSED TO BE COMPLETED POST-DEMOLITION
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.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**

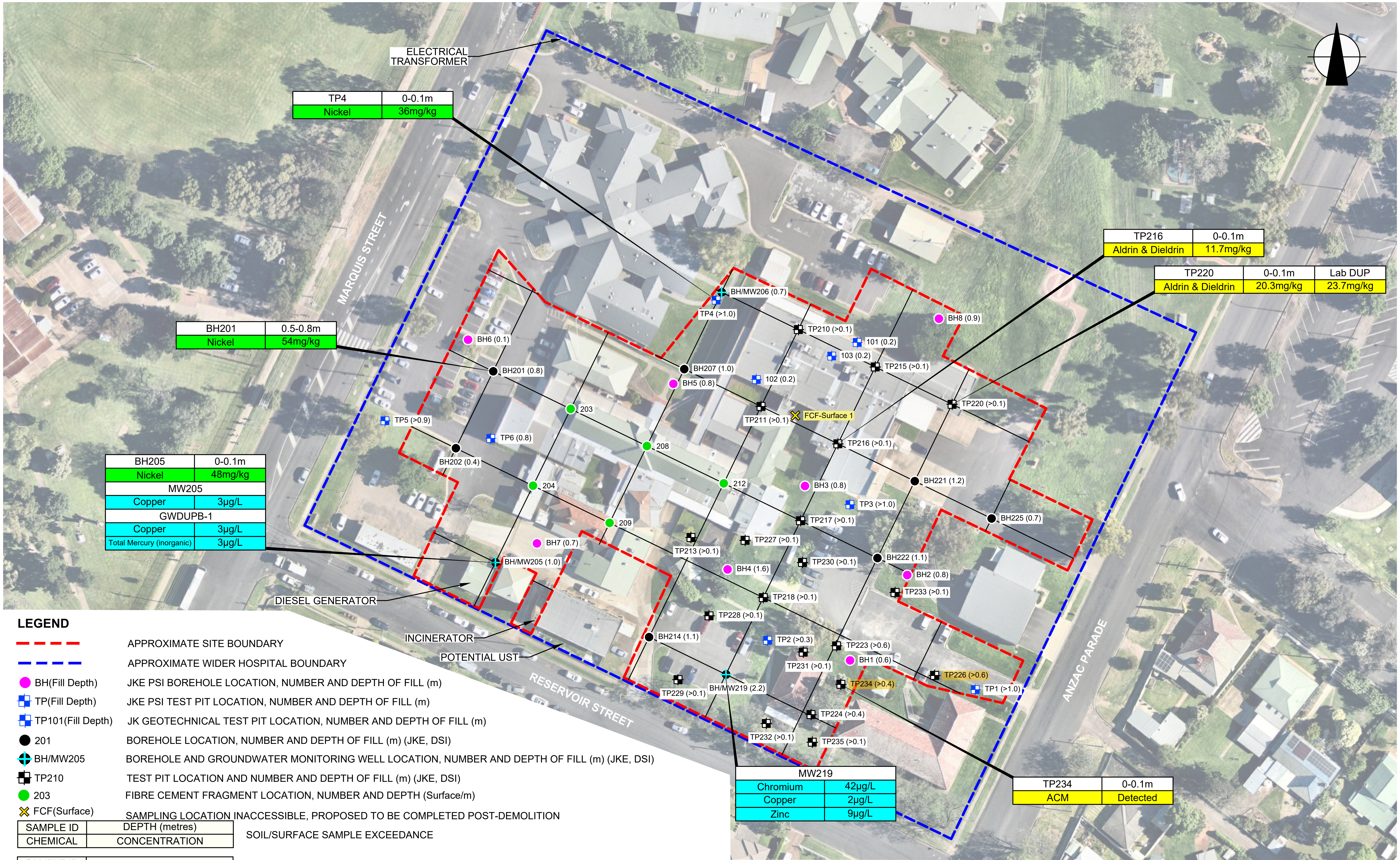
Location: GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW

Project No: E35091UPD

Figure No: 2

JKEnvironments

PLOT DATE: 21/02/2023 9:14:29 AM DWG FILE: K:\5C EIS JOBS\35000'S\E35091UPD GUNNEDAH\CAD\E35091UPD.DWG



LEGEND

Red dashed line	APPROXIMATE SITE BOUNDARY
Blue dashed line	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)
TP101(Fill Depth)	JK GEOTECHNICAL TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
201	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
BH/MW205	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
TP210	TEST PIT LOCATION AND NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
203	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
FCF(Surface)	SAMPLING LOCATION INACCESSIBLE, PROPOSED TO BE COMPLETED POST-DEMOLITION
SAMPLE ID / DEPTH (metres); CHEMICAL / CONCENTRATION	SOIL/SURFACE SAMPLE EXCEEDANCE
SAMPLE ID / -; CHEMICAL / CONCENTRATION (µg/L)	GROUNDWATER SAMPLE EXCEEDANCE
Yellow	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK
Green	SOIL/SURFACE CONTAMINATION ABOVE SAC FOR ECOLOGICAL RISK
Cyan	GROUNDWATER CONTAMINATION ABOVE SAC
Orange	ASBESTOS DETECTED IN FILL

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.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: GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW

Project No: E35091UPD

Figure No: 3

JKEnvironments

PLOT DATE: 21/02/2023 9:16:25 AM DWG FILE: K:\5C EIS JOBS\35000'S\E35091UPD GUNNEDAH\CAD\E35091UPD.DWG

LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(blue dashed line)	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)
TP101(Fill Depth)	JK GEOTECHNICAL TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
201	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
BH/MW205	BOREHOLE AND GROUNDWATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
TP210	TEST PIT LOCATION AND NUMBER AND DEPTH OF FILL (m) (JKE, DSI)
203	SAMPLING LOCATION INACCESSIBLE, PROPOSED TO BE COMPLETED POST-DEMOLITION
FCF(Surface)	FIBRE CEMENT FRAGMENT LOCATION, NUMBER AND DEPTH (Surface/m)
276.5	GROUNDWATER CONTOUR INTERVALS (m)
(arrow)	INFERRED GROUNDWATER FLOW DIRECTION

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

0 10 20 30 40 50

SCALE 1:1000 @A3 METRES

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

Title: **GROUNDWATER CONTOUR PLOT**

Location: GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW

Project No: E35091UPD

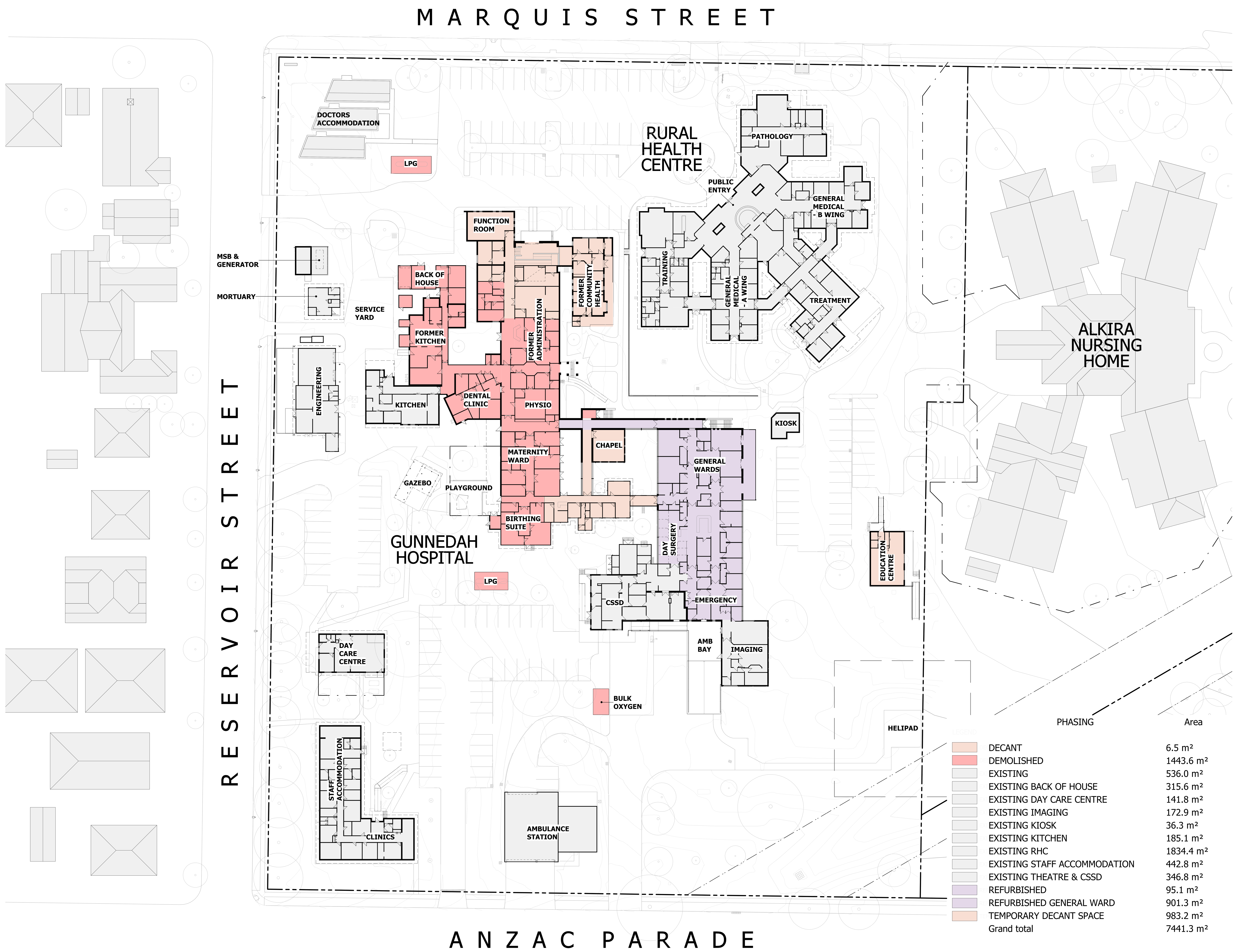
Figure No: 4

JKEnvironments

PLOT DATE: 21/02/2023 9:15:06 AM DWG FILE: K:\5C EIS JOBS\35000'S\E35091UPD GUNNEDAH\CAD\E35091UPD.DWG

Appendix B: Site Information and Site History

Proposed Development Plans



PHASING	Area
DECANT	6.5 m²
DEMOLISHED	1443.6 m²
EXISTING	536.0 m²
EXISTING BACK OF HOUSE	315.6 m²
EXISTING DAY CARE CENTRE	141.8 m²
EXISTING IMAGING	172.9 m²
EXISTING KIOSK	36.3 m²
EXISTING KITCHEN	185.1 m²
EXISTING RHC	1834.4 m²
EXISTING STAFF ACCOMMODATION	442.8 m²
EXISTING THEATRE & CSSD	346.8 m²
REFURBISHED	95.1 m²
REFURBISHED GENERAL WARD	901.3 m²
TEMPORARY DECANT SPACE	983.2 m²
Grand total	7441.3 m²

Notes

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Drawings are to be read in conjunction with all other contract documents.
Use figured dimensions only. Do not scale from drawings.
dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section is confirmation of the status of the drawing. The drawing shall not be used for construction unless endorsed 'For Construction' and authorised for issue.

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
E	100% SCHEMATIC ISSUE	17.10.2022	LS	EC
D	EARLY WORKS PTE	26.09.2022	SA	EC
C	FOR COORDINATION	15.08.2022	LS	EC
B	70% SCHEMATIC ISSUE	15.07.2022	LS	EC
A	40% SCHEMATIC ISSUE	10.06.2022	LS	EC

Architect/ Designer
dwp
www.dwp.com

Client
NSW HEALTH INFRASTRUCTURE

Project
GUNNEDAH HOSPITAL REDEVELOPMENT

Location
MARQUIS STREET, GUNNEDAH, NSW 2380

Project Number
21-0218

Drawing
SITE EXISTING DIAGRAM

Scale (A1) 1 : 400
Date Printed 17/10/2022 6:32:55 PM

Drawing Number AR-00-AA0010
Issue E

dwp

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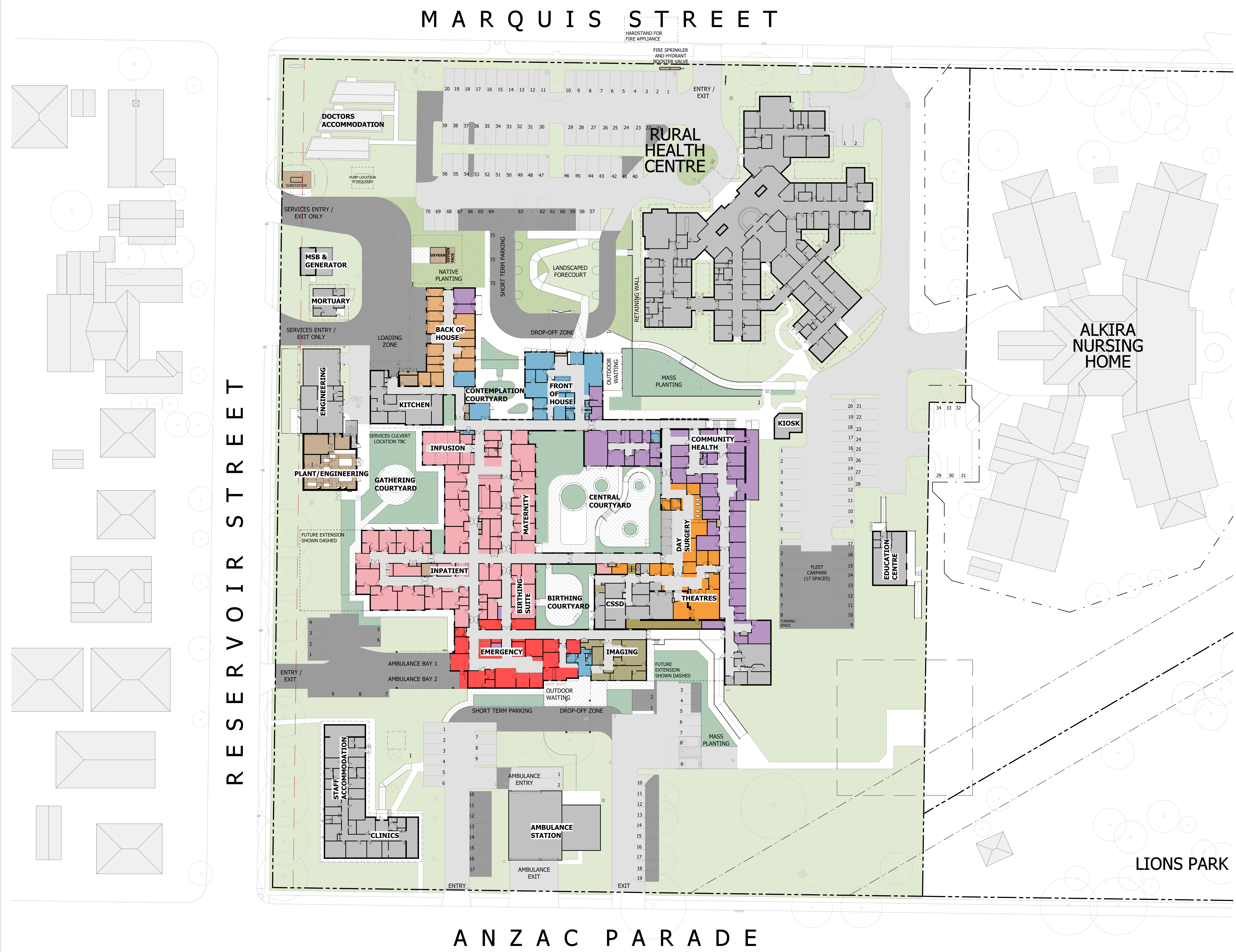

Notes

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DEPARTMENT LEGEND

- EXISTING BUILDING
- FRONT OF HOUSE
- BACK OF HOUSE
- PLANT / ENGINEERING
- COMMUNITY HEALTH
- INPATIENT UNIT
- EMERGENCY DEPARTMENT
- MEDICAL IMAGING
- DAY SURGERY & THEATRES

SITE LEGEND

- TURFED AREA
- MASS PLANTING OF NATIVE GRASSES
- MASS PLANTING AREA
- PAVING TYPE 1
- PAVING TYPE 2
- NEW ROADWAYS/PARKING
- EXISTING ROADWAYS/PARKING

SCHEMATIC DESIGN

NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
N	100% SCHEMATIC ISSUE	17.10.2022	LS	EC
M	FOR COORDINATION	04.10.2022	LS	EC
L	FOR INFORMATION	29.09.2022	LS	EC
K	FOR INFORMATION	26.09.2022	SA	EC
J	FOR COORDINATION	23.08.2022	LS	EC
H	FOR COORDINATION	16.08.2022	LS	EC
G	FOR COORDINATION	15.08.2022	LS	EC
F	FOR INFORMATION	11.08.2022	LS	EC
E	FOR COORDINATION	10.08.2022	LS	EC
D	70% SCHEMATIC ISSUE	15.07.2022	LS	EC
C	FOR COORDINATION	11.07.2022	LS	EC
B	FOR INFORMATION	06.07.2022	LS	EC
A	FOR COORDINATION	29.06.2022	LS	EC

Architect/ Designer
dwp
www.dwp.com

Client
NSW HEALTH INFRASTRUCTURE

Project
GUNNEDAH HOSPITAL REDEVELOPMENT

Location
MARQUIS STREET, GUNNEDAH, NSW 2380

Project Number
21-0218

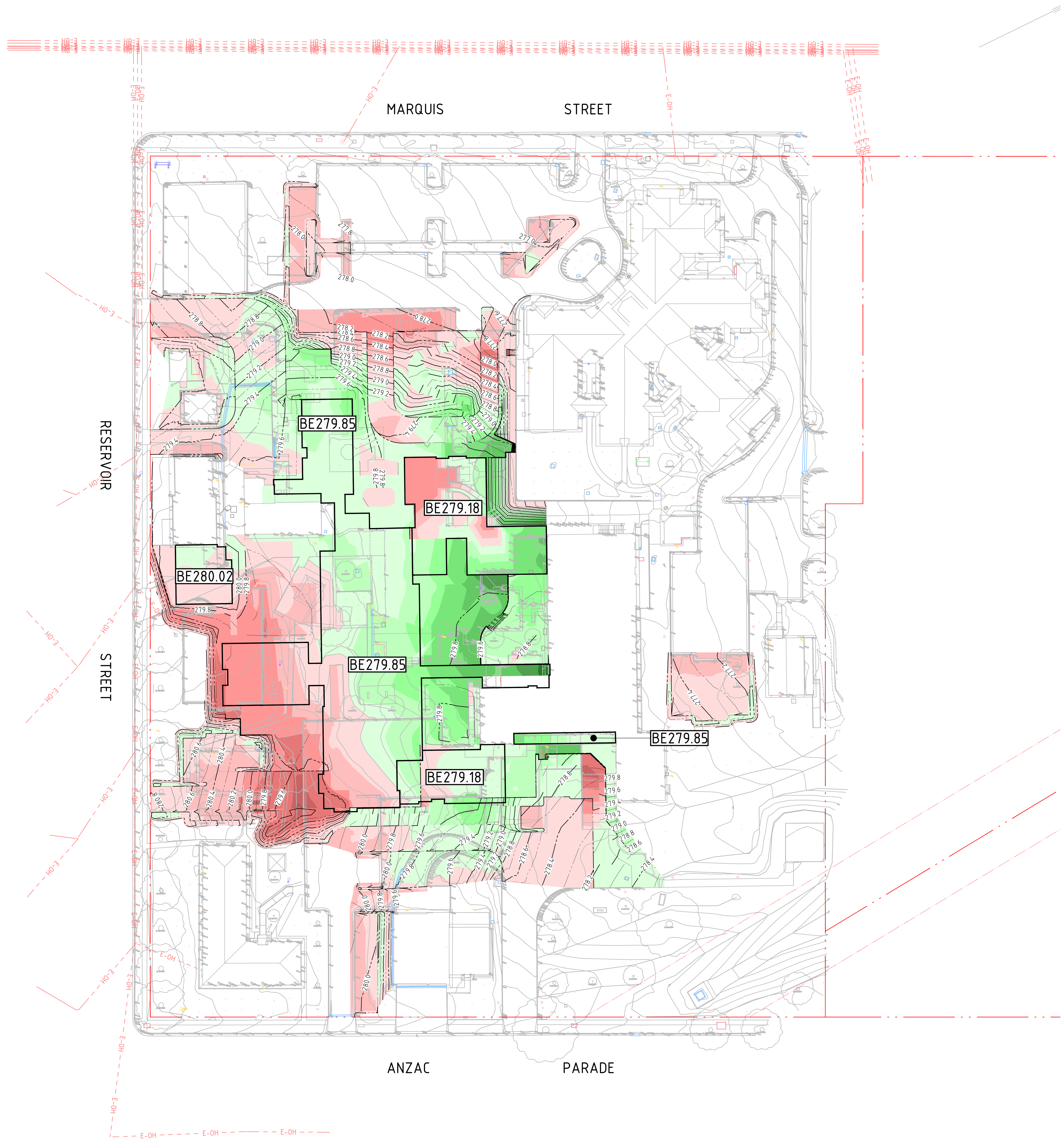
Drawing
SITE COMPLETE WORKS DIAGRAM

Scale (A1) 1 : 400
Date Printed 17/10/2022 6:33:14 PM

Drawing Number AR-00-AA0011
Issue N

dwp

DRAWN: E. EAGER DESIGNED: A. CARVALHAES JOB MANAGER: A. CARVALHAES VERIFIER: -



LEGEND

	PROPOSED BOUNDARY LINE
	EXISTING BOUNDARY LINE
	EASEMENT LINE
BEXX.XX	BULK EARTHWORKS PAD LEVEL
	EXISTING CONTOURS
	BULK EARTHWORKS CONTOURS

DEPTH OF CUT

	- 999m TO - 2.0m
	- 2.0m TO - 1.5m
	- 1.5m TO - 1.25m
	- 1.25m TO - 1.0m
	- 1.0m TO - 0.75m
	- 0.75m TO - 0.5m
	- 0.5m TO - 0.25m
	- 0.25m TO - 0.0m

DEPTH OF FILL

	0.0m TO 0.25m
	0.25m TO 0.5m
	0.5m TO 0.75m
	0.75m TO 1.0m
	1.0m TO 1.25m
	1.25m TO 1.5m
	1.5m TO 2.0m
	2.0m TO 999m

GENERAL NOTES

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
2. CAD FILES / DTM FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).
3. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
4. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS AND THE LIKE. CONTRACTOR IS TO ALLOW FOR REMOVAL OF ALL EXCESS MATERIAL GENERATED BY THE WORKS.
5. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
6. BULK EARTHWORKS ARE BASED ON THE FOLLOWING DEPTHS FROM FINISHED SURFACE LEVELS;
   - 6.1. ASPHALT VEHICLE PAVEMENT 410mm
   - 6.2. CONCRETE VEHICLE PAVEMENT 280mm
   - 6.3. BUILDING SUSPENDED SLAB 200mm
   - 6.4. BUILDING SLAB ON GROUND 160mm
   - 6.5. FOOTPATHS 150mm
   - 6.6. LANDSCAPE AREA 300mm
7. APPROXIMATE BULK EARTHWORK VALUES AS FOLLOWS;
   - 7.1. CUT -1,829 cu.m
   - 7.2. FILL 1,877 cu.m
   - 7.3. BALANCE 48
   - 7.4. A 150mm STRIP HAS BEEN ALLOWED FOR EQUATIN TO APPROX. 1866 cu.m
   - 7.5. TEMPORARY BATTERS BEYOND SITE BOUNDARY HAS BEEN EXCLUDED FROM BULK EARTHWORK VALUES.

REV	DESCRIPTION	ISS'D	VER'D	APP'D	DATE
A	ISSUED FOR SCHEMATIC DESIGN	EE		AC	26.08.22
B	RE-ISSUED FOR SCHEMATIC DESIGN	MM		AC	14.10.22

ARCHITECT

dwp

CLIENT

NSW GOVERNMENT Health Infrastructure

PROJECT

GUNNEDAH HOSPITAL REDEVELOPMENT

MARQUIS STREET, GUNNEDAH, NSW 2380

NORTHROP
Sydney
Level 11, 345 George Street, Sydney, N.S.W. 2000
Ph (02) 9241 4188 Email: sydney@northrop.com.au
ABN 81 094 433 100

SCALE 1:500@ A1 0 5 10 15 20 25m

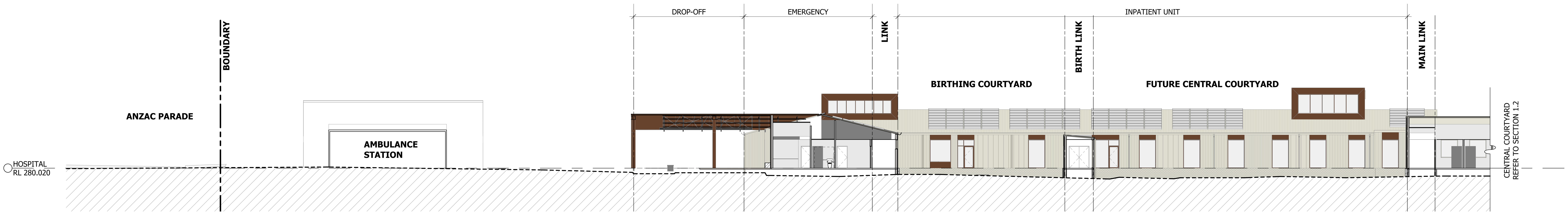
DRAWING TITLE

CUT AND FILL PLAN

NOT FOR CONSTRUCTION

JOB NUMBER	DRAWING NUMBER	REVISION
220254	GHR-CI-MW-0301	B

DRAWING SHEET SIZE = A1



1.1 SITE SECTION 1.1 - MAIN WORKS - EMERGENCY ENTRY
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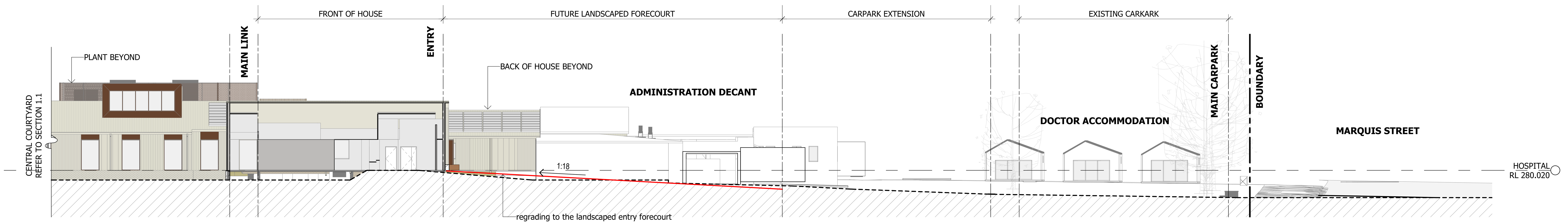

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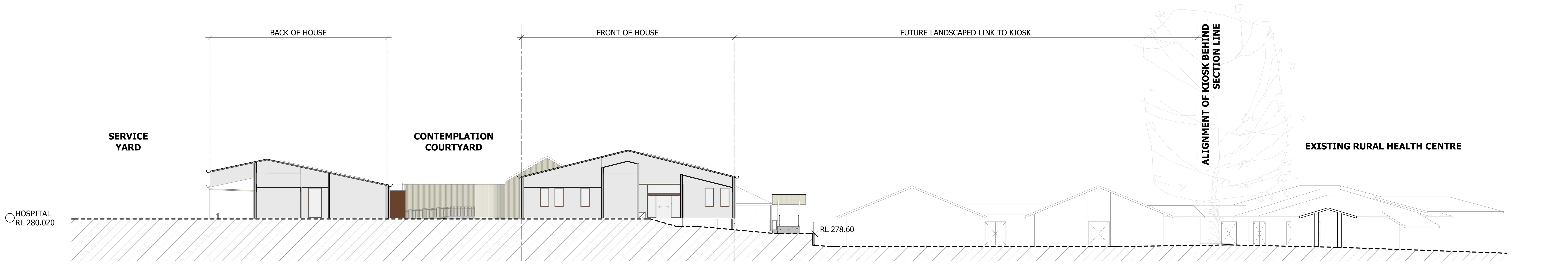
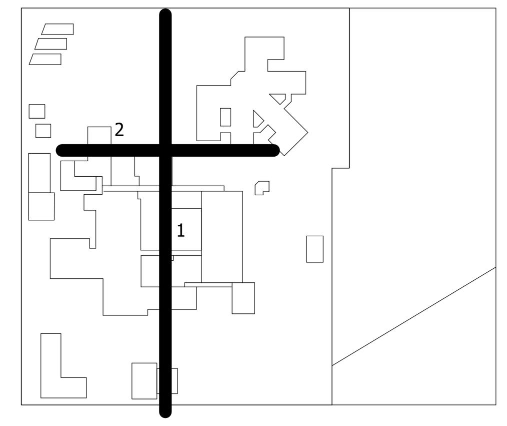


2 SITE SECTION 2 - MAIN WORKS - FRONT OF HOUSE & KIOSK CONNECTION
1 : 200



SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
C	100% SCHEMATIC ISSUE	17.10.2022	LS	EC
B	70% SCHEMATIC ISSUE	15.07.2022	LS	EC
A	40% SCHEMATIC ISSUE	10.06.2022	LS	EC

Architect/ Designer
dwp
www.dwp.com

Client
NSW HEALTH INFRASTRUCTURE

Project
GUNNEDAH HOSPITAL REDEVELOPMENT

Location
MARQUIS STREET, GUNNEDAH, NSW 2380

Project Number
21-0218

Drawing
SITE SECTIONS

Scale (A1): 1 : 200
Date Printed: 17/10/2022 6:48:03 PM

Drawing Number: AR-MW-AA3001
Issue: C

File Name: BIM 360://21-0218_Gunnedah Hospital Redevelopment/21-0218-AR-GUNNEDAH HOSPITAL REDEVELOPMENT-R21.rvt

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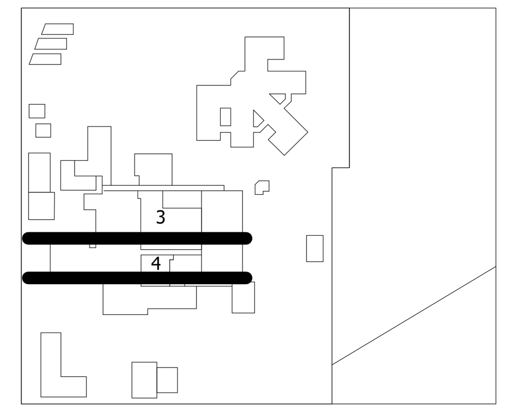
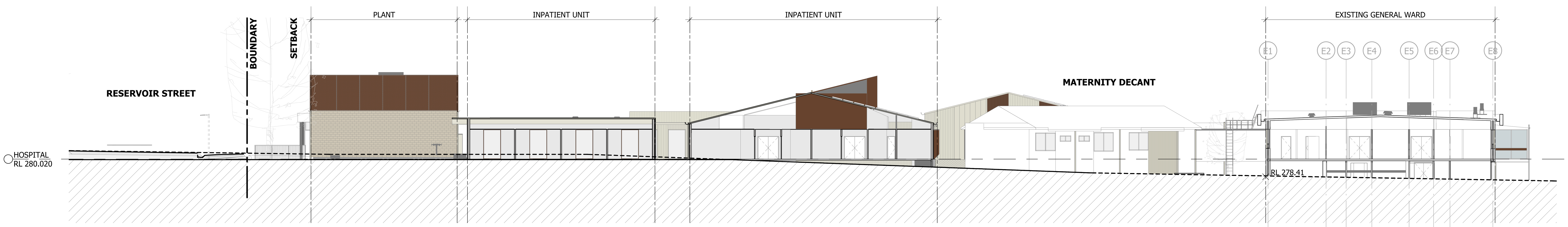
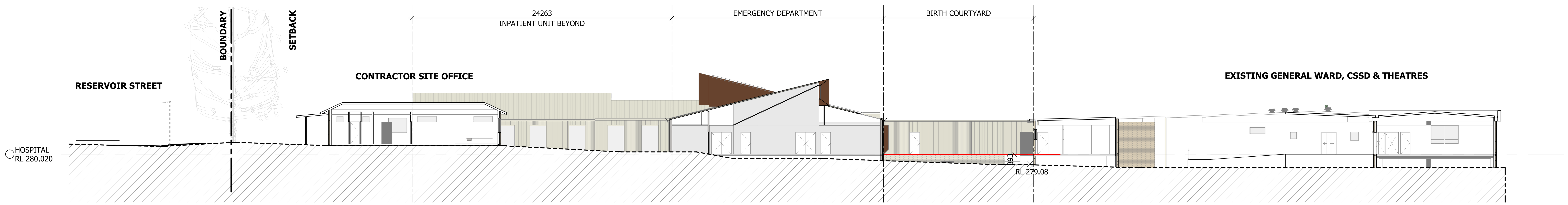
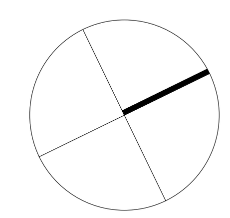




3 SITE SECTION 3 - MAIN WORKS - MAIN COURTYARD
1 : 200



4 SITE SECTION 4 - MAIN WORKS - BIRTHING COURTYARD
1 : 200



SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
C	100% SCHEMATIC ISSUE	17.10.2022	LS	EC
B	70% SCHEMATIC ISSUE	15.07.2022	LS	EC
A	40% SCHEMATIC ISSUE	10.06.2022	LS	EC

Architect/ Designer
dwp
www.dwp.com

Client
NSW HEALTH INFRASTRUCTURE

Project
GUNNEDAH HOSPITAL REDEVELOPMENT

Location
MARQUIS STREET, GUNNEDAH, NSW 2380

Project Number
21-0218

Drawing
SITE SECTIONS

Scale (A1)
1 : 200

Date Printed
17/10/2022 6:48:15 PM

Drawing Number
AR-MW-AA3002

Issue
C

dwp

File Name: BIM 360://21-0218_Gunnedah Hospital Redevelopment/21-0218-AR-GUNNEDAH HOSPITAL REDEVELOPMENT-R21.rvt

Appendix C: Laboratory Results Summary Tables

DSI Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

- The chromium results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- Carcinogenic PAHs is a toxicity weighted sum of analyte concentrations for a specific list of PAH compounds relative to B(a)P. It is also refered to as the B(a)P Toxic Equivalence Quotient (TEQ).
- Statistical calculations are undertaken using Open UCL (Bet Ver 3.02). Statistical calculation is usually undertaken using data fr fill samples.

EIL/ESL Table:

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

Waste Classification and TCLP Table:

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

QA/QC Table:

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

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

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)		
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos	TOTAL PCBs	ASBESTOS FIBRES
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			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	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**25**	**21**	**48**	**0.6**	**27**	**56**	**0.09**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201 (lab duplicate)	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**25**	**21**	**54**	**0.6**	**28**	**63**	**0.07**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH201	0.5-0.8	Fill: silty sandy clay	<4	<0.4	**46**	**34**	**13**	<0.1	**54**	**47**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH201	0.8-0.95	Silty clay	<4	<0.4	**25**	**18**	**6**	<0.1	**25**	**19**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH202	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**21**	**18**	**10**	<0.1	**15**	**31**	<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 sand	<4	<0.4	**29**	**25**	**18**	<0.1	**48**	**41**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH205	0.5-0.8	Silty clay	<4	<0.4	**24**	**14**	**8**	<0.1	**21**	**60**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
BH205	1.5-1.8	Silty clay	<4	<0.4	**18**	**14**	**5**	<0.1	**21**	**17**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH206	0-0.1	Fill: silty sand	<4	<0.4	**21**	**17**	**17**	**0.3**	**19**	**34**	**0.2**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH207	0-0.1	Fill: silty sand	<4	<0.4	**22**	**17**	**30**	**0.5**	**25**	**35**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH207	0.5-0.8	Fill: silty sand	<4	<0.4	**17**	**12**	**7**	**0.1**	**19**	**20**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	1.0-1.2	Silty clay	<4	<0.4	**23**	**17**	**6**	<0.1	**25**	**16**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP210	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**65**	**19**	**0.3**	**24**	**64**	**0.4**	<0.5	<0.1	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP210 (lab duplicate)	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**68**	**18**	**0.3**	**21**	**57**	**0.3**	<0.5	<0.1	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP211	0.05-1.5	Fill: silty clayey sand	<4	<0.4	**17**	**14**	**20**	<0.1	**17**	**58**	**0.85**	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP213	0-0.1	Fill: silty sand	<4	<0.4	**15**	**22**	**28**	**0.2**	**14**	**51**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH214	0.05-0.25	Fill: silty sand	<4	<0.4	**20**	**17**	**5**	<0.1	**17**	**24**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH214	0.8-0.95	Fill: silty clay	<4	<0.4	**14**	**11**	**4**	<0.1	**17**	**11**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP215	0-0.1	Fill: gravelly silt	<4	<0.4	**22**	**22**	**27**	<0.1	**26**	**42**	**0.52**	<0.5	<0.1	<0.1	<0.1	**8.7**	**0.8**	<0.1	<0.1	<0.1	<0.1	NA
TP216	0-0.1	Fill: gravelly silt	<4	<0.4	**29**	**21**	**9**	<0.1	**24**	**27**	<0.05	<0.5	<0.1	<0.1	<0.1	**11.7**	**0.3**	<0.1	<0.1	<0.1	<0.1	NA
TP217	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**19**	**30**	<0.1	**20**	**69**	<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 clayey sand	<4	<0.4	**20**	**16**	**18**	**0.1**	**21**	**38**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH219	0.05-0.4	Fill: silty sand	<4	<0.4	**13**	**43**	**17**	**0.3**	**9**	**49**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH219	1.5-1.8	Fill: silty clay	<4	<0.4	**23**	**17**	**8**	<0.1	**28**	**23**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH219	2.2-2.5	Silty clay	<4	<0.4	**25**	**12**	**7**	<0.1	**16**	**14**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP220	0-0.1	Fill: gravelly silt	<4	<0.4	**20**	**18**	**10**	<0.1	**24**	**34**	<0.05	<0.5	<0.1	<0.1	<0.1	**20.3**	**0.5**	<0.1	<0.1	<0.1	<0.1	Not Detected
TP220 (lab duplicate)	0-0.1	Fill: gravelly silt	<4	<0.4	**20**	**17**	**10**	<0.1	**25**	**36**	<0.05	<0.5	<0.1	<0.1	<0.1	**23.7**	**0.6**	<0.1	<0.1	<0.1	<0.1	NA
BH221	0-.15-0.35	Fill: silty sand	<4	<0.4	**18**	**15**	**12**	<0.1	**21**	**40**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH221	1.5-1.8	Silty clay	<4	<0.4	**27**	**17**	**6**	<0.1	**29**	**17**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH222	0.0.5-0.25	Fill: silty sand	<4	<0.4	**10**	**12**	**9**	<0.1	**11**	**26**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH222	1.1-1.3	Silty clay	<4	<0.4	**18**	**14**	**5**	<0.1	**23**	**16**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP223	0-0.1	Fill: silty clayey sand	<4	<0.4	**18**	**6**	**6**	<0.1	**12**	**9**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP224	0.15-0.4	Fill: silty sandy gravel	<4	<0.4	**13**	**15**	**8**	<0.1	**16**	**29**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP224 (lab duplicate)	0.15-0.4	Fill: silty sandy gravel	<4	<0.4	**14**	**14**	**9**	<0.1	**18**	**28**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH225	0.05-0.3	Fill: silty sand clay	<4	<0.4	**20**	**16**	**6**	<0.1	**25**	**22**	<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 clayey sand	<4	<0.4	**25**	**17**	**9**	<0.1	**32**	**37**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP226	0.4-0.6	Fill: silty clayey sand	<4	<0.4	**21**	**16**	**9**	<0.1	**23**	**39**	<0.05	<0.5	<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 sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP228	0-0.1	Fill: silty clayey sand	<4	<0.4	**21**	**15**	**17**	**0.2**	**20**	**31**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP234	0-0.1	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
SDUPB-1	NA	Fill soil	<4	<0.4	**18**	**15**	**11**	**0.3**	**19**	**34**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUPD-1	NA	Fill soil	<4	<0.4	**18**	**14**	**21**	**0.1**	**17**	**42**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUPC-1	NA	Fill soil	<4	<0.4	**27**	**19**	**17**	**0.6**	**27**	**39**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUPC-1 (lab duplicate)	NA	Fill soil	<4	<0.4	**23**	**17**	**14**	**0.5**	**24**	**36**	NA	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	NA	NA
SDUPF-1	NA	Fill soil	<4	<0.4	**15**	**22**	**31**	**0.1**	**14**	**54**	0.4	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF-Surface1	NA	Fibre cement fragment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**Detected**
TP226-spoil	NA	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			43	43	43	43	43	43	43	43	42	42	33	33	33	33	33	33	33	32	32	7
Maximum Value			<PQL	<PQL	46	68	54	0.6	54	69	0.85	<PQL	<PQL	<PQL	<PQL	23.7	0.8	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																						
Number of Fill Samples			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	38	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1.197	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3.931	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	95 (Chebyshev UCL)	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3.997	NC	NC	NC	NC	NC	NC

Concentration above the SAC	**VALUE**	Standard deviation exceeds data assessment criteria	**VALUE**
Asbestos Detected	**Detected**		
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**								
BH201	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH201 (lab duplicate)	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH201	0.5-0.8	Fill: silty sandy clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH201	0.8-0.95	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH202	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH205	0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH205	0.5-0.8	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH205	1.5-1.8	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH206	0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH207	0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH207	0.5-0.8	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	1.3
BH207	1.0-1.2	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP210	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP210 (lab duplicate)	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP211	0.05-1.5	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP213	0-0.1	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH214	0.05-0.25	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH214	0.8-0.95	Fill: silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP215	0-0.1	Fill: gravelly silt	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP216	0-0.1	Fill: gravelly silt	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP217	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP218	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219	0.05-0.4	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219	1.5-1.8	Fill: silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH219	2.2-2.5	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP220	0-0.1	Fill: gravelly silt	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP220 (lab duplicate)	0-0.1	Fill: gravelly silt	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH221	0-.15-0.35	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH221	1.5-1.8	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH222	0.0.5-0.25	Fill: silty sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH222	1.1-1.3	Silty clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP223	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP224	0.15-0.4	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP224 (lab duplicate)	0.15-0.4	Fill: silty sandy gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH225	0.05-0.3	Fill: silty sand clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP226	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP226	0.4-0.6	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP228	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUPB-1	NA	Fill soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUPD-1	NA	Fill soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUPC-1	NA	Fill soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUPF-1	NA	Fill soil	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples					42	42	42	42	42	42	42	42
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	1.3

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	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201 (lab duplicate)	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201	0.5-0.8	Fill: silty sandy clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH201	0.8-0.95	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH202	0.05-0.3	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH205	0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH205	0.5-0.8	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH205	1.5-1.8	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH206	0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH207	0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH207	0.5-0.8	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH207	1.0-1.2	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP210	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP210 (lab duplicate)	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP211	0.05-1.5	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP213	0-0.1	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH214	0.05-0.25	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH214	0.8-0.95	Fill: silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP215	0-0.1	Fill: gravelly silt	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP216	0-0.1	Fill: gravelly silt	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP217	0-0.1	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP218	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219	0.05-0.4	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219	1.5-1.8	Fill: silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH219	2.2-2.5	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP220	0-0.1	Fill: gravelly silt	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP220 (lab duplicate)	0-0.1	Fill: gravelly silt	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH221	0-.15-0.35	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH221	1.5-1.8	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH222	0.0.5-0.25	Fill: silty sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH222	1.1-1.3	Silty clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP223	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP224	0.15-0.4	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP224 (lab duplicate)	0.15-0.4	Fill: silty sandy gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH225	0.05-0.3	Fill: silty sand clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP226	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP226	0.4-0.6	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP228	0-0.1	Fill: silty clayey sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUPB-1	NA	Fill soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUPD-1	NA	Fill soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUPC-1	NA	Fill soil	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUPF-1	NA	Fill soil	0m to <1m	Sand	45	110	0.5	160	55	40	3

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

			C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
PQL - Envirolab Services			25	50	100	100
NEPM 2013 Land Use Category			**RESIDENTIAL, PARKLAND & PUBLIC OPEN SPACE**			
Sample Reference	**Sample Depth**	**Soil Texture**				
BH201	0.05-0.3	Coarse	<25	<50	<100	<100
BH201 (lab duplicate)	0.05-0.3	Coarse	<25	<50	<100	<100
BH201	0.5-0.8	Fine	<25	<50	<100	<100
BH201	0.8-0.95	Fine	<25	<50	<100	<100
BH202	0.05-0.3	Coarse	<25	<50	<100	<100
BH205	0-0.1	Coarse	<25	<50	<100	<100
BH205	0.5-0.8	Fine	<25	<50	<100	<100
BH205	1.5-1.8	Fine	<25	<50	<100	<100
BH206	0-0.1	Coarse	<25	<50	<100	<100
BH207	0-0.1	Coarse	<25	<50	<100	<100
BH207	0.5-0.8	Coarse	<25	<50	<100	<100
BH207	1.0-1.2	Fine	<25	<50	<100	<100
TP210	0-0.1	Coarse	<25	<50	<100	<100
TP210 (lab duplicate)	0-0.1	Coarse	<25	<50	<100	<100
TP211	0.05-1.5	Coarse	<25	<50	<100	<100
TP213	0-0.1	Coarse	<25	<50	<100	<100
BH214	0.05-0.25	Coarse	<25	<50	<100	<100
BH214	0.8-0.95	Fine	<25	<50	<100	<100
TP215	0-0.1	Fine	<25	<50	<100	<100
TP216	0-0.1	Fine	<25	<50	<100	<100
TP217	0-0.1	Coarse	<25	<50	<100	<100
TP218	0-0.1	Coarse	<25	<50	<100	<100
BH219	0.05-0.4	Coarse	<25	<50	<100	<100
BH219	1.5-1.8	Fine	<25	<50	<100	<100
BH219	2.2-2.5	Fine	<25	<50	<100	<100
TP220	0-0.1	Fine	<25	<50	<100	<100
TP220 (lab duplicate)	0-0.1	Fine	<25	<50	<100	<100
BH221	0-.15-0.35	Coarse	<25	<50	<100	<100
BH221	1.5-1.8	Fine	<25	<50	<100	<100
BH222	0.0.5-0.25	Coarse	<25	<50	<100	<100
BH222	1.1-1.3	Fine	<25	<50	<100	<100
TP223	0-0.1	Coarse	<25	<50	<100	<100
TP224	0.15-0.4	Coarse	<25	<50	<100	<100
TP224 (lab duplicate)	0.15-0.4	Coarse	<25	<50	<100	<100
BH225	0.05-0.3	Fine	<25	<50	<100	<100
TP226	0-0.1	Coarse	<25	<50	<100	<100
TP226	0.4-0.6	Coarse	<25	<50	<100	<100
TP228	0-0.1	Coarse	<25	<50	<100	<100
SDUPB-1	NA	Coarse	<25	<50	<100	<100
SDUPD-1	NA	Coarse	<25	<50	<100	<100
SDUPC-1	NA	Coarse	<25	<50	<100	<100
SDUPF-1	NA	Coarse	<25	<50	<100	<100
Total Number of Samples			43	43	43	43
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)
BH201	0.05-0.3	Coarse	700	1000	2500	10000
BH201 (lab duplicate)	0.05-0.3	Coarse	700	1000	2500	10000
BH201	0.5-0.8	Fine	800	1000	3500	10000
BH201	0.8-0.95	Fine	800	1000	3500	10000
BH202	0.05-0.3	Coarse	700	1000	2500	10000
BH205	0-0.1	Coarse	700	1000	2500	10000
BH205	0.5-0.8	Fine	800	1000	3500	10000
BH205	1.5-1.8	Fine	800	1000	3500	10000
BH206	0-0.1	Coarse	700	1000	2500	10000
BH207	0-0.1	Coarse	700	1000	2500	10000
BH207	0.5-0.8	Coarse	700	1000	2500	10000
BH207	1.0-1.2	Fine	800	1000	3500	10000
TP210	0-0.1	Coarse	700	1000	2500	10000
TP210 (lab duplicate)	0-0.1	Coarse	700	1000	2500	10000
TP211	0.05-1.5	Coarse	700	1000	2500	10000
TP213	0-0.1	Coarse	700	1000	2500	10000
BH214	0.05-0.25	Coarse	700	1000	2500	10000
BH214	0.8-0.95	Fine	800	1000	3500	10000
TP215	0-0.1	Fine	800	1000	3500	10000
TP216	0-0.1	Fine	800	1000	3500	10000
TP217	0-0.1	Coarse	700	1000	2500	10000
TP218	0-0.1	Coarse	700	1000	2500	10000
BH219	0.05-0.4	Coarse	700	1000	2500	10000
BH219	1.5-1.8	Fine	800	1000	3500	10000
BH219	2.2-2.5	Fine	800	1000	3500	10000
TP220	0-0.1	Fine	800	1000	3500	10000
TP220 (lab duplicate)	0-0.1	Fine	800	1000	3500	10000
BH221	0-.15-0.35	Coarse	700	1000	2500	10000
BH221	1.5-1.8	Fine	800	1000	3500	10000
BH222	0.0.5-0.25	Coarse	700	1000	2500	10000
BH222	1.1-1.3	Fine	800	1000	3500	10000
TP223	0-0.1	Coarse	700	1000	2500	10000
TP224	0.15-0.4	Coarse	700	1000	2500	10000
TP224 (lab duplicate)	0.15-0.4	Coarse	700	1000	2500	10000
BH225	0.05-0.3	Fine	800	1000	3500	10000
TP226	0-0.1	Coarse	700	1000	2500	10000
TP226	0.4-0.6	Coarse	700	1000	2500	10000
TP228	0-0.1	Coarse	700	1000	2500	10000
SDUPB-1	NA	Coarse	700	1000	2500	10000
SDUPD-1	NA	Coarse	700	1000	2500	10000
SDUPC-1	NA	Coarse	700	1000	2500	10000
SDUPF-1	NA	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**										
BH1	0-0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<1	0
BH1 (lab duplicate)	0-0.1	<25	<50	**130**	<100	<0.2	<0.5	<1	<1	<1	0
BH1	1.0-1.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	3.9
BH2	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH3	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	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH7	0.15-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH8	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0.1
TP1	0-0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	0.1
TP2	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP2 (lab duplicate)	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
TP6	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP1	-	<25	<50	**100**	**110**	<0.2	<0.5	<1	<1	<1	0
SDUP2	-	<25	<50	**170**	<100	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples		19	19	19	19	19	19	19	19	19	19
Maximum Value		<PQL	<PQL	170	110	<PQL	<PQL	<PQL	<PQL	<PQL	NA

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**
13/12/2022	BH201	0.05-0.5	No	NA	7,240	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH202	0.05-0.4	No	NA	6,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH205	0-0.1	No	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH205	0.1-1.0	NA	NA	2,410	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	313438	BH205	0.5-0.8	535.18	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
13/12/2022	BH206	0-0.1	No	10	10,180	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH206	0.1-0.7	NA	NA	4,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH207	0-0.1	No	NA	7,150	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH207	0.1-1.0	No	NA	4,900	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH214	0.05-0.8	No	NA	6,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH214	0.8-1.1	NA	NA	2,250	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH219	0.05-0.8	No	NA	5,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH219	0.8-1.8	NA	NA	6,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH221	0.125-1.3	NA	NA	5,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH222	0.05-1.1	No	NA	5,560	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13/12/2022	BH225	0.05-0.7	No	NA	9,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP210	0-0.1	No	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP211	0.05-0.15	No	10	11,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	313438	TP211	0.05-0.15	744.23	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
15/12/2022	TP213	0-0.1	No	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP215	0-0.1	No	10	10,130	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP216	0-0.1	No	10	12,770	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP217	0-0.1	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP218	0-0.2	No	10	11,680	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP220	0-0.1	No	10	13,050	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	313438	TP220	0-0.1	761.13	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
15/12/2022	TP223	0-0.1	No	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP223	0.1-0.6	NA	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP224	0.05-0.15	No	10	13,180	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP224	0.15-0.4	No	10	11,170	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP226	0-0.1	No	10	11,660	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP226	0.1-0.6	NA	10	11,480	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP227	0-0.1	No	10	10,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	313438	TP227	0-0.1	604.51	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
14/12/2022	TP228	0-0.1	No	10	11,480	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP229	0-0.1	No	NA	9,140	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP230	0-0.1	No	10	11,800	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP231	0-0.1	No	10	10,310	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP232	0-0.1	No	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP233	0-0.1	No	10	10,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15/12/2022	TP234	0-0.1	Yes	10	14,860	15.94	2.391	0.0161	No ACM <7mm observed	--	--	No FA observed	--	--	313438	TP234	0-0.1	542.06	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
15/12/2022	TP234	0.1-0.4	NA	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14/12/2022	TP235	0-0.1	No	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH201	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**25**	**21**	**48**	**27**	**56**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.09**
BH201 (lab	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**25**	**21**	**54**	**28**	**63**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
BH201	0.5-0.8	Fill: silty sandy clay	Fine	NA	NA	NA	<4	**46**	**34**	**13**	**54**	**47**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH201	0.8-0.95	Silty clay	Fine	NA	NA	NA	<4	**25**	**18**	**6**	**25**	**19**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH202	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**21**	**18**	**10**	**15**	**31**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH205	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	<4	**29**	**25**	**18**	**48**	**41**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH205	0.5-0.8	Silty clay	Fine	NA	NA	NA	<4	**24**	**14**	**8**	**21**	**60**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH205	1.5-1.8	Silty clay	Fine	NA	NA	NA	<4	**18**	**14**	**5**	**21**	**17**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH206	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	<4	**21**	**17**	**17**	**19**	**34**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
BH207	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	<4	**22**	**17**	**30**	**25**	**35**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH207	0.5-0.8	Fill: silty sand	Coarse	NA	NA	NA	<4	**17**	**12**	**7**	**19**	**20**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH207	1.0-1.2	Silty clay	Fine	NA	NA	NA	<4	**23**	**17**	**6**	**25**	**16**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP210	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**20**	**65**	**19**	**24**	**64**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
TP210 (lab	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**20**	**68**	**18**	**21**	**57**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
TP211	0.05-1.5	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**17**	**14**	**20**	**17**	**58**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.1**
TP213	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	<4	**15**	**22**	**28**	**14**	**51**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH214	0.05-0.25	Fill: silty sand	Coarse	NA	NA	NA	<4	**20**	**17**	**5**	**17**	**24**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH214	0.8-0.95	Fill: silty clay	Fine	NA	NA	NA	<4	**14**	**11**	**4**	**17**	**11**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP215	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	<4	**22**	**22**	**27**	**26**	**42**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.06**
TP216	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	<4	**29**	**21**	**9**	**24**	**27**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP217	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**20**	**19**	**30**	**20**	**69**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP218	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**20**	**16**	**18**	**21**	**38**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH219	0.05-0.4	Fill: silty sand	Coarse	NA	NA	NA	<4	**13**	**43**	**17**	**9**	**49**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH219	1.5-1.8	Fill: silty clay	Fine	NA	NA	NA	<4	**23**	**17**	**8**	**28**	**23**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH219	2.2-2.5	Silty clay	Fine	NA	NA	NA	<4	**25**	**12**	**7**	**16**	**14**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP220	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	<4	**20**	**18**	**10**	**24**	**34**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP220 (lab	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	<4	**20**	**17**	**10**	**25**	**36**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH221	0-.15-0.35	Fill: silty sand	Coarse	NA	NA	NA	<4	**18**	**15**	**12**	**21**	**40**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH221	1.5-1.8	Silty clay	Fine	NA	NA	NA	<4	**27**	**17**	**6**	**29**	**17**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH222	0.0.5-0.25	Fill: silty sand	Coarse	NA	NA	NA	<4	**10**	**12**	**9**	**11**	**26**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH222	1.1-1.3	Silty clay	Fine	NA	NA	NA	<4	**18**	**14**	**5**	**23**	**16**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP223	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**18**	**6**	**6**	**12**	**9**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP224	0.15-0.4	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**13**	**15**	**8**	**16**	**29**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP224 (lab	0.15-0.4	Fill: silty sandy gravel	Coarse	NA	NA	NA	<4	**14**	**14**	**9**	**18**	**28**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH225	0.05-0.3	Fill: silty sand clay	Fine	NA	NA	NA	<4	**20**	**16**	**6**	**25**	**22**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP226	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**25**	**17**	**9**	**32**	**37**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP226	0.4-0.6	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**21**	**16**	**9**	**23**	**39**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP228	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**21**	**15**	**17**	**20**	**31**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUPB-1	NA	Fill soil	Coarse	NA	NA	NA	<4	**18**	**15**	**11**	**19**	**34**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUPD-1	NA	Fill soil	Coarse	NA	NA	NA	<4	**18**	**14**	**21**	**17**	**42**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUPC-1	NA	Fill soil	Coarse	NA	NA	NA	<4	**27**	**19**	**17**	**27**	**39**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUPC-1 (lab	NA	Fill soil	Coarse	NA	NA	NA	<4	**23**	**17**	**14**	**24**	**36**	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUPF-1	NA	Fill soil	Coarse	NA	NA	NA	<4	**15**	**22**	**31**	**14**	**54**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	**0.07**
Total Number of Samples				0	0	0	43	43	43	43	43	43	42	33	42	42	42	42	42	42	42	42	42
Maximum Value				NA	NA	NA	<PQL	46	68	54	54	69	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.1

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	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH201 (lab duplicate)	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH201	0.5-0.8	Fill: silty sandy clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH201	0.8-0.95	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH202	0.05-0.3	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH205	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH205	0.5-0.8	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH205	1.5-1.8	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH206	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH207	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH207	0.5-0.8	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	300	2800	50	85	70	105	20
BH207	1.0-1.2	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP210	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP210 (lab duplicate)	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP211	0.05-1.5	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP213	0-0.1	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH214	0.05-0.25	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH214	0.8-0.95	Fill: silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP215	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP216	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP217	0-0.1	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP218	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH219	0.05-0.4	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH219	1.5-1.8	Fill: silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH219	2.2-2.5	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP220	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP220 (lab duplicate)	0-0.1	Fill: gravelly silt	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
BH221	0-.15-0.35	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH221	1.5-1.8	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
BH222	0.0.5-0.25	Fill: silty sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH222	1.1-1.3	Silty clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	--	180	120	1300	5600	65	105	125	45	20
TP223	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP224	0.15-0.4	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP224 (lab duplicate)	0.15-0.4	Fill: silty sandy gravel	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH225	0.05-0.3	Fill: silty sand clay	Fine	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	1300	5600	65	105	125	45	20
TP226	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP226	0.4-0.6	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP228	0-0.1	Fill: silty clayey sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUPB-1	NA	Fill soil	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUPD-1	NA	Fill soil	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUPC-1	NA	Fill soil	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUPC-1 (lab duplicate)	NA	Fill soil	Coarse	NA	NA	NA	100	200	80	1200	35	150	--	180	--	--	--	--	--	--	--	--	--
SDUPF-1	NA	Fill soil	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20

TABLE S7

SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES

All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH201	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**25**	**21**	**48**	**0.6**	**27**	**56**	**0.09**	**0.09**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201 (lab duplicate)	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**25**	**21**	**54**	**0.6**	**28**	**63**	**0.07**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201	0.5-0.8	Fill: silty sandy clay	<4	<0.4	**46**	**34**	**13**	<0.1	**54**	**47**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH201	0.8-0.95	Silty clay	<4	<0.4	**25**	**18**	**6**	<0.1	**25**	**19**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH202	0.05-0.3	Fill: silty sandy gravel	<4	<0.4	**21**	**18**	**10**	<0.1	**15**	**31**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH205	0-0.1	Fill: silty sand	<4	<0.4	**29**	**25**	**18**	<0.1	**48**	**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
BH205	0.5-0.8	Silty clay	<4	<0.4	**24**	**14**	**8**	<0.1	**21**	**60**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH205	1.5-1.8	Silty clay	<4	<0.4	**18**	**14**	**5**	<0.1	**21**	**17**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH206	0-0.1	Fill: silty sand	<4	<0.4	**21**	**17**	**17**	**0.3**	**19**	**34**	**0.2**	**0.06**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH207	0-0.1	Fill: silty sand	<4	<0.4	**22**	**17**	**30**	**0.5**	**25**	**35**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH207	0.5-0.8	Fill: silty sand	<4	<0.4	**17**	**12**	**7**	**0.1**	**19**	**20**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH207	1.0-1.2	Silty clay	<4	<0.4	**23**	**17**	**6**	<0.1	**25**	**16**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP210	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**65**	**19**	**0.3**	**24**	**64**	**0.4**	**0.07**	<0.1	<0.1	<0.1	**0.4**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP210 (lab duplicate)	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**68**	**18**	**0.3**	**21**	**57**	**0.3**	**0.06**	<0.1	<0.1	<0.1	**0.4**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP211	0.05-1.5	Fill: silty clayey sand	<4	<0.4	**17**	**14**	**20**	<0.1	**17**	**58**	**0.85**	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP213	0-0.1	Fill: silty sand	<4	<0.4	**15**	**22**	**28**	**0.2**	**14**	**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	NA
BH214	0.05-0.25	Fill: silty sand	<4	<0.4	**20**	**17**	**5**	<0.1	**17**	**24**	<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
BH214	0.8-0.95	Fill: silty clay	<4	<0.4	**14**	**11**	**4**	<0.1	**17**	**11**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP215	0-0.1	Fill: gravelly silt	<4	<0.4	**22**	**22**	**27**	<0.1	**26**	**42**	**0.52**	**0.06**	<0.1	<0.1	<0.1	**9.5**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP216	0-0.1	Fill: gravelly silt	<4	<0.4	**29**	**21**	**9**	<0.1	**24**	**27**	<0.05	<0.05	<0.1	<0.1	<0.1	**12**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP217	0-0.1	Fill: silty sandy gravel	<4	<0.4	**20**	**19**	**30**	<0.1	**20**	**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
TP218	0-0.1	Fill: silty clayey sand	<4	<0.4	**20**	**16**	**18**	**0.1**	**21**	**38**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH219	0.05-0.4	Fill: silty sand	<4	<0.4	**13**	**43**	**17**	**0.3**	**9**	**49**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH219	1.5-1.8	Fill: silty clay	<4	<0.4	**23**	**17**	**8**	<0.1	**28**	**23**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH219	2.2-2.5	Silty clay	<4	<0.4	**25**	**12**	**7**	<0.1	**16**	**14**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP220	0-0.1	Fill: gravelly silt	<4	<0.4	**20**	**18**	**10**	<0.1	**24**	**34**	<0.05	<0.05	<0.1	<0.1	<0.1	**20.8**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP220 (lab duplicate)	0-0.1	Fill: gravelly silt	<4	<0.4	**20**	**17**	**10**	<0.1	**25**	**36**	<0.05	<0.05	<0.1	<0.1	<0.1	**24.3**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH221	0-.15-0.35	Fill: silty sand	<4	<0.4	**18**	**15**	**12**	<0.1	**21**	**40**	<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
BH221	1.5-1.8	Silty clay	<4	<0.4	**27**	**17**	**6**	<0.1	**29**	**17**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH222	0.0.5-0.25	Fill: silty sand	<4	<0.4	**10**	**12**	**9**	<0.1	**11**	**26**	<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
BH222	1.1-1.3	Silty clay	<4	<0.4	**18**	**14**	**5**	<0.1	**23**	**16**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP223	0-0.1	Fill: silty clayey sand	<4	<0.4	**18**	**6**	**6**	<0.1	**12**	**9**	<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
TP224	0.15-0.4	Fill: silty sandy gravel	<4	<0.4	**13**	**15**	**8**	<0.1	**16**	**29**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP224 (lab duplicate)	0.15-0.4	Fill: silty sandy gravel	<4	<0.4	**14**	**14**	**9**	<0.1	**18**	**28**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH225	0.05-0.3	Fill: silty sand clay	<4	<0.4	**20**	**16**	**6**	<0.1	**25**	**22**	<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 clayey sand	<4	<0.4	**25**	**17**	**9**	<0.1	**32**	**37**	<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	0.4-0.6	Fill: silty clayey sand	<4	<0.4	**21**	**16**	**9**	<0.1	**23**	**39**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP227	0-0.1	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP228	0-0.1	Fill: silty clayey sand	<4	<0.4	**21**	**15**	**17**	**0.2**	**20**	**31**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
TP234	0-0.1	Fill: silty sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
SDUPB-1	NA	Fill soil	<4	<0.4	**18**	**15**	**11**	**0.3**	**19**	**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
SDUPD-1	NA	Fill soil	<4	<0.4	**18**	**14**	**21**	**0.1**	**17**	**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
SDUPC-1	NA	Fill soil	<4	<0.4	**27**	**19**	**17**	**0.6**	**27**	**39**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
SDUPC-1 (lab duplicate)	NA	Fill soil	<4	<0.4	**23**	**17**	**14**	**0.5**	**24**	**36**	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUPF-1	NA	Fill soil	<4	<0.4	**15**	**22**	**31**	**0.1**	**14**	**54**	**0.4**	**0.07**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
Total Number of Samples			43	43	43	43	43	43	43	43	42	42	33	32	32	32	32	42	42	42	42	42	42	42	42	42	5
Maximum Value			<PQL	<PQL	46	68	54	0.6	54	69	0.85	0.1	<PQL	<PQL	<PQL	24.3	<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 LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Nickel
PQL - Envirolab Services			0.02
TCLP1 - General Solid Waste			2
TCLP2 - Restricted Solid Waste			8
TCLP3 - Hazardous Waste			>8
Sample Reference	**Sample Depth**	**Sample Description**	
BH201	0.5-0.8	Fill: silty sandy clay	<0.02
BH205	0-0.1	Fill: silty sand	0.02
Total Number of samples			
Maximum Value			

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

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ADWG:	AustralianDrinking Water Guidelines
ANZG	Australian and New Zealand Guidelines
B(a)P:	Benzo(a)pyrene
CRC:	Cooperative Research Centre
ESLs:	Ecological Screening Levels
GIL:	Groundwater Investigation Levels
HILs:	Health Investigation Levels
HSLs:	Health Screening Levels
HSL-SSA:	Health Screening Level-SiteSpecific Assessment
NA:	Not Analysed
NC:	Not Calculated
NEPM:	National Environmental Protection Measure
NHMRC:	National Health and Medical Research Council
NL:	Not Limiting
NSL:	No Set Limit
OCP:	Organochlorine Pesticides
OPP:	Organophosphorus Pesticides
PAHs:	Polycyclic Aromatic Hydrocarbons
ppm:	Parts per million
PCBs:	Polychlorinated Biphenyls
PCE:	Perchloroethylene (Tetrachloroethylene or Tetrachloroethene)
PQL:	Practical Quantitation Limit
RS:	Rinsate Sample
RSL:	Regional Screening Levels
SAC:	Site Assessment Criteria
SSA:	Site Specific Assessment
SSHSLs:	Site Specific Health Screening Levels
TB:	Trip Blank
TCA:	1,1,1 Trichloroethane (methyl chloroform)
TCE:	Trichloroethylene (Trichloroethene)
TS:	Trip Spike
TRH:	Total Recoverable Hydrocarbons
UCL:	Upper Level Confidence Limit on Mean Value
USEPA	United States Environmental Protection Agency
VOCC:	Volatile Organic Chlorinated Compounds
WHO:	World Health Organisation

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

	PQL Envirolab Services	ANZG 2018 Fresh Waters	SAMPLES						
			MW205	MW205 (lab replicate)	MW206	MW206 (lab replicate)	MW219	GWDUPA-1	GWDUPB-1
Inorganic Compounds and Parameters									
pH		6.5 - 8.5	7.5	NA	7.8	NA	8	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**4000**	NA	**1500**	NA	**6700**	NA	NA
Turbidity (NTU)		NSL	NA	NA	NA	NA	NA	NA	NA
Metals and Metalloids									
Arsenic (As III)	1	24	<1	<1	**1**	NA	**3**	<1	<1
Cadmium	0.1	0.2	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Chromium (SAC for Cr III adopted)	1	3.3	<1	<1	<1	NA	**42**	<1	<1
Copper	1	1.4	**3**	**3**	<1	NA	**2**	<1	**3**
Lead	1	3.4	<1	<1	<1	NA	<1	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05	<0.05	NA	<0.05	<0.05	**3**
Nickel	1	11	**2**	**2**	**4**	NA	**2**	**4**	**4**
Zinc	1	8	**4**	**4**	**1**	NA	**9**	**7**	<0.05
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)									
Benzene	1	950	<1	NA	<1	<1	<1	<1	<10
Toluene	1	180	<1	NA	<1	<1	<1	<1	<10
Ethylbenzene	1	80	<1	NA	<1	<1	<1	<1	<10
m+p-xylene	2	75	<2	NA	<2	<2	<2	<2	<10
o-xylene	1	350	<1	NA	<1	<1	<1	<1	<10
Total xylenes	2	NSL	<2	NA	<2	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	0.2	16	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Anthracene	0.1	0.01	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1

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

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

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	SAMPLES						
			MW205	MW205 (lab replicate)	MW206	MW206 (lab replicate)	MW219	GWDUPA-1	GWDUPB-1
Inorganic Compounds and Parameters									
pH		6.5 - 8.5	7.5	NA	7.8	NA	8	NA	NA
Electrical Conductivity (µS/cm)	1	NSL	**4000**	NA	**1500**	NA	**6700**	NA	NA
Turbidity (NTU)		NSL	NA	NA	NA	NA	NA	NA	NA
Metals and Metalloids									
Arsenic (As III)	1	100	<1	<1	**1**	NA	**3**	<1	<1
Cadmium	0.1	20	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Chromium (total)	1	500	<1	<1	<1	NA	**42**	<1	<1
Copper	1	20000	**3**	**3**	<1	NA	**2**	<1	**3**
Lead	1	100	<1	<1	<1	NA	<1	<1	<1
Total Mercury (inorganic)	0.05	10	<0.05	<0.05	<0.05	NA	<0.05	<0.05	**3**
Nickel	1	200	**2**	**2**	**4**	NA	**2**	**4**	**4**
Zinc	1	30000	**4**	**4**	**1**	NA	**9**	**7**	<0.05
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)									
Benzene	1	10	<1	NA	<1	<1	<1	<1	<10
Toluene	1	8000	<1	NA	<1	<1	<1	<1	<10
Ethylbenzene	1	3000	<1	NA	<1	<1	<1	<1	<10
m+p-xylene	2	NSL	<2	NA	<2	<2	<2	<2	<10
o-xylene	1	NSL	<1	NA	<1	<1	<1	<1	<10
Total xylenes	2	6000	<2	NA	<2	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)									
Naphthalene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.1
Acenaphthylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Phenanthrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Fluoranthene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2	<0.2	NA	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1

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

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

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services				10	50	1	1	1	2	1	
NEPM 2013 - Land Use Category				HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MW205	1.84	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	0.6
MW205 (lab replicate)	1.84	0m to <2m	Sand	NA	<50	NA	NA	NA	NA	NA	NA
MW206	1.1	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	1.1
MW206 (lab replicate)	1.1	0m to <2m	Sand	<10	NA	<1	<1	<1	<2	<1	NA
MW219	7.34	4m to <8m	Sand	<10	**160**	<1	<1	<1	<2	<1	>500
GWDUPA-1	1.1	0m to <2m	Sand	<10	<50	<1	<1	<1	<2	<1	NA
GWDUPB-1	1.84	0m to <2m	Sand	<10	<50	<10	<10	<10	<2	<10	NA
Total Number of Samples				6	6	6	6	6	6	6	3
Maximum Value				<PQL	160	<PQL	<PQL	<PQL	<PQL	<PQL	7500

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

HSL GROUNDWATER ASSESSMENT CRITERIA

Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
MW205	1.84	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW205 (lab replicate)	1.84	0m to <2m	Sand	NA	SSA	NA	NA	NA	NA	NA
MW206	1.1	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
MW206 (lab replicate)	1.1	0m to <2m	Sand	SSA	NA	SSA	SSA	SSA	SSA	SSA
MW219	7.34	4m to <8m	Sand	1000	1000	800	NL	NL	NL	NL
GWDUPA-1	1.1	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA
GWDUPB-1	1.84	0m to <2m	Sand	SSA	SSA	SSA	SSA	SSA	SSA	SSA

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TABLE G4
GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011	WHO 2008	USEPA RSL Tapwater 2017	SAMPLES					
					MW205	MW205 (lab replicate)	MW206	MW206 (lab replicate)	GWDUPA-1	GWDUPB-1
Total Recoverable Hydrocarbons (TRH)										
C_6-C_9 Aliphatics (assessed using F1)	10	-	-	-	<10	NA	<10	<10	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	-	90-300	-	<50	<50	<50	NA	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)										
Benzene	1	1	-	-	<1	NA	<1	<1	<1	<10
Toluene	1	800	-	-	<1	NA	<1	<1	<1	<10
Ethylbenzene	1	300	-	-	<1	NA	<1	<1	<1	<10
Total xylenes	2	600	-	-	<2	NA	<2	<2	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)										
Naphthalene	1	-	-	6.1	<1	NA	<1	<1	<1	<10

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

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TABLE Q1
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	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*	*2*	*1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH206	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	0.06	<0.1	<0.1	<0.1
laboratory	SDUPB-1	NA	<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	0.075	nc	nc	nc	0.043	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	67%	nc	nc	nc	82%	nc	nc	nc
Intra	TP218	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	SDUPD-1	NA	<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	BH207	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1
laboratory	SDUPC-1	NA	<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	TP213	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	SDUPF-1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.2	0.07	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0.125	0.125	nc	nc	nc	0.048	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	120%	120%	nc	nc	nc	95%	nc	nc	nc
Trip	TSS-A1		-	-	-	-	115%	117%	112%	110%	113%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/12/22																									
Field	TBS-A1	NA	<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	13 - 15/12/2022																									
Field	FRS-A1	µg/L	<10	<50	<100	<100	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1
Rinsate	13/12/22																									
Field	FRS-B1	µg/L	<10	<50	<100	<100	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1
Rinsate	14/12/22																									

			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	BH206	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	SDUPB-1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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	TP218	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	SDUPD-1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	BH207	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUPC-1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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	TP213	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	SDUPF-1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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
Trip	TSS-A1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/12/22																					
Field	TBS-A1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	13 - 15/12/2022																					
Field	FRS-A1	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	13/12/22																					
Field	FRS-B1	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	14/12/22																					

			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*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*
Intra	BH206	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	21	17	17	0.3	19	34
laboratory	SDUPB-1	NA	<0.1	<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	18	15	11	0.3	19	34
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	19.5	16	14	0.3	19	34
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	15%	13%	43%	0%	0%	0%
Intra	TP218	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	18	0.1	21	38
laboratory	SDUPD-1	NA	<0.1	<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	18	14	21	0.1	17	42
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	19	15	19.5	0.1	19	40
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	11%	13%	15%	0%	21%	10%
Inter	BH207	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	22	17	30	0.5	25	35
laboratory	SDUPC-1	NA	<0.1	<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	27	19	17	0.6	27	39
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	24.5	18	23.5	0.55	26	37
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	20%	11%	55%	18%	8%	11%
Inter	TP213	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	15	22	28	0.2	14	51
laboratory	SDUPF-1	NA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	15	22	31	0.1	14	54
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	15	22	29.5	0.15	14	52.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0%	0%	10%	67%	0%	6%
Trip	TSS-A1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/12/22																						
Field	TBS-A1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<4	<0.4	3	<1	2	<0.1	<1	1
Blank	13 - 15/12/2022																						
Field	FRS-A1	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<0.1	<1	260	<1	<0.05	<1	20
Rinsate	13/12/22																						
Field	FRS-B1	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<0.1	<1	150	1	<0.05	<1	54
Rinsate	14/12/22																						

Result outside of QA/QC acceptance criteria

TABLE Q2
GROUNDWATER QA/QC SUMMARY

		TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD	*10*	*50*	*100*	*100*	*1*	*1*	*1*	*2*	*1*
	PQL Envirolab VIC	*10*	*50*	*100*	*100*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*
Inter	MW206	<10	<50	<100	<100	<1	<1	<1	<2	<1
laboratory	GWDUPA-1	<10	<50	<100	<100	<1	<1	<1	<2	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	MW205	<10	<50	<100	<100	<1	<1	<1	<2	<1
laboratory	GWDUPB-1	<10	<50	<100	<100	<10	<10	<10	<10	<10
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	GW-TB1	<10	<50	<100	<100	<1	<1	<1	<2	<1
Blank	15/12/2022									
Trip	TSW-A1	-	-	-	-	92%	90%	85%	96%	81%
Spike	15/12/2022									

		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	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
	PQL Envirolab VIC	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Inter	MW206	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
laboratory	GWDUPA-1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	MW205	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
laboratory	GWDUPB-1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
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	GW-TB1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1
Blank	15/12/2022															
Trip	TSW-A1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	15/12/2022															

		Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
	PQL Envirolab VIC	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
Inter	MW206	1	<0.1	<1	<1	<1	<0.05	4	1
laboratory	GWDUPA-1	<1	<0.1	<1	<1	<1	<0.05	4	7
duplicate	MEAN	0.75	nc	nc	nc	nc	nc	4	4
	RPD %	67%	nc	nc	nc	nc	nc	0%	150%
Intra	MW205	<1	<0.1	<1	3	<1	<0.05	2	4
laboratory	GWDUPB-1	<1	<0.1	<1	3	<1	3	4	<0.05
duplicate	MEAN	nc	nc	nc	3	nc	1.5125	3	2.25
	RPD %	nc	nc	nc	0%	nc	197%	67%	156%
Field	GW-TB1	<1	<0.1	<1	150	1	<0.05	<1	52
Blank	15/12/2022								
Trip	TSW-A1	-	-	-	-	-	-	-	
Spike	15/12/2022								

Result outside of QA/QC acceptance criteria: Value

PSI Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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

Waste Classification and TCLP Table:

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

QA/QC Table:

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

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

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**25**	**22**	<0.1	**29**	**78**	<0.05	<0.5	<0.1	<0.1	<0.1	**1.1**	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH1 (lab duplicate)	0-0.1	Fill: Silty Clay	<4	<0.4	**23**	**20**	**20**	<0.1	**26**	**66**	<0.05	<0.5	<0.1	<0.1	<0.1	**1.1**	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH2	0-0.1	Fill: Sandy Clay	<4	<0.4	**24**	**13**	**10**	<0.1	**23**	**34**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH3	0-0.1	Fill: Sandy Clay	<4	<0.4	**28**	**25**	**37**	**0.1**	**33**	**80**	**5.5**	**0.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH4	0-0.1	Fill: Silty Sand	<4	<0.4	**22**	**18**	**29**	<0.1	**28**	**57**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH5	0-0.1	Fill: Silty Sand	<4	<0.4	**30**	**20**	**19**	**8.4**	**31**	**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
BH6	0-0.1	Fill: Silty Sand	<4	<0.4	**32**	**20**	**29**	**0.3**	**30**	**50**	<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	0.15-0.3	Fill: Sandy Gravel	<4	<0.4	**56**	**38**	**5**	<0.1	**90**	**45**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH8	0-0.1	Fill: Sandy Clay	<4	<0.4	**27**	**19**	**11**	<0.1	**32**	**38**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP1	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**19**	**11**	<0.1	**24**	**74**	<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	0-0.1	Fill: Gravelly Clay	<4	<0.4	**27**	**31**	**35**	**0.1**	**32**	**71**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	<4	<0.4	**28**	**32**	**35**	**0.2**	**35**	**75**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
TP3	0-0.1	Fill: Gravelly Clay	<4	<0.4	**30**	**23**	**12**	<0.1	**33**	**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
TP4	0-0.1	Fill: Sandy Clay	<4	<0.4	**31**	**22**	**14**	**0.3**	**36**	**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
TP5	0-0.1	Fill: Gravelly Clay	<4	<0.4	**25**	**20**	**20**	**0.2**	**29**	**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
TP6	0-0.1	Fill: Gravelly Clay	<4	<0.4	**61**	**16**	**11**	<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
SDUP1	-	Fill: Silty Clay	<4	<0.4	**28**	**25**	**22**	<0.1	**35**	**81**	<0.05	<0.5	<0.1	<0.1	<0.1	**1.2**	<0.1	<0.1	<0.1	<0.1	<0.1	NA
SDUP2	-	Fill: Gravelly Clay	<4	<0.4	**23**	**18**	**11**	<0.1	**22**	**69**	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
FCF1-TP2	0.1-0.3	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			18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	13
Maximum Value			<PQL	<PQL	61	38	37	8.4	90	81	5.5	0.8	<PQL	<PQL	<PQL	1.2	<PQL	<PQL	<PQL	<PQL	<PQL	Detected

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

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

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH1 (lab duplicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH1	1.0-1.45	Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.9
BH2	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH3	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH4	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH5	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH6	0-0.1	Fill: Silty Sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH7	0.15-0.3	Fill: Sandy Gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH8	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP1	0-0.1	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
TP2	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP3	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP4	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP5	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
TP6	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP1	-	Fill: Silty Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
SDUP2	-	Fill: Gravelly Clay	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples					19	19	19	19	19	19	19	19
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL

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

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	Sample Depth	Sample Description	Depth Category	Soil Category	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
BH1	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1 (lab duplicate)	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH1	1.0-1.45	Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH2	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH3	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH4	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH5	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH6	0-0.1	Fill: Silty Sand	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH7	0.15-0.3	Fill: Sandy Gravel	0m to <1m	Sand	45	110	0.5	160	55	40	3
BH8	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP1	0-0.1	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP2	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP3	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP4	0-0.1	Fill: Sandy Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP5	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
TP6	0-0.1	Fill: Gravelly Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP1	-	Fill: Silty Clay	0m to <1m	Sand	45	110	0.5	160	55	40	3
SDUP2	-	Fill: Gravelly 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**				
BH1	0-0.1	Coarse	<25	<50	**100**	<100
BH1 (lab replicate)	0-0.1	Coarse	<25	<50	**130**	<100
BH1	1.0-1.45	Coarse	<25	<50	<100	<100
BH2	0-0.1	Coarse	<25	<50	<100	<100
BH3	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	0-0.1	Coarse	<25	<50	<100	<100
BH7	0.15-0.3	Coarse	<25	<50	<100	<100
BH8	0-0.1	Coarse	<25	<50	<100	<100
TP1	0-0.1	Coarse	<25	<50	**140**	<100
TP2	0-0.1	Coarse	<25	<50	<100	<100
TP2 (lab replicate)	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
TP6	0-0.1	Coarse	<25	<50	<100	<100
SDUP1	-	Coarse	<25	<50	**100**	**110**
SDUP2	-	Coarse	<25	<50	**170**	<100
Total Number of Samples			19	19	19	19
Maximum Value			<PQL	<PQL	170	110

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

MANAGEMENT LIMIT ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Soil Texture**	C_6-C_{10} (F1) plus BTEX	>C_{10}-C_{16} (F2) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)
BH1	0-0.1	Coarse	700	1000	2500	10000
BH1 (lab replicate)	0-0.1	Coarse	700	1000	2500	10000
BH1	1.0-1.45	Coarse	700	1000	2500	10000
BH2	0-0.1	Coarse	700	1000	2500	10000
BH3	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	0-0.1	Coarse	700	1000	2500	10000
BH7	0.15-0.3	Coarse	700	1000	2500	10000
BH8	0-0.1	Coarse	700	1000	2500	10000
TP1	0-0.1	Coarse	700	1000	2500	10000
TP2	0-0.1	Coarse	700	1000	2500	10000
TP2 (lab replicate)	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
TP6	0-0.1	Coarse	700	1000	2500	10000
SDUP1	-	Coarse	700	1000	2500	10000
SDUP2	-	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**										
BH1	0-0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<1	0
BH1 (lab duplicate)	0-0.1	<25	<50	**130**	<100	<0.2	<0.5	<1	<1	<1	0
BH1	1.0-1.45	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	3.9
BH2	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH3	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	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH7	0.15-0.3	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
BH8	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0.1
TP1	0-0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<1	0.1
TP2	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
TP2 (lab duplicate)	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
TP6	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	0
SDUP1	-	<25	<50	**100**	**110**	<0.2	<0.5	<1	<1	<1	0
SDUP2	-	<25	<50	**170**	<100	<0.2	<0.5	<1	<1	<1	0
Total Number of Samples		19	19	19	19	19	19	19	19	19	19
Maximum Value		<PQL	<PQL	170	110	<PQL	<PQL	<PQL	<PQL	<PQL	NA

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

JKEnvironments

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**
1/06/2022	BH1	0-0.1	No	10	10,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH1	0-0.1	630.91	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
1/06/2022	BH1	0.1-0.6	NA	10	10,650	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	BH2	0-0.1	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH2	0-0.1	691.17	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
1/06/2022	BH2	0.1-0.8	NA	NA	4,180	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	BH3	0-0.1	No	10	10,070	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH3	0-0.1	642.9	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
1/06/2022	BH3	0.1-0.8	NA	NA	4,750	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/06/2022	BH4	0-0.1	No	10	10,690	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH4	0-0.1	749.46	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
2/06/2022	BH4	0.1-1.0	NA	NA	NA	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/06/2022	BH4	1.0-1.6	NA	NA	4,070	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/06/2022	BH5	0-0.1	No	NA	9,870	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH5	0-0.1	702.75	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
2/06/2022	BH5	0.1-0.8	NA	NA	2,020	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/06/2022	BH6	0-0.1	No	10	11,020	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH6	0-0.1	544.19	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected			<0.01	<0.001
3/06/2022	BH7	0.15-0.3	NA	NA	2,770	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH7	0.15-0.3	831.26	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
3/06/2022	BH7	0.3-0.7	NA	NA	9,500	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3/06/2022	BH8	0-0.1	No	10	10,850	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	BH8	0-0.1	744.64	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
3/06/2022	BH8	0.1-0.9	NA	NA	8,630	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP1	0-0.1	No	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP1	0-0.1	616.78	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
1/06/2022	TP1	0.1-0.2	NA	10	10,200	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP1	0.2-0.6	NA	10	10,910	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP1	0.6-1.0	NA	10	10,710	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP2	0-0.1	No	10	11,710	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP2	0.1-0.3	NA	10	10,050	12.3	1.8465	0.0184	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP2	0.1-0.3	745.43	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected			<0.01	<0.001
1/06/2022	TP3	0-0.1	No	10	11,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP3	0-0.1	709.63	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
1/06/2022	TP3	0.1-0.2m	NA	10	11,110	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP3	0.2-1.0	NA	10	10,700	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP4	0-0.1	No	10	10,410	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP4	0-0.1	673.26	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
1/06/2022	TP4	0.1-0.7	NA	10	10,100	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP5	0-0.1	No	10	10,190	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP5	0-0.1	795.56	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
1/06/2022	TP5	0.25-0.5	NA	10	11,030	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP5	0.5-0.9	NA	10	10,010	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP6	0-0.1	No	10	10,760	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	297823	TP6	0-0.1	40	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	NA	NA	NA	NA
1/06/2022	TP6	0.1-0.3	NA	10	10,570	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/06/2022	TP6	0.3-0.5	NA	10	10,450	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Concentration above the SAC **VALUE**

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

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	8	18	104	5	77	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	<4	**25**	**25**	**22**	**29**	**78**	<1	<0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	<0.05
BH1 (lab duplicate)	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	<4	**23**	**20**	**20**	**26**	**66**	<1	<0.1	<25	<50	**130**	<100	<0.2	<0.5	<1	<1	<0.05
BH1	1.0-1.45	Silty Clay	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	NA
BH2	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	<4	**24**	**13**	**10**	**23**	**34**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH3	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	<4	**28**	**25**	**37**	**33**	**80**	<1	<0.1	<25	<50	**100**	<100	<0.2	<0.5	<1	<1	**0.55**
BH4	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**22**	**18**	**29**	**28**	**57**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH5	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**30**	**20**	**19**	**31**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH6	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	<4	**32**	**20**	**29**	**30**	**50**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH7	0.15-0.3	Fill: Sandy Gravel	Coarse	**8.6**	**18**	**10**	<4	**56**	**38**	**5**	**90**	**45**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH8	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	<4	**27**	**19**	**11**	**32**	**38**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP1	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	<4	**25**	**19**	**11**	**24**	**74**	<1	<0.1	<25	<50	**140**	<100	<0.2	<0.5	<1	<1	<0.05
TP2	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**27**	**31**	**35**	**32**	**71**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**28**	**32**	**35**	**35**	**75**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP3	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**30**	**23**	**12**	**33**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP4	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	<4	**31**	**22**	**14**	**36**	**44**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP5	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**25**	**20**	**20**	**29**	**51**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
TP6	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**61**	**16**	**11**	**19**	**48**	<1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
SDUP1	-	Fill: Silty Clay	Coarse	NA	NA	NA	<4	**28**	**25**	**22**	**35**	**81**	<1	<0.1	<25	<50	**100**	**110**	<0.2	<0.5	<1	<1	<0.05
SDUP2	-	Fill: Gravelly Clay	Coarse	NA	NA	NA	<4	**23**	**18**	**11**	**22**	**69**	<1	<0.1	<25	<50	**170**	<100	<0.2	<0.5	<1	<1	<0.05
Total Number of Samples				1	1	1	18	18	18	18	18	18	19	18	19	19	19	19	19	19	19	19	18
Maximum Value				8.6	18	10	<PQL	61	38	37	90	81	<PQL	<PQL	<PQL	<PQL	170	110	<PQL	<PQL	<PQL	<PQL	0.55

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

EIL AND ESL ASSESSMENT CRITERIA																							
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**	pH	CEC (cmolc/kg)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
BH1	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH1 (lab duplicate)	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH1	1.0-1.45	Silty Clay	Coarse	NA	NA	NA	--	--	--	--	--	--	170	--	180	120	300	2800	50	85	70	105	--
BH2	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH3	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH4	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH5	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH6	0-0.1	Fill: Silty Sand	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
BH7	0.15-0.3	Fill: Sandy Gravel	Coarse	**8.6**	**18**	**10**	100	410	230	1200	280	780	170	180	180	120	300	2800	50	85	70	105	20
BH8	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP1	0-0.1	Fill: Silty Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP2	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP3	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP4	0-0.1	Fill: Sandy Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP5	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
TP6	0-0.1	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP1	-	Fill: Silty Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20
SDUP2	-	Fill: Gravelly Clay	Coarse	NA	NA	NA	100	200	80	1200	35	150	170	180	180	120	300	2800	50	85	70	105	20

JKEnvironments

TABLE S7

SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES

All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled		C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	50	0.2	0.5	1	1	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	50	50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	50	50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**25**	**22**	<0.1	**29**	**78**	<0.05	<0.05	<0.1	<0.1	<0.1	**1.1**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH1 (lab duplicate	0-0.1	Fill: Silty Clay	<4	<0.4	**23**	**20**	**20**	<0.1	**26**	**66**	<0.05	<0.05	<0.1	<0.1	<0.1	**1.1**	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	NA
BH1	1.0-1.45	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
BH2	0-0.1	Fill: Sandy Clay	<4	<0.4	**24**	**13**	**10**	<0.1	**23**	**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	Not Detected
BH3	0-0.1	Fill: Sandy Clay	<4	<0.4	**28**	**25**	**37**	**0.1**	**33**	**80**	**5.5**	**0.55**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH4	0-0.1	Fill: Silty Sand	<4	<0.4	**22**	**18**	**29**	<0.1	**28**	**57**	<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 Sand	<4	<0.4	**30**	**20**	**19**	**8.4**	**31**	**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
BH6	0-0.1	Fill: Silty Sand	<4	<0.4	**32**	**20**	**29**	**0.3**	**30**	**50**	<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	0.15-0.3	Fill: Sandy Gravel	<4	<0.4	**56**	**38**	**5**	<0.1	**90**	**45**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
BH8	0-0.1	Fill: Sandy Clay	<4	<0.4	**27**	**19**	**11**	<0.1	**32**	**38**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<1	Not Detected
TP1	0-0.1	Fill: Silty Clay	<4	<0.4	**25**	**19**	**11**	<0.1	**24**	**74**	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	**120**	**120**	<0.2	<0.5	<1	<1	Not Detected
TP2	0-0.1	Fill: Gravelly Clay	<4	<0.4	**27**	**31**	**35**	**0.1**	**32**	**71**	<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
TP2 (lab duplicate)	0-0.1	Fill: Gravelly Clay	<4	<0.4	**28**	**32**	**35**	**0.2**	**35**	**75**	<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
TP3	0-0.1	Fill: Gravelly Clay	<4	<0.4	**30**	**23**	**12**	<0.1	**33**	**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
TP4	0-0.1	Fill: Sandy Clay	<4	<0.4	**31**	**22**	**14**	**0.3**	**36**	**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
TP5	0-0.1	Fill: Gravelly Clay	<4	<0.4	**25**	**20**	**20**	**0.2**	**29**	**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
TP6	0-0.1	Fill: Gravelly Clay	<4	<0.4	**61**	**16**	**11**	<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
SDUP1	-	Fill: Silty Clay	<4	<0.4	**28**	**25**	**22**	<0.1	**35**	**81**	<0.05	<0.05	<0.1	<0.1	<0.1	**1.2**	<0.1	<25	<50	<100	**130**	**130**	<0.2	<0.5	<1	<1	NA
SDUP2	-	Fill: Gravelly Clay	<4	<0.4	**23**	**18**	**11**	<0.1	**22**	**69**	<0.05	<0.05	<0.1	<0.1	<0.1	**<0.1**	<0.1	<25	<50	<100	**190**	**190**	<0.2	<0.5	<1	<1	NA
FCF1-TP2	0.1-0.3	Fibre Cement Fragment	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			18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	19	19	19	19	19	19	19	19	19	13
Maximum Value			<PQL	<PQL	61	38	37	8.4	90	81	5.5	0.55	<PQL	<PQL	<PQL	1.2	<PQL	<PQL	<PQL	<PQL	190	190	<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 LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Mercury	Nickel
PQL - Envirolab Services			0.01	0.02
TCLP1 - General Solid Waste			0.2	2
TCLP2 - Restricted Solid Waste			0.8	8
TCLP3 - Hazardous Waste			>0.8	>8
Sample Reference	**Sample Depth**	**Sample Description**		
BH5	0-0.1	Fill: Silty Sand	<0.0005	NA
BH7	0.15-0.3	Fill: Sandy Gravel	NA	**0.1**
Total Number of samples			1	1
Maximum Value			<PQL	0.1

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

JKEnvironments

TABLE 9
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*	*2*	*1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*
Intra	BH1	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	SDUP1	-	<25	<50	100	110	<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	100	80	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	0%	75%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	TP2	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	SDUP2	-	<25	<50	170	<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	110	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	109%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	mg/kg	NA	NA	NA	NA	<0.2	<0.5	<1	<2	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	1/06/22																									
Field	FR-S1-SPT	µg/L	NA	NA	NA	NA	<1	<1	<1	<2	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rinsate	3/06/22																									
Trip	TS-S1		-	-	-	-	89%	96%	100%	98%	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	1/06/22																									

			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	BH1	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	1.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
laboratory	SDUP1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<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	1.15	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	9%	nc	nc	nc	nc	nc	nc	nc
Inter	TP2	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	SDUP2	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	1/06/22																					
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	3/06/22																					
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	1/06/22																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4*	*0.4*	*1*	*1*	*1*	*0.1*	*1*	*1*
	PQL Envirolab VIC		*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*4.0*	*0.4*	*1.0*	*1.0*	*1.0*	*0.1*	*1.0*	*1.0*
Intra	BH1	0-0.1	<0.1	<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	25	25	22	<0.1	29	78
laboratory	SDUP1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	28	25	22	<0.1	35	81
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	26.5	25	22	nc	32	79.5
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	11%	0%	0%	nc	19%	4%
Inter	TP2	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	27	31	35	0.1	32	71
laboratory	SDUP2	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	23	18	11	<0.1	22	69
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	25	24.5	23	0.075	27	70
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	16%	53%	104%	67%	37%	3%
Field	TB-S1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	1/06/22																						
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	NA
Rinsate	3/06/22																						
Trip	TS-S1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spike	1/06/22																						

Result outside of QA/QC acceptance criteria

Appendix D: Borehole & Test pit Logs

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH201** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 277.72m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sandy gravel, fine to medium grained, brown, igneous, fine to medium grained sand.	D			SCREEN: 7.24kg 0.05-0.05m NO FCF
		N = 3 2,1,2	0.5			FILL: Silty sandy clay, low plasticity, brown, trace of river gravel, ash and medium grained sand.	w<PL			INSUFFICIENT VOLUME FOR BULK SCREEN
			1		CL-CI	Silty CLAY: low to medium plasticity, brown, trace of ironstone gravel.	w<PL			RESIDUAL
		N = 10 3,5,5	1.5							
			2			END OF BOREHOLE AT 1.95m				
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH202** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 278.47m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sandy gravel, fine to medium grained, igneous, trace of fine to medium grained sand.	D			SCREEN: 6.1kg 0.05-0.4m NO FCF
		N = 5 3,2,3	0.5		CL-CI	Silty CLAY: low to medium plasticity, brown, trace of ironstone gravel, and fine to medium grained sand.	w≈PL			RESIDUAL
			1			END OF BOREHOLE AT 0.95m				
			1.5							
			2							
			2.5							
			3							
			3.5							

ENVIRONMENTAL LOG

Log No. **BH205**

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 279.27m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			FILL: Silty sand, fine to medium grained, brown, trace of igneous, ironstone and river gravel, and brick.	D			GRASS COVER SCREEN: 10.5kg 0-0.1m NO FCF SCREEN: 2.41kg 0.1-1.0m NO FCF
		N = 12 7,6,6	0.5							
			1		CL-CI	Silty CLAY: low to medium platicity, brown, trace of ironstone gravel, and root fibres.	w<PL			RESIDUAL
		N = 10 3,4,6	1.5							
ON 15/12/22			2							
			2.5			as above, but trace of fine to medium grained sand.	w≈PL			
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No.
BH205
2/2

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 279.27m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									CL-CI	as above, but trace of fine to medium grained sand.	w≈PL			
▶							4		SC	Silty clayey SAND: fine to medium grained, brown, fine to medium grained sand.	W			
							4.5							
							5							
							5.5							
							6			END OOF BOREHOLE AT 6.0m				GROUNDWATER MONITORING WELL INSTALLED TO 8.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 8.0m TO 3.0m.CASING 3.0m TO SURFACE. 2mm SAND FILTER PACK 2.2m TO 1.5m. BENTONITE SEAL 1.5m TO 1.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							6.5							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH206** 1/2

SDUPB-1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 277.60m

Date: 13/12/22 **Datum:** AHD

Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
		0		FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel, and brick fragments.	D			GRASS COVER SCREEN: 10.18kg 0-0.1m NO FCF SCREEN: 4.0kg 0.1-0.7m NO FCF
	N = 4 4,2,7	0.5	CI	Silty CLAY: medium plasticity, brown.	w<PL			RESIDUAL
ON 15/12/22		1						
	N = 7 2,3,4	1.5		as above, but trace of ash.				
		2						
		2.5						
		3		as above, but light brown mottled brown, trace of ironstone gravel.				
		3.5						

SAMPLES: ES ASS ASB SAL DB

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH206**

2/2

SDUPB-1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 277.60m

Date: 13/12/22 **Datum:** AHD

Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
										Silty CLAY: medium plasticity, light brown mottled brown, trace of ironstone gravel and ash.	w<PL			
▶							4		CL-CI	Silty sandy CLAY: low plasticity, brown, fine to medium grained sand.	w>PL			
							4.5							
							5							
							5.5							GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.0m TO 3.0m. CASING 3.0m TO SURFACE. 2mm SAND FILTER PACK 6.0m TO 2.5m. BENTONITE SEAL 2.7m TO 2.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							6			END OF BOREHOLE AT 6.0m				
							6.5							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH207** 1/1

SDUPC-1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 278.60m

Date: 13/12/22 **Datum:** AHD

Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION		0		FILL: Silty sand, fine to medium grained, brown, trace of igneous and ironstone gravel, brick and concrete fragments, and slag.	D			GRASS COVER SCREEN: 7.15kg 0-0.1m NO FCF SCREEN 4.9kg 0.1-1.0m NO FCF
	N = 4 5,3,1	0.5						
		1	CL-CI	Silty CLAY: low to medium plasticity, brown, trace of ash.	w<PL			RESIDUAL
	N = 4 1,1,5	1.5						
		2		END OF BOREHOLE AT 2.0m				
		2.5						
		3						
		3.5						

Samples columns: ES, ASS, ASB, SAL, DB

JKEnvironments

ENVIRONMENTAL LOG

Log No.
BH214
1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 280.24m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			ASPHALTIC CONCRETE: 50mm.t				
									-	FILL: Silty sand, fine to medium grained, light brown, with igneous gravel.	D			SCREEN: 6.0kg 0.05-0.8m NO FCF
						N = 4 6,2,2	0.5							
										FILL: Silty clay, low plasticity, brown, trace of igneous and ironstone gravel, and ash.	w<PL			SCREEN: 2.25kg 0.8-1.1m NO FCF
							1		CL-CI	Silty CLAY: low to medium plasticity, brown, trace of ash.	w<PL			RESIDUAL
						N = 4 1,2,2	1.5							
							2			END OF BOREHOLE AT 1.95m				
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH219** 1/3

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 280.60m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION		0		ASPHALTIC CONCRETE: 50mm.t				
			-	FILL: Silty sand, fine to medium grained, light brown, with igneous gravel.	D			SCREEN: 5.10kg 0.05-0.8m NO FCF
	N = 13 4,6,7	0.5		FILL: Silty clay, low plasticity, brown, trace of igneous and ironstone gravel, ash and brick.				
		1						SCREEN: 6.2kg 0.8-1.8m NO FCF
	N = 12 6,6,6	1.5						INSUFFICIENT VOLUME FOR BULK SAMPLE 1.8-2.2m
		2						
			CL	Silty CLAY: low plasticity, brown, trace of ironstone gravel, and sand.	w<PL			
		2.5						
	N = 10 1,3,7	3						
		3.5						

SAMPLES: ES, ASS, ASB, SAL, DB

Graphic Log

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **BH219**

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 280.60m

Date: 13/12/22 **Datum:** AHD

Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
									CL-CI	Silty CLAY: low to medium plasticity, brown, trace of ironstone gravel.	w<PL			RESIDUAL
							4							
							4.5							
							5							
							5.5			as above, but with trace of sand.				
							6							
							6.5							
							7							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH219** 3/3

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 280.60m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
▼ ON 15/12/22							7.5							
							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 SURFACE. 2mm SAND FILTER PACK 8.0m TO 2.0m. BENTONITE SEAL 2.0m TO 1.3m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GATIC COVER.
							8.5							
							9							
							9.5							
							10							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH221** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 279.08m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			CONCRETE: 125mm.t				
					-	FILL: Silty sand, fine to medium grained, brown, trace of igneous and ironstone gravel and ironstone cobbles, and sand.	D			SCREEN: 5.2kg 0.125-1.3m NO FCF
		N = 3 2,2,1	0.5							
			1							
					CL	Silty CLAY: low plasticity, brown, trace sand.	w<PL			RESIDUAL
		N = 10 3,5,5	1.5							
			2			END OF BOREHOLE AT 1.95m				
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH222** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 279.90m
Date: 13/12/22 **Datum:** AHD
Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			ASPHALTIC CONCRETE: 50mm.t				
					-	FILL: Silty sand, fine to medium grained, light brown, with igneous gravel.	D			SCREEN: 5.56kg 0.05-1.1 m NO FCF
		N = 13 8,7,6	0.5							
			1		CL-CI	Silty CLAY: low to medium plasticity, dark brown, trace of ironstone gravel, and ash.	w<PL			RESIDUAL
		N = 8 3,3,5	1.5			as above, but brown mottled light brown.	w≈PL			
			2			END OF BOREHOLE AT 1.95m				
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **BH225**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** SPIRAL AUGER **R.L. Surface:** ≈ 279.31m

Date: 13/12/22 **Datum:** AHD

Plant Type: JK308 **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			ASPHALTIC CONCRETE: 50mm.t				
										FILL: Silty sandy clay, low plasticity, brown, trace of igneous and river gravel.	D			SCREEN: 9.2kg 0.05-0.7m NO FCF
						N = 7 2,3,4	0.5		CL-CI	Silty CLAY: low to medium plasticity, brown.	w<PL			RESIDUAL
							1			as above, but trace of sand.				
							1.5			END OF BOREHOLE AT 1.5m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. TP210 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** N/A

Date: 15/12/22 **Datum:** -

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sandy gravel, fine to medium grained, igneous, dark brown, fine to medium grained sand, trace of brick, concrete, metal and ceramic fragments.	D			SCREEN: 10.5kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP211** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 278.46m
Date: 15/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			GRAVEL COVER: 50mm.t				
									-	FILL: Silty clayey sand, medium to coarse grained, dark brown, trace of igneous and ironstone gravel, and river cobbles.	M			SCREEN: 11.05kg 0.05-0.15m NO FCF
										END OF TEST PIT AT 0.15m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP213 1/1

SDUPF-1: 0-0.1m

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 279.89m
Date: 15/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, and root fibres.	D			GRASS COVER SCREEN: 10.2kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							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

SDUPF-1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** N/A

Date: 15/12/22 **Datum:** -

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravely silt, fine to medium grained, brown, igneous, with clay fines, trace of concrete fragments.	D			SCREEN: 10.13kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP216** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** N/A

Date: 15/12/22 **Datum:** -

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0	▨		FILL: Silty gravel, fine to medium grained, igneous, brown, trace of ironstone gravel, igneous cobbles, concrete and brick fragments.	D			SCREEN: 12.77kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. TP217 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 279.35m
Date: 15/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sandy gravel, fine to medium grained, igneous, brown, fine to medium grained sand, trace of ironstone gravel and igneous cobbles, and root fibres.	D			GRASS COVER SCREEN: 10kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No.
TP218
1/1

Environmental logs are not to be used for geotechnical purposes

SDUPD-1: 0-0.1m

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.50m

Date: 15/12/22 **Datum:** AHD

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, and root fibres.	D			GRASS COVER SCREEN: 11.68kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP220**

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** N/A

Date: 15/12/22 **Datum:** -

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty gravel, fine to medium grained, igneous, brown, with clay fines, trace of ironstone gravel, igneous cobbles, and concrete fragments.	D			SCREEN: 13.05kg 0-0.1m NO FCF
										END OF TEST PIT AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP223** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.19m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES, ASS, ASB, SAL, DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0 – 0.5			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, and grass root fibres.	D			GRASS COVER SCREEN: 10.5kg 0-0.1m NO FCF SCREEN: 10.2kg 0.1-0.6m NO FCF
			1, 1.5, 2, 2.5, 3, 3.5			END OF TEST PIT AT 0.6m				

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ENVIRONMENTAL LOG

Log No. **TP224** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 281.00m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES (ES / ASS / ASB / SAL / DB)	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION			0			PAVERS: 50mm.t				
					-	FILL: Silty sandy gravel, grey, fine to medium grained, igneous, fine to medium grained sand.	D			SCREEN: 13.18kg 0.05-0.15m NO FCF
						FILL: Silty sandy, fine to medium grained, brown, clay, with igneous gravel and trace of ash and slag.	w<PL			SCREEN: 11.17kg 0.15-0.4m NO FCF
			0.5			END OF TEST PIT AT 0.4m				
			1							
			1.5							
			2							
			2.5							
			3							
			3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP226**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** 5T EXCAVATOR **R.L. Surface:** ≈ 280.70m

Date: 14/12/22 **Datum:** AHD

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0 – 0.5			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, and root fibres.	D			GRASS COVER SCREEN: 11.66kg 0-0.1m NO FCF SCREEN: 11.48kg 0.1-0.6m NO FCF
							1 – 3.5			END OF TEST PIT AT 0.6m				TEST PIT TERMINATED, PVC STORMWATER PIPE DAMAGED AND REPAIRED FIBRE CEMENT FRAGMENT (TP226-SPOIL) IDENTIFIED IN TEST PIT SPOIL

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP227** 1/1

Environmental logs are not to be used for geotechnical purposes

SDUPE-1: 0-0.1m

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 279.74m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous and ironstone gravel, brick and concrete fragments and root fibres.	D			GRASS COVER SCREEN: 10.7kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP228 1/1

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.74m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, and root fibres.	D			GRASS COVER SCREEN: 11.48kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP229** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.62m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, glass fragments and slag.	D			GRASS COVER SCREEN: 9.14kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP230** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.02m
Date: 15/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sandy gravel, fine to medium grained, brown, igneous, fine to medium grained sand, trace of ironstone gravel, slag and root fibres.	D			GRASS COVER SCREEN: 11.8kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. TP231

1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.57m

Date: 14/12/22 **Datum:** AHD

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

Groundwater Record	SAMPLES: ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, brown, trace of igneous and ironstone gravel, slag and root fibres.	D			GRASS COVER SCREEN: 10.31kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP232** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.92m
Date: 14/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous and ironstone gravel, glass, slag and root fibres.	D			GRASS COVER SCREEN: 10.1kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. TP233 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.35m
Date: 15/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sandy gravel, fine to medium grained, brown, igneous, fine to medium grained sand, trace of ironstone gravel, and root fibres.	D			GRASS COVER SCREEN: 10.5kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP234** 1/1

Environmental logs are not to be used for geotechnical purposes

SDUPA-1: 0-0.1m

Client: HI
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 280.74m
Date: 12/12/22 **Datum:** AHD
Plant Type: - **Logged/Checked by:** M.D./T.H.

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION							0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel and cobbles, brick and concrete fragments and FCF.	D			GRASS COVER SCREEN: 14.86kg 0-0.1m FCF1, FCF2, FCF3, FCF4
										END OF BOREHOLE AT 0.4m				SCREEN: 10.1kg 0.1-0.4m NO FCF HAND AUGER REFUSAL ON ROOTS
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Log No. **TP235** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: HI

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: MARQUIS STREET, GUNNEDAH, NSW

Job No.: E35091UPD **Method:** HAND TOOLS **R.L. Surface:** ≈ 281.16m

Date: 14/12/22 **Datum:** AHD

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

Groundwater Record	SAMPLES ES	ASS	ASB	SAL	DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty sand, fine to medium grained, brown, trace of igneous and ironstone gravel, trace of ash and root fibres.	D			GRASS COVER SCREEN: 10.2kg 0-0.1m NO FCF
										END OF BOREHOLE AT 0.1m				
							0.5							
							1							
							1.5							
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

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

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

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

DESCRIPTION AND CLASSIFICATION METHODS

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

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

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

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

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

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

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

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

INVESTIGATION METHODS

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

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

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

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

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

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

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

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

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

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

The test results are reported in the following form:

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

  N = 13
  4, 6, 7

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

  N > 30
  15, 30/40mm

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

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

LOGS

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

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

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

GROUNDWATER

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

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

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

FILL

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

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

LABORATORY TESTING

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

SYMBOL LEGENDS

SOIL

- FILL
- TOPSOIL
- CLAY (CL, CI, CH)
- SILT (ML, MH)
- SAND (SP, SW)
- GRAVEL (GP, GW)
- SANDY CLAY (CL, CI, CH)
- SILTY CLAY (CL, CI, CH)
- CLAYEY SAND (SC)
- SILTY SAND (SM)
- GRAVELLY CLAY (CL, CI, CH)
- CLAYEY GRAVEL (GC)
- SANDY SILT (ML, MH)
- PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK

- CONGLOMERATE
- SANDSTONE
- SHALE/MUDSTONE
- SILTSTONE
- CLAYSTONE
- COAL
- LAMINITE
- LIMESTONE
- PHYLLITE, SCHIST
- TUFF
- GRANITE, GABBRO
- DOLERITE, DIORITE
- BASALT, ANDESITE
- QUARTZITE

OTHER MATERIALS

- BRICKS OR PAVERS
- CONCRETE
- ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

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

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

Laboratory Classification Criteria

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

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

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

NOTES:

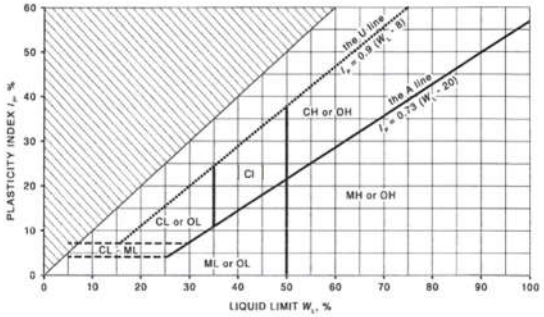
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

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

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

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

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



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record	▼	Standing water level. Time delay following completion of drilling/excavation may be shown.
	—C—	Extent of borehole/test pit collapse shortly after drilling/excavation.
	▶	Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES U50 DB DS ASB ASS SAL	Sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos analysis. Soil sample taken over depth indicated, for acid sulfate soil analysis. Soil sample taken over depth indicated, for salinity analysis.
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)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)**
	VL	VERY LOOSE ≤ 15 / 0 – 4
	L	LOOSE > 15 and ≤ 35 / 4 – 10
	MD	MEDIUM DENSE > 35 and ≤ 65 / 10 – 30
	D	DENSE > 65 and ≤ 85 / 30 – 50
	VD	VERY DENSE > 85 / > 50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
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

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

Appendix E: Laboratory Report(s) & COC Documents

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CERTIFICATE OF ANALYSIS 313438

Client Details

Client	JK Environments
Attention	Mitchell Delaney
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35091UPD, Gunnedah**
Number of Samples	63 Soil, 3 Material, 2 Water
Date samples received	19/12/2022
Date completed instructions received	19/12/2022

Analysis Details

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

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

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

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

Report Details

Date results requested by	04/01/2023
Date of Issue	04/01/2023

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Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Hannah Nguyen, Metals Supervisor
Josh Williams, Organics and LC Supervisor
Kyle Gavrily, Senior Chemist
Liam Timmins, Organic Instruments Team Leader
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Steven Luong, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-1	313438-2	313438-3	313438-5	313438-7
Your Reference	UNITS	BH201	BH201	BH201	BH202	BH205
Depth		0.05-0.3	0.5-0.8	0.8-0.95	0.05-0.3	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	112	106	112	108

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-8	313438-9	313438-10	313438-14	313438-15
Your Reference	UNITS	BH205	BH205	BH206	BH207	BH207
Depth		0.5-0.8	1.5-1.8	0-0.1	0-0.1	0.5-0.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	95	109	103	115

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-16	313438-17	313438-18	313438-19	313438-20
Your Reference	UNITS	BH207	TP210	TP211	TP213	TP214
Depth		1.0-1.2	0-0.1	0.05-1.5	0-0.1	0.05-0.25
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	95	102	106	114	85

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-21	313438-23	313438-24	313438-25	313438-26
Your Reference	UNITS	TP214	TP215	TP216	TP217	TP218
Depth		0.8-0.95	0-0.1	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	114	112	108	117

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-27	313438-29	313438-30	313438-32	313438-33
Your Reference	UNITS	BH219	BH219	BH219	TP220	BH221
Depth		0.05-0.4	1.5-1.8	2.2-2.5	0-0.1	0-.15-0.35
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	109	110	108	117	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-35	313438-36	313438-37	313438-39	313438-42
Your Reference	UNITS	BH221	BH222	BH222	TP223	TP224
Depth		1.5-1.8	0.0.5-0.25	1.1-1.3	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	109	107	106	76	109

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	108	111	105	106

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		313438-65	313438-66	313438-67
Your Reference	UNITS	TSS-A1	TBS-A1	TP228
Depth		NA	NA	0-0.1
Type of sample		Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	.
Date extracted	-	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	[NA]	<25	<25
TRH C_6 - C_{10}	mg/kg	[NA]	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	<25	<25
Benzene	mg/kg	115%	<0.2	<0.2
Toluene	mg/kg	117%	<0.5	<0.5
Ethylbenzene	mg/kg	112%	<1	<1
m+p-xylene	mg/kg	110%	<2	<2
o-Xylene	mg/kg	113%	<1	<1
Naphthalene	mg/kg	[NA]	<1	<1
Total +ve Xylenes	mg/kg	[NA]	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	110	108

svTRH (C10-C40) in Soil						
Our Reference		313438-1	313438-2	313438-3	313438-5	313438-7
Your Reference	UNITS	BH201	BH201	BH201	BH202	BH205
Depth		0.05-0.3	0.5-0.8	0.8-0.95	0.05-0.3	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	120	123	125	112	116

svTRH (C10-C40) in Soil						
Our Reference		313438-8	313438-9	313438-10	313438-14	313438-15
Your Reference	UNITS	BH205	BH205	BH206	BH207	BH207
Depth		0.5-0.8	1.5-1.8	0-0.1	0-0.1	0.5-0.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	132	119	133	120	121

svTRH (C10-C40) in Soil						
Our Reference		313438-16	313438-17	313438-18	313438-19	313438-20
Your Reference	UNITS	BH207	TP210	TP211	TP213	TP214
Depth		1.0-1.2	0-0.1	0.05-1.5	0-0.1	0.05-0.25
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	130	138	121	137	110

svTRH (C10-C40) in Soil						
Our Reference		313438-21	313438-23	313438-24	313438-25	313438-26
Your Reference	UNITS	TP214	TP215	TP216	TP217	TP218
Depth		0.8-0.95	0-0.1	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	121	137	140	135	71

svTRH (C10-C40) in Soil						
Our Reference		313438-27	313438-29	313438-30	313438-32	313438-33
Your Reference	UNITS	BH219	BH219	BH219	TP220	BH221
Depth		0.05-0.4	1.5-1.8	2.2-2.5	0-0.1	0-.15-0.35
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	131	112	108	139	107

svTRH (C10-C40) in Soil						
Our Reference		313438-35	313438-36	313438-37	313438-39	313438-42
Your Reference	UNITS	BH221	BH222	BH222	TP223	TP224
Depth		1.5-1.8	0.0.5-0.25	1.1-1.3	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	94	128	111	113	110

svTRH (C10-C40) in Soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	123	117	116	128	139

svTRH (C10-C40) in Soil			
Our Reference		313438-66	313438-67
Your Reference	UNITS	TBS-A1	TP228
Depth		NA	0-0.1
Type of sample		Soil	Soil
Date Sampled		15/12/2022	.
Date extracted	-	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	111	126

PAHs in Soil						
Our Reference		313438-1	313438-2	313438-3	313438-5	313438-7
Your Reference	UNITS	BH201	BH201	BH201	BH202	BH205
Depth		0.05-0.3	0.5-0.8	0.8-0.95	0.05-0.3	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	21/12/2022	21/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.09	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.09	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	85	114	115	82	83

PAHs in Soil						
Our Reference		313438-8	313438-9	313438-10	313438-14	313438-15
Your Reference	UNITS	BH205	BH205	BH206	BH207	BH207
Depth		0.5-0.8	1.5-1.8	0-0.1	0-0.1	0.5-0.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	30/12/2022	30/12/2022	21/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.06	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	0.2	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	118	112	85	83	110

PAHs in Soil						
Our Reference		313438-16	313438-17	313438-18	313438-19	313438-20
Your Reference	UNITS	BH207	TP210	TP211	TP213	TP214
Depth		1.0-1.2	0-0.1	0.05-1.5	0-0.1	0.05-0.25
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	0.2	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.2	0.2	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.07	0.1	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.4	0.85	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	113	86	81	85	90

PAHs in Soil						
Our Reference		313438-21	313438-23	313438-24	313438-25	313438-26
Your Reference	UNITS	TP214	TP215	TP216	TP217	TP218
Depth		0.8-0.95	0-0.1	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.06	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.52	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	112	84	86	79	84

PAHs in Soil						
Our Reference		313438-27	313438-29	313438-30	313438-32	313438-33
Your Reference	UNITS	BH219	BH219	BH219	TP220	BH221
Depth		0.05-0.4	1.5-1.8	2.2-2.5	0-0.1	0-.15-0.35
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	15/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	21/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	81	78	107	88	76

PAHs in Soil						
Our Reference		313438-35	313438-36	313438-37	313438-39	313438-42
Your Reference	UNITS	BH221	BH222	BH222	TP223	TP224
Depth		1.5-1.8	0.0.5-0.25	1.1-1.3	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	30/12/2022	21/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	107	78	108	79	76

PAHs in Soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	78	78	77	77	78

PAHs in Soil			
Our Reference		313438-66	313438-67
Your Reference	UNITS	TBS-A1	TP228
Depth		NA	0-0.1
Type of sample		Soil	Soil
Date Sampled		15/12/2022	.
Date extracted	-	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	30/12/2022
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	109	77

Organochlorine Pesticides in soil						
Our Reference		313438-1	313438-5	313438-7	313438-10	313438-14
Your Reference	UNITS	BH201	BH202	BH205	BH206	BH207
Depth		0.05-0.3	0.05-0.3	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	88	85	87	83

Organochlorine Pesticides in soil						
Our Reference		313438-17	313438-18	313438-19	313438-20	313438-23
Your Reference	UNITS	TP210	TP211	TP213	TP214	TP215
Depth		0-0.1	0.05-1.5	0-0.1	0.05-0.25	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	15/12/2022	13/12/2022	15/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	2.4
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.4	<0.1	<0.1	<0.1	6.3
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	86	85	93	84

Organochlorine Pesticides in soil						
Our Reference		313438-24	313438-25	313438-26	313438-27	313438-29
Your Reference	UNITS	TP216	TP217	TP218	BH219	BH219
Depth		0-0.1	0-0.1	0-0.1	0.05-0.4	1.5-1.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	14/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	3.3	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	8.4	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	83	87	87	84

Organochlorine Pesticides in soil						
Our Reference		313438-32	313438-33	313438-36	313438-39	313438-42
Your Reference	UNITS	TP220	BH221	BH222	TP223	TP224
Depth		0-0.1	0-.15-0.35	0.0.5-0.25	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	6.3	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	14	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	82	82	85	81

Organochlorine Pesticides in soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	82	82	81	80	81

Organochlorine Pesticides in soil		
Our Reference		313438-67
Your Reference	UNITS	TP228
Depth		0-0.1
Type of sample		Soil
Date Sampled		.
Date extracted	-	20/12/2022
Date analysed	-	30/12/2022
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	82

Organophosphorus Pesticides in Soil						
Our Reference		313438-1	313438-5	313438-7	313438-10	313438-14
Your Reference	UNITS	BH201	BH202	BH205	BH206	BH207
Depth		0.05-0.3	0.05-0.3	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	88	85	87	83

Organophosphorus Pesticides in Soil						
Our Reference		313438-17	313438-18	313438-19	313438-20	313438-23
Your Reference	UNITS	TP210	TP211	TP213	TP214	TP215
Depth		0-0.1	0.05-1.5	0-0.1	0.05-0.25	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	15/12/2022	13/12/2022	15/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	86	85	93	84

Organophosphorus Pesticides in Soil						
Our Reference		313438-24	313438-25	313438-26	313438-27	313438-29
Your Reference	UNITS	TP216	TP217	TP218	BH219	BH219
Depth		0-0.1	0-0.1	0-0.1	0.05-0.4	1.5-1.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	14/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	0.8	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	83	87	87	84

Organophosphorus Pesticides in Soil						
Our Reference		313438-32	313438-33	313438-36	313438-39	313438-42
Your Reference	UNITS	TP220	BH221	BH222	TP223	TP224
Depth		0-0.1	0-.15-0.35	0.0.5-0.25	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	82	82	85	81

Organophosphorus Pesticides in Soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	82	82	81	80	81

Organophosphorus Pesticides in Soil		
Our Reference		313438-67
Your Reference	UNITS	TP228
Depth		0-0.1
Type of sample		Soil
Date Sampled		.
Date extracted	-	20/12/2022
Date analysed	-	30/12/2022
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Ethion	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Surrogate TCMX	%	82

PCBs in Soil						
Our Reference		313438-1	313438-5	313438-7	313438-10	313438-14
Your Reference	UNITS	BH201	BH202	BH205	BH206	BH207
Depth		0.05-0.3	0.05-0.3	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	88	85	87	83

PCBs in Soil						
Our Reference		313438-17	313438-18	313438-19	313438-20	313438-23
Your Reference	UNITS	TP210	TP211	TP213	TP214	TP215
Depth		0-0.1	0.05-1.5	0-0.1	0.05-0.25	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	15/12/2022	13/12/2022	15/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	90	86	85	93	84

PCBs in Soil						
Our Reference		313438-24	313438-25	313438-26	313438-27	313438-29
Your Reference	UNITS	TP216	TP217	TP218	BH219	BH219
Depth		0-0.1	0-0.1	0-0.1	0.05-0.4	1.5-1.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	15/12/2022	14/12/2022	13/12/2022	13/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	83	87	87	84

PCBs in Soil						
Our Reference		313438-32	313438-33	313438-36	313438-39	313438-42
Your Reference	UNITS	TP220	BH221	BH222	TP223	TP224
Depth		0-0.1	0-.15-0.35	0.0.5-0.25	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		15/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	82	82	85	81

PCBs in Soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	30/12/2022	30/12/2022	30/12/2022	30/12/2022	30/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	82	82	81	80	81

PCBs in Soil		
Our Reference		313438-67
Your Reference	UNITS	TP228
Depth		0-0.1
Type of sample		Soil
Date Sampled		.
Date extracted	-	20/12/2022
Date analysed	-	30/12/2022
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCMX	%	82

Acid Extractable metals in soil						
Our Reference		313438-1	313438-2	313438-3	313438-5	313438-7
Your Reference	UNITS	BH201	BH201	BH201	BH202	BH205
Depth		0.05-0.3	0.5-0.8	0.8-0.95	0.05-0.3	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	25	46	25	21	29
Copper	mg/kg	21	34	18	18	25
Lead	mg/kg	48	13	6	10	18
Mercury	mg/kg	0.6	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	27	54	25	15	48
Zinc	mg/kg	56	47	19	31	41

Acid Extractable metals in soil						
Our Reference		313438-8	313438-9	313438-10	313438-14	313438-15
Your Reference	UNITS	BH205	BH205	BH206	BH207	BH207
Depth		0.5-0.8	1.5-1.8	0-0.1	0-0.1	0.5-0.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	24	18	21	22	17
Copper	mg/kg	14	14	17	17	12
Lead	mg/kg	8	5	17	30	7
Mercury	mg/kg	<0.1	<0.1	0.3	0.5	0.1
Nickel	mg/kg	21	21	19	25	19
Zinc	mg/kg	60	17	34	35	20

Acid Extractable metals in soil						
Our Reference		313438-16	313438-17	313438-18	313438-19	313438-20
Your Reference	UNITS	BH207	TP210	TP211	TP213	TP214
Depth		1.0-1.2	0-0.1	0.05-1.5	0-0.1	0.05-0.25
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	20	17	15	20
Copper	mg/kg	17	65	14	22	17
Lead	mg/kg	6	19	20	28	5
Mercury	mg/kg	<0.1	0.3	<0.1	0.2	<0.1
Nickel	mg/kg	25	24	17	14	17
Zinc	mg/kg	16	64	58	51	24

Acid Extractable metals in soil						
Our Reference		313438-21	313438-23	313438-24	313438-25	313438-26
Your Reference	UNITS	TP214	TP215	TP216	TP217	TP218
Depth		0.8-0.95	0-0.1	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	22	29	20	20
Copper	mg/kg	11	22	21	19	16
Lead	mg/kg	4	27	9	30	18
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	17	26	24	20	21
Zinc	mg/kg	11	42	27	69	38

Acid Extractable metals in soil						
Our Reference		313438-27	313438-29	313438-30	313438-32	313438-33
Your Reference	UNITS	BH219	BH219	BH219	TP220	BH221
Depth		0.05-0.4	1.5-1.8	2.2-2.5	0-0.1	0-.15-0.35
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	15/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	23	25	20	18
Copper	mg/kg	43	17	12	18	15
Lead	mg/kg	17	8	7	10	12
Mercury	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	28	16	24	21
Zinc	mg/kg	49	23	14	34	40

Acid Extractable metals in soil						
Our Reference		313438-35	313438-36	313438-37	313438-39	313438-42
Your Reference	UNITS	BH221	BH222	BH222	TP223	TP224
Depth		1.5-1.8	0.0.5-0.25	1.1-1.3	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	27	10	18	18	13
Copper	mg/kg	17	12	14	6	15
Lead	mg/kg	6	9	5	6	8
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	29	11	23	12	16
Zinc	mg/kg	17	26	16	9	29

Acid Extractable metals in soil						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	25	21	18	18
Copper	mg/kg	16	17	16	15	14
Lead	mg/kg	6	9	9	11	21
Mercury	mg/kg	<0.1	<0.1	<0.1	0.3	0.1
Nickel	mg/kg	25	32	23	19	17
Zinc	mg/kg	22	37	39	34	42

Acid Extractable metals in soil			
Our Reference		313438-66	313438-67
Your Reference	UNITS	TBS-A1	TP228
Depth		NA	0-0.1
Type of sample		Soil	Soil
Date Sampled		15/12/2022	.
Date prepared	-	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	3	21
Copper	mg/kg	<1	15
Lead	mg/kg	2	17
Mercury	mg/kg	<0.1	0.2
Nickel	mg/kg	<1	20
Zinc	mg/kg	1	31

Moisture						
Our Reference		313438-1	313438-2	313438-3	313438-5	313438-7
Your Reference	UNITS	BH201	BH201	BH201	BH202	BH205
Depth		0.05-0.3	0.5-0.8	0.8-0.95	0.05-0.3	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	19	53	5.1	4.5	5.7

Moisture						
Our Reference		313438-8	313438-9	313438-10	313438-14	313438-15
Your Reference	UNITS	BH205	BH205	BH206	BH207	BH207
Depth		0.5-0.8	1.5-1.8	0-0.1	0-0.1	0.5-0.8
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	13/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	4.2	5.9	5.2	4.7	5.3

Moisture						
Our Reference		313438-16	313438-17	313438-18	313438-19	313438-20
Your Reference	UNITS	BH207	TP210	TP211	TP213	TP214
Depth		1.0-1.2	0-0.1	0.05-1.5	0-0.1	0.05-0.25
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	7.3	3.8	4.6	4.2	4.3

Moisture						
Our Reference		313438-21	313438-23	313438-24	313438-25	313438-26
Your Reference	UNITS	TP214	TP215	TP216	TP217	TP218
Depth		0.8-0.95	0-0.1	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	5.1	0.6	1.4	4.5	4.5

Moisture						
Our Reference		313438-27	313438-29	313438-30	313438-32	313438-33
Your Reference	UNITS	BH219	BH219	BH219	TP220	BH221
Depth		0.05-0.4	1.5-1.8	2.2-2.5	0-0.1	0-.15-0.35
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	15/12/2022	13/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	1.5	9.0	6.5	0.7	5.8

Moisture						
Our Reference		313438-35	313438-36	313438-37	313438-39	313438-42
Your Reference	UNITS	BH221	BH222	BH222	TP223	TP224
Depth		1.5-1.8	0.0.5-0.25	1.1-1.3	0-0.1	0.15-0.4
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	13/12/2022	13/12/2022	14/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	71	4.0	4.7	4.8	3.9

Moisture						
Our Reference		313438-43	313438-45	313438-46	313438-56	313438-57
Your Reference	UNITS	BH225	TP226	TP226	SDUPB-1	SDUPD-1
Depth		0.05-0.3	0-0.1	0.4-0.6	NA	NA
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	14/12/2022	14/12/2022	13/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
Moisture	%	5.8	5.4	6.0	6.3	4.5

Moisture			
Our Reference		313438-66	313438-67
Your Reference	UNITS	TBS-A1	TP228
Depth		NA	0-0.1
Type of sample		Soil	Soil
Date Sampled		15/12/2022	.
Date prepared	-	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022
Moisture	%	0.6	4.5

Asbestos ID - soils NEPM - ASB-001						
Our Reference		313438-8	313438-18	313438-32	313438-47	313438-53
Your Reference	UNITS	BH205	TP211	TP220	TP227	TP234
Depth		0.5-0.8	0.05-1.5	0-0.1	0-0.1	0-0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Sampled		13/12/2022	15/12/2022	15/12/2022	15/12/2022	14/12/2022
Date analysed	-	29/12/2022	29/12/2022	29/12/2022	29/12/2022	29/12/2022
Sample mass tested	g	535.19	744.23	761.13	604.51	542.06
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

vTRH(C6-C10)/BTEXN in Water			
Our Reference		313438-63	313438-64
Your Reference	UNITS	FRS-A1	FRS-B1
Depth		NA	NA
Type of sample		Water	Water
Date Sampled		13/12/2022	14/12/2022
Date extracted	-	22/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	113	104
Surrogate toluene-d8	%	102	100
Surrogate 4-BFB	%	101	103

svTRH (C10-C40) in Water			
Our Reference		313438-63	313438-64
Your Reference	UNITS	FRS-A1	FRS-B1
Depth		NA	NA
Type of sample		Water	Water
Date Sampled		13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	95	86

PAHs in Water			
Our Reference		313438-63	313438-64
Your Reference	UNITS	FRS-A1	FRS-B1
Depth		NA	NA
Type of sample		Water	Water
Date Sampled		13/12/2022	14/12/2022
Date extracted	-	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	96	92

HM in water - dissolved			
Our Reference		313438-63	313438-64
Your Reference	UNITS	FRS-A1	FRS-B1
Depth		NA	NA
Type of sample		Water	Water
Date Sampled		13/12/2022	14/12/2022
Date prepared	-	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022
Arsenic-Dissolved	μg/L	<1	<1
Cadmium-Dissolved	μg/L	<0.1	<0.1
Chromium-Dissolved	μg/L	<1	<1
Copper-Dissolved	μg/L	260	150
Lead-Dissolved	μg/L	<1	1
Mercury-Dissolved	μg/L	<0.05	<0.05
Nickel-Dissolved	μg/L	<1	<1
Zinc-Dissolved	μg/L	20	54

Asbestos ID - materials			
Our Reference		313438-60	313438-62
Your Reference	UNITS	FCF-Surface1	TP226-spoil
Depth		NA	NA
Type of sample		Material	Material
Date Sampled		15/12/2022	14/12/2022
Date analysed	-	21/12/2022	21/12/2022
Mass / Dimension of Sample	-	39.43g	5.24g
Sample Description	-	Grey fibre cement material	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected	Chrysotile asbestos detected
Trace Analysis	-	[NT]	[NT]

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			21/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			22/12/2022	1	20/12/2022	20/12/2022		20/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	108	106
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	108	106
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	122	118
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	111	107
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	98	96
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	104	104
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	104	103
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	116	1	107	110	3	112	117

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	20/12/2022	20/12/2022		21/12/2022	21/12/2022
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	17	<25	<25	0	108	101
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	17	<25	<25	0	108	101
Benzene	mg/kg	0.2	Org-023	[NT]	17	<0.2	<0.2	0	126	118
Toluene	mg/kg	0.5	Org-023	[NT]	17	<0.5	<0.5	0	112	106
Ethylbenzene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	96	88
m+p-xylene	mg/kg	2	Org-023	[NT]	17	<2	<2	0	104	97
o-Xylene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	103	95
Naphthalene	mg/kg	1	Org-023	[NT]	17	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	17	102	113	10	112	108

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	21/12/2022	21/12/2022		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	32	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	32	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	32	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	32	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	32	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	32	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	32	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	32	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	32	117	114	3	[NT]	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	21/12/2022	21/12/2022		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	42	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	42	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	42	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	42	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	42	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	42	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	42	<1	<1	0	[NT]	[NT]
Naphthalene	mg/kg	1	Org-023	[NT]	42	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	42	109	107	2	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			29/12/2022	1	29/12/2022	29/12/2022		29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	90	99
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	96	99
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	129	86
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	90	99
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	96	99
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	129	86
Surrogate o-Terphenyl	%		Org-020	83	1	120	130	8	87	100

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	29/12/2022	29/12/2022		29/12/2022	29/12/2022
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	17	<50	<50	0	113	128
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	121	131
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	86	96
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	17	<50	<50	0	113	128
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	121	131
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	17	<100	<100	0	86	96
Surrogate o-Terphenyl	%		Org-020	[NT]	17	138	120	14	111	97

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	29/12/2022	29/12/2022		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	32	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	32	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	32	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	32	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	32	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	32	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	32	139	121	14	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	30/12/2022	30/12/2022		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	42	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	42	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	42	<100	<100	0	[NT]	[NT]
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-020	[NT]	42	<50	<50	0	[NT]	[NT]
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-020	[NT]	42	<100	<100	0	[NT]	[NT]
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-020	[NT]	42	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	42	110	119	8	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			30/12/2022	1	30/12/2022	30/12/2022		30/12/2022	30/12/2022
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	93	95
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	95
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	92
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	101
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	101
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	99	104
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	73	78
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	0.09	0.07	25	96	101
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	79	1	85	81	5	83	80

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	30/12/2022	30/12/2022		21/12/2022	30/12/2022
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	124	92
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	119	89
Fluorene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	120	86
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	123	96
Anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	17	0.2	0.1	67	117	90
Pyrene	mg/kg	0.1	Org-022/025	[NT]	17	0.2	0.1	67	115	91
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	89	71
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	17	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	17	0.07	0.06	15	122	82
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	17	86	83	4	107	70

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	30/12/2022	30/12/2022		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	32	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	32	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	32	88	88	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	30/12/2022	30/12/2022		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	42	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	42	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	42	76	76	0	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			30/12/2022	1	30/12/2022	30/12/2022		30/12/2022	30/12/2022
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	90
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	94
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	103
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	93	93
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	93
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	105
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	103
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	89
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	90
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	78	78
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	84	1	87	85	2	83	84

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	30/12/2022	30/12/2022		30/12/2022	30/12/2022
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	88	80
HCB	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	91	80
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	92	91
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	77	87
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	81	82
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	96	96
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	17	0.4	0.4	0	99	90
Endrin	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	101	74
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	79	76
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	91	74
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	17	90	88	2	88	84

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	30/12/2022	30/12/2022		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	32	6.3	7.7	20	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	32	0.5	0.6	18	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	32	14	16	13	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	32	86	85	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	30/12/2022	30/12/2022		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	42	81	83	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			30/12/2022	1	30/12/2022	30/12/2022		30/12/2022	30/12/2022
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	85
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	85	87
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	83
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	79	87
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	102
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	71	66
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	80	88
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	84	1	87	85	2	83	84

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	30/12/2022	30/12/2022		30/12/2022	30/12/2022
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	90	63
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	80	71
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	72	73
Malathion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	78	93
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	79	82
Parathion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	71	71
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	77	76
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	17	90	88	2	88	84

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	30/12/2022	30/12/2022		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	32	1	1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	32	86	85	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	30/12/2022	30/12/2022		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	42	81	83	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			30/12/2022	1	30/12/2022	30/12/2022		30/12/2022	30/12/2022
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	111	120
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	84	1	87	85	2	83	84

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date extracted	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	30/12/2022	30/12/2022		30/12/2022	30/12/2022
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	109	100
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	17	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	17	90	88	2	88	84

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	30/12/2022	30/12/2022		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	32	86	85	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	30/12/2022	30/12/2022		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	42	81	83	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	313438-5
Date prepared	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			22/12/2022	1	22/12/2022	22/12/2022		22/12/2022	22/12/2022
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	94	74
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	89	83
Chromium	mg/kg	1	Metals-020	<1	1	25	25	0	98	#
Copper	mg/kg	1	Metals-020	<1	1	21	21	0	99	97
Lead	mg/kg	1	Metals-020	<1	1	48	54	12	91	#
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.6	0.6	0	81	74
Nickel	mg/kg	1	Metals-020	<1	1	27	28	4	92	#
Zinc	mg/kg	1	Metals-020	<1	1	56	63	12	89	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	313438-33
Date prepared	-			[NT]	17	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			[NT]	17	22/12/2022	22/12/2022		22/12/2022	22/12/2022
Arsenic	mg/kg	4	Metals-020	[NT]	17	<4	<4	0	89	75
Cadmium	mg/kg	0.4	Metals-020	[NT]	17	<0.4	<0.4	0	84	82
Chromium	mg/kg	1	Metals-020	[NT]	17	20	20	0	93	82
Copper	mg/kg	1	Metals-020	[NT]	17	65	68	5	95	97
Lead	mg/kg	1	Metals-020	[NT]	17	19	18	5	86	71
Mercury	mg/kg	0.1	Metals-021	[NT]	17	0.3	0.3	0	93	82
Nickel	mg/kg	1	Metals-020	[NT]	17	24	21	13	87	#
Zinc	mg/kg	1	Metals-020	[NT]	17	64	57	12	84	73

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	32	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	32	22/12/2022	22/12/2022		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	32	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	32	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	32	20	20	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	32	18	17	6	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	32	10	10	0	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	32	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	32	24	25	4	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	32	34	36	6	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	42	20/12/2022	20/12/2022		[NT]	[NT]
Date analysed	-			[NT]	42	22/12/2022	22/12/2022		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	42	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	42	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	42	13	14	7	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	42	15	14	7	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	42	8	9	12	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	42	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	42	16	18	12	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	42	29	28	4	[NT]	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	120	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	103	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	96	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	101	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/12/2022	63	20/12/2022	20/12/2022		20/12/2022	[NT]
Date analysed	-			20/12/2022	63	21/12/2022	21/12/2022		20/12/2022	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	63	<50	<50	0	99	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	63	<100	<100	0	114	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	63	<100	<100	0	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	63	<50	<50	0	99	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	63	<100	<100	0	114	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	63	<100	<100	0	100	[NT]
Surrogate o-Terphenyl	%		Org-020	91	63	95	83	13	95	[NT]

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	313438-64
Date extracted	-			20/12/2022	63	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			22/12/2022	63	22/12/2022	22/12/2022		22/12/2022	22/12/2022
Naphthalene	µg/L	1	Org-022/025	<1	63	<1	<1	0	107	86
Acenaphthylene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-022/025	<1	63	<1	<1	0	107	89
Fluorene	µg/L	1	Org-022/025	<1	63	<1	<1	0	116	95
Phenanthrene	µg/L	1	Org-022/025	<1	63	<1	<1	0	130	102
Anthracene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-022/025	<1	63	<1	<1	0	125	94
Pyrene	µg/L	1	Org-022/025	<1	63	<1	<1	0	129	101
Benzo(a)anthracene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-022/025	<1	63	<1	<1	0	125	99
Benzo(b,j+k)fluoranthene	µg/L	2	Org-022/025	<2	63	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-022/025	<1	63	<1	<1	0	138	80
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-022/025	<1	63	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	139	63	96	84	13	107	86

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			20/12/2022	[NT]	[NT]	[NT]	[NT]	20/12/2022	[NT]
Date analysed	-			20/12/2022	[NT]	[NT]	[NT]	[NT]	20/12/2022	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	91	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

8 metals in soil - # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

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

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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Mitchell Delaney

Sample Login Details	
Your reference	E35091UPD, Gunnedah
Envirolab Reference	313438
Date Sample Received	19/12/2022
Date Instructions Received	19/12/2022
Date Results Expected to be Reported	04/01/2023

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	63 Soil, 3 Material, 2 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	HM in water - dissolved	Asbestos ID - materials	On Hold
BH201-0.05-0.3	✓	✓	✓	✓	✓	✓	✓							
BH201-0.5-0.8	✓	✓	✓				✓							
BH201-0.8-0.95	✓	✓	✓				✓							
BH201-1.5-1.8														✓
BH202-0.05-0.3	✓	✓	✓	✓	✓	✓	✓							
BH202-0.5-0.8														✓
BH205-0-0.1	✓	✓	✓	✓	✓	✓	✓							
BH205-0.5-0.8	✓	✓	✓				✓	✓						
BH205-1.5-1.8	✓	✓	✓				✓							
BH206-0-0.1	✓	✓	✓	✓	✓	✓	✓							
BH206-0.5-0.7														✓
BH206-0.7-0.95														✓
BH206-1.5-1.7														✓
BH207-0-0.1	✓	✓	✓	✓	✓	✓	✓							
BH207-0.5-0.8	✓	✓	✓				✓							
BH207-1.0-1.2	✓	✓	✓				✓							
TP210-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP211-0.05-1.5	✓	✓	✓	✓	✓	✓	✓	✓						
TP213-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP214-0.05-0.25	✓	✓	✓	✓	✓	✓	✓							
TP214-0.8-0.95	✓	✓	✓				✓							
TP214-1.5-1.8														✓
TP215-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP216-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP217-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP218-0-0.1	✓	✓	✓	✓	✓	✓	✓							
BH219-0.05-0.4	✓	✓	✓	✓	✓	✓	✓							
BH219-0.8-0.95														✓
BH219-1.5-1.8	✓	✓	✓	✓	✓	✓	✓							
BH219-2.2-2.5	✓	✓	✓				✓							
BH219-3.2-3.45														✓
TP220-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓						

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	HM in water - dissolved	Asbestos ID - materials	On Hold
BH221-0-.15-0.35	✓	✓	✓	✓	✓	✓	✓							
BH221-0.8-0.95														✓
BH221-1.5-1.8	✓	✓	✓				✓							
BH222-0.0.5-0.25	✓	✓	✓	✓	✓	✓	✓							
BH222-1.1-1.3	✓	✓	✓				✓							
BH222-1.5-1.8														✓
TP223-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP223-0.4-0.6														✓
TP224-0.05-0.15														✓
TP224-0.15-0.4	✓	✓	✓	✓	✓	✓	✓							
BH225-0.05-0.3	✓	✓	✓	✓	✓	✓	✓							
BH225-0.7-0.95														✓
TP226-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP226-0.4-0.6	✓	✓	✓	✓	✓	✓	✓							
TP227-0-0.1								✓						
TP229-0-0.1														✓
TP230-0-0.1														✓
TP231-0-0.1														✓
TP232-0-0.1														✓
TP233-0-0.1														✓
TP234-0-0.1								✓						
TP235-0-0.1														✓
SDUPA-1-NA														✓
SDUPB-1-NA	✓	✓	✓	✓	✓	✓	✓							
SDUPD-1-NA	✓	✓	✓	✓	✓	✓	✓							
SDUPE-1-NA														✓
Surface1.1-0-0.5														✓
FCF-Surface1-NA													✓	
TP234 (FCF1-FCF4)-NA														✓
TP226-spoil-NA													✓	
FRS-A1-NA									✓	✓	✓	✓		
FRS-B1-NA									✓	✓	✓	✓		

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	HM in water - dissolved	Asbestos ID - materials	On Hold
TSS-A1-NA	✓													
TBS-A1-NA	✓	✓	✓				✓							
TP228-0-0.1	✓	✓	✓	✓	✓	✓	✓							
TP233-0.4-0.6														✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

ICC 19/12 12:26

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 1/3	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
13.12.22	1	BH201	0.05-0.3	G, A	0	Fill	X											
13.12.22	2	BH201	0.5-0.8	G, A	0	Fill		X										
13.12.22	3	BH201	0.8-0.95	G, A	0	Silty clay		X										
13.12.22	4	BH201	1.5-1.8	G	0	Silty clay												
13.12.22	5	BH202	0.05-0.3	G, A	0	Fill	X											
13.12.22	6	BH202	0.5-0.8	G	0	Silty clay												
13.12.22	7	BH205	0-0.1	G, A	0	Fill	X											
13.12.22	8	BH205	0.5-0.8	G, A	0	Fill		X	X									
13.12.22	9	BH205	1.5-1.8	G	0	Silty clay		X										
13.12.22	10	BH206	0-0.1	G, A	0	Fill	X											
13.12.22	11	BH206	0.5-0.7	G, A	0	Fill												
13.12.22	12	BH206	0.7-0.95	G	0	Silty clay												
13.12.22	13	BH206	1.5-1.7	G	0	Silty clay												
13.12.22	14	BH207	0-0.1	G, A	0	Fill	X											
13.12.22	15	BH207	0.5-0.8	G, A	1.3	Fill		X										
13.12.22	16	BH207	1.0-1.2	G	0	Silty clay		X										
15.12.22	17	TP210	0-0.1	G, A	0	Fill	X											
15.12.22	18	TP211	0.05-1.5	G, A	0	Fill	X		X									
15.12.22	19	TP213	0-0.1	G, A	0	Fill	X											
13.12.22	20	TP214	0.05-0.25	G, A	0	Fill	X											
13.12.22	21	TP214	0.8-0.95	G, A	0	Fill		X										
13.12.22	22	TP214	1.5-1.8	G	0	Silty clay												
15.12.22	23	TP215	0-0.1	G, A	0	Fill	X											
15.12.22	24	TP216	0-0.1	G, A	0	Fill	X											
15.12.22	25	TP217	0-0.1	G, A	0	Fill	X											

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 313438
Date Received: 16/12/22
Time Received: 1530
Received By: OL
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):		Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag		
Relinquished By: MD	Date: 16.12.22	Time: 1530	Received By: [illegible]	Date: 16/12/22

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 2/3	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
14.12.22	26	TP218	0-0.1	G, A	0	Fill	X											
13.12.22	27	BH219	0.05-0.4	G, A	0	Fill	X											
13.12.22	28	BH219	0.8-0.95	G, A	0	Fill												
13.12.22	29	BH219	1.5-1.8	G, A	0	Fill	X											
13.12.22	30	BH219	2.2-2.5	G, A	0	Silty clay		X										
13.12.22	31	BH219	3.2-3.45	G	0	Silty clay												
15.12.22	32	TP220	0-0.1	G, A	0	Fill	X		X									
13.12.22	33	BH221	0-.15-0.35	G, A	0	Fill	X											
13.12.22	34	BH221	0.8-0.95	G, A	0	Fill												
13.12.22	35	BH221	1.5-1.8	G	0	Silty clay		X										
13.12.22	36	BH222	0.0.5-0.25	G, A	0	Fill	X											
13.12.22	37	BH222	1.1-1.3	G	0	Silty clay		X										
13.12.22	38	BH222	1.5-1.8	G	0	Silty clay												
14.12.22	39	TP223	0-0.1	G, A	0	Fill	X											
14.12.22	40	TP223	0.4-0.6	G, A	0	Fill												
14.12.22	41	TP224	0.05-0.15	G, A	0	Fill												
14.12.22	42	TP224	0.15-0.4	G, A	0	Fill	X											
13.12.22	43	BH225	0.05-0.3	G, A	0	Fill	X											
13.12.22	44	BH225	0.7-0.95	G	0	Silty clay												
14.12.22	45	TP226	0-0.1	G, A	0	Fill	X											
14.12.22	46	TP226	0.4-0.6	G, A	0	Fill	X											
15.12.22	47	TP227	0-0.1	G, A	0	Fill			X									
14.12.22	48	TP229	0-0.1	G, A	0	Fill												
15.12.22	49	TP230	0-0.1	G, A	0	Fill												
14.12.22	50	TP231	0-0.1	G, A	0	Fill												

Remarks (comments/detection limits required):		Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag		
Relinquished By: MD	Date: 16.12.22	Time:	Received By:	Date:

313438
16/12 CH

SAMPLE AND CHAIN OF CUSTODY FORM

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 3/3	FROM: JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
14.12.22	51	TP232	0-0.1	G, A	0	Fill												
14.12.22	52	TP233	0-0.1	G, A	0	Fill												
14.12.22	53	TP234	0-0.1	G, A	0	Fill			X									
14.12.22	54	TP235	0-0.1	GA	0	Fill												
12.12.22	55	SDUPA-1	NA	G	NA	Soil												
13.12.22	56	SDUPB-1	NA	G	NA	Soil	X											
13.12.22	—	SDUPC-1	NA	G	NA	Soil	X		Please Send to Envirolab VIC									
14.12.22	57	SDUPD-1	NA	G	NA	Soil	X											
15.12.22	58	SDUPE-1	NA	G	NA	Soil												
15.12.22	—	SDUPF-1	NA	G	NA	Soil	X		Please Send to Envirolab VIC									
15.12.22	59	Surface1.1	0-0.5	A	NA	Fill												
15.12.22	60	FCF-Surface1	NA	A	NA	material				X								
12.15.22	61	TP234 (FCF1-FCF4)	NA	A	NA	material												
14.12.22	62	TP226-spoil	NA	A	NA	Material				X								
13.12.22	63	FRS-A1	NA	#	NA	Water		X										
14.12.22	64	FRS-B1	NA	#	NA	Water		X										
15.12.22	65	TSS-A1	NA	Vial	NA	Sand					X							
13-15.12.22	66	TBS-A1	NA	G	NA	Sand		X										
	67	TP228	0-0.1															
	68	TP333	0.4-0.6															

Remarks (comments/detection limits required): Please wiegh fibre cement fragments # 2xamber bottles, 1 x vial, 1 x hno3	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By: MD	Date: 16.12.22	Time:	Received By:	Date:

313438
16/12 CH

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CERTIFICATE OF ANALYSIS 313438-A

Client Details

Client	JK Environments
Attention	Mitchell Delaney
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35091UPD, Gunnedah**
Number of Samples	additional analysis
Date samples received	19/12/2022
Date completed instructions received	16/01/2023

Analysis Details

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

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

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

Report Details

Date results requested by	16/01/2023
Date of Issue	12/01/2023

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Results Approved By
Loren Bardwell, Development Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Metals from Leaching Fluid pH 2.9 or 5			
Our Reference		313438-A-2	313438-A-7
Your Reference	UNITS	BH201	BH205
Depth		0.5-0.8	0-0.1
Type of sample		Soil	Soil
Date Sampled		13/12/2022	13/12/2022
Date extracted	-	11/01/2023	11/01/2023
Date analysed	-	11/01/2023	11/01/2023
pH of soil for fluid# determ.	pH units	9.0	7.6
pH of soil TCLP (after HCl)	pH units	1.8	1.7
Extraction fluid used		1	1
pH of final Leachate	pH units	5.0	5.2
Nickel	mg/L	<0.02	0.02

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311. Please note that the mass used may be scaled down from default based on sample mass available. Samples are stored at 2-6oC before and after leachate preparation.
Metals-020	Determination of various metals by ICP-AES following buffer determination as per USEPA 1311 and hence AS 4439.3. Extraction Fluid 1 refers to the pH 5.0 buffer and Extraction Fluid 2 is the pH 2.9 buffer.

QUALITY CONTROL: Metals from Leaching Fluid pH 2.9 or 5					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/01/2023	2	11/01/2023	11/01/2023		11/01/2023	[NT]
Date analysed	-			11/01/2023	2	11/01/2023	11/01/2023		11/01/2023	[NT]
Nickel	mg/L	0.02	Metals-020	<0.02	2	<0.02	<0.02	0	88	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Mitchell Delaney

Sample Login Details	
Your reference	E35091UPD, Gunnedah
Envirolab Reference	313438-A
Date Sample Received	19/12/2022
Date Instructions Received	16/01/2023
Date Results Expected to be Reported	16/01/2023

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

Comments
Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Nickel	On Hold
BH201-0.05-0.3						✓
BH201-0.5-0.8	✓	✓	✓	✓	✓	
BH201-0.8-0.95						✓
BH201-1.5-1.8						✓
BH202-0.05-0.3						✓
BH202-0.5-0.8						✓
BH205-0-0.1	✓	✓	✓	✓	✓	
BH205-0.5-0.8						✓
BH205-1.5-1.8						✓
BH206-0-0.1						✓
BH206-0.5-0.7						✓
BH206-0.7-0.95						✓
BH206-1.5-1.7						✓
BH207-0-0.1						✓
BH207-0.5-0.8						✓
BH207-1.0-1.2						✓
TP210-0-0.1						✓
TP211-0.05-1.5						✓
TP213-0-0.1						✓
TP214-0.05-0.25						✓
TP214-0.8-0.95						✓
TP214-1.5-1.8						✓
TP215-0-0.1						✓
TP216-0-0.1						✓
TP217-0-0.1						✓
TP218-0-0.1						✓
BH219-0.05-0.4						✓
BH219-0.8-0.95						✓
BH219-1.5-1.8						✓
BH219-2.2-2.5						✓
BH219-3.2-3.45						✓
TP220-0-0.1						✓

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Sample ID	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Nickel	On Hold
BH221-0-.15-0.35						✓
BH221-0.8-0.95						✓
BH221-1.5-1.8						✓
BH222-0.0.5-0.25						✓
BH222-1.1-1.3						✓
BH222-1.5-1.8						✓
TP223-0-0.1						✓
TP223-0.4-0.6						✓
TP224-0.05-0.15						✓
TP224-0.15-0.4						✓
BH225-0.05-0.3						✓
BH225-0.7-0.95						✓
TP226-0-0.1						✓
TP226-0.4-0.6						✓
TP227-0-0.1						✓
TP229-0-0.1						✓
TP230-0-0.1						✓
TP231-0-0.1						✓
TP232-0-0.1						✓
TP233-0-0.1						✓
TP234-0-0.1						✓
TP235-0-0.1						✓
SDUPA-1-NA						✓
SDUPB-1-NA						✓
SDUPD-1-NA						✓
SDUPE-1-NA						✓
Surface1.1-0-0.5						✓
FCF-Surface1-NA						✓
TP234 (FCF1-FCF4)-NA						✓
TP226-spoil-NA						✓
FRS-A1-NA						✓
FRS-B1-NA						✓

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Sample ID	pH of soil for fluid#determ.	pH of soil TCLP (after HCl)	Extraction fluid used	pH of final Leachate	Nickel	On Hold
TSS-A1-NA						✓
TBS-A1-NA						✓
TP228-0-0.1						✓
TP233-0.4-0.6						✓

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

Additional Info

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

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

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Ming To

From: Mitchell Delaney <MDelaney@jkenvironments.com.au>
Sent: Monday, 9 January 2023 3:19 PM
To: Lucy Zhu
Cc: Samplereceipt
Subject: RE: Results for Registration 313438 E35091UPD, Gunnedah

Ref: 313438-A
TAT: Standard.
Due: 16/01/2023
MT.

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Hi all,

Could I please have the fibre cement fragments for this job weighed? Email repose is fine.

Also can is please schedule TCLP analysis for nickel on the samples BH201 (2) (0.5-0.8) and BH205 (7) (0-0.1).

Cheers.

Regards
Mitchell Delaney
Senior Associate | Environmental Scientist

Our offices with be closed from COB on 23 Dec 2022 to 2 Jan 2023

The Principals and Staff of the JK Group wish you a safe and joyful festive season and a wonderful New Year!

T: +617 3709 9799
D: 0405 140 181
E: MDelaney@jkenvironments.com.au
www.jkgeotechnics.com.au

Brisbane Office
Level 22, 69 Ann Street
BRISBANE QLD 4000
Sunshine Coast Office
8 Innovation Parkway
BIRTINYA QLD 4575

JKEnvironments

From: Lucy Zhu <LZhu@envirolab.com.au>
Sent: Wednesday, 4 January 2023 10:03 AM
To: Mitchell Delaney <MDelaney@jkenvironments.com.au>
Subject: Results for Registration 313438 E35091UPD, Gunnedah

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 35241

Client Details

Client	JK Environments
Attention	Mitch Delaney
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35091UPD**
Number of Samples	2 Soil, 2 Soil
Date samples received	21/12/2022
Date completed instructions received	21/12/2022

Analysis Details

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

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

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

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

Report Details

Date results requested by	04/01/2023
Date of Issue	29/12/2022

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Results Approved By
Chris De Luca, Assistant Lab Manager
Suk Lee, Organic Supervisor

Authorised By

P.Adams.

Pamela Adams, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
vTRH C_6 - C_9	mg/kg	<25	<25
vTRH C_6 - C_{10}	mg/kg	<25	<25
TRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Naphthalene	mg/kg	<1	<1
Total BTEX	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	98

TRH Soil C10-C40 NEPM			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	86	85

PAHs in Soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2
Pyrene	mg/kg	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j&k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.4
Benzo(a)pyrene TEQ calc (Zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc (Half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc (PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	108	112

OCP in Soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
alpha-BHC	mg/kg	<0.1	<0.1
Hexachlorobenzene	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve reported Aldrin + Dieldrin	mg/kg	<0.1	<0.1
Total +ve reported DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	90	102

OP in Soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
Azinphos-methyl	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Chlorpyrifos	mg/kg	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Dichlorovos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Surrogate 2-chlorophenol-d4	%	90	102

PCBs in Soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date extracted	-	21/12/2022	21/12/2022
Date analysed	-	22/12/2022	22/12/2022
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate 2-fluorobiphenyl	%	90	92

Acid Extractable metals in soil			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date digested	-	22/12/2022	22/12/2022
Date analysed	-	22/12/2022	22/12/2022
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	27	15
Copper	mg/kg	19	22
Lead	mg/kg	17	31
Mercury	mg/kg	0.6	0.1
Nickel	mg/kg	27	14
Zinc	mg/kg	39	54

Moisture			
Our Reference		35241-1	35241-2
Your Reference	UNITS	SDUPC-1	SDUPF-1
Date Sampled		13/12/2022	15/12/2022
Type of sample		Soil	Soil
Date prepared	-	22/12/2022	22/12/2022
Date analysed	-	28/12/2022	28/12/2022
Moisture	%	13	11

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105°C for a minimum of 12 hours.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021/022	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD or GC-MS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-022	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Note, For OCs the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
vTRH C_6 - C_9	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	110	[NT]
vTRH C_6 - C_{10}	mg/kg	25	Org-023	<25	[NT]	[NT]	[NT]	[NT]	110	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	[NT]	[NT]	[NT]	[NT]	102	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	[NT]	[NT]	[NT]	[NT]	109	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
m+p-xylene	mg/kg	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	114	[NT]
o-Xylene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Naphthalene	mg/kg	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	102	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: TRH Soil C10-C40 NEPM					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	89	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	95	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	89	[NT]
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	95	[NT]
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate o-Terphenyl	%		Org-020	93	[NT]	[NT]	[NT]	[NT]	83	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
Naphthalene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Acenaphthylene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Fluorene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Phenanthrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	128	[NT]
Pyrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	132	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Benzo(b,j&k)fluoranthene	mg/kg	0.2	Org-022	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022	110	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: OCP in Soil					Duplicate					Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	1	21/12/2022	21/12/2022		21/12/2022	[NT]
Date analysed	-			22/12/2022	1	22/12/2022	22/12/2022		22/12/2022	[NT]
alpha-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	106	[NT]
Hexachlorobenzene	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	104	[NT]
gamma-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	122	[NT]
delta-BHC	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	122	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	126	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	128	[NT]
alpha-chlordane	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	122	[NT]
Dieldrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	112	[NT]
Endrin	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	122	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	124	[NT]
Methoxychlor	mg/kg	0.1	Org-022	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	112	1	90	100	11	100	[NT]

QUALITY CONTROL: OP in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
Azinphos-methyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	128	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Diazinon	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	114	[NT]
Dichlorovos	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Fenitrothion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Malathion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-chlorophenol-d4	%		Org-022	112	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			21/12/2022	[NT]	[NT]	[NT]	[NT]	21/12/2022	[NT]
Date analysed	-			22/12/2022	[NT]	[NT]	[NT]	[NT]	22/12/2022	[NT]
Aroclor 1016	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	132	[NT]
Aroclor 1260	mg/kg	0.1	Org-022	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-fluorobiphenyl	%		Org-022	86	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	35241-2
Date digested	-			22/12/2022	1	22/12/2022	22/12/2022		22/12/2022	22/12/2022
Date analysed	-			22/12/2022	1	22/12/2022	22/12/2022		22/12/2022	22/12/2022
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	1	<4	<4	0	100	83
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	1	<0.4	<0.4	0	90	70
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	1	27	23	16	97	81
Copper	mg/kg	1	Metals-020 ICP-AES	<1	1	19	17	11	104	91
Lead	mg/kg	1	Metals-020 ICP-AES	<1	1	17	14	19	100	#
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	1	0.6	0.5	18	102	109
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	1	27	24	12	95	74
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	1	39	36	8	89	#

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

METALS: # Low spike recovery was obtained for this sample. The sample was re-digested and re-spiked and the low recovery was confirmed. This is due to matrix interferences. However, an acceptable recovery was obtained for the LCS.

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Mitch Delaney

Sample Login Details	
Your reference	E35091UPD
Envirolab Reference	35241
Date Sample Received	21/12/2022
Date Instructions Received	21/12/2022
Date Results Expected to be Reported	04/01/2023

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Soil, 2 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
Nil

Please direct any queries to:

Pamela Adams	Chris De Luca
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: cdeluca@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
25 Research Drive Croydon South VIC 3136
ph 03 9763 2500 fax 03 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	TRH Soil C10-C40 NEPM	PAHs in Soil	OCP in Soil	OP in Soil	PCBsin Soil	Acid Extractable metalsin soil
SDUPC-1	✓	✓	✓	✓	✓	✓	✓
SDUPF-1	✓	✓	✓	✓	✓	✓	✓

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

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

icc 19/12 12:26

SAMPLE AND CHAIN OF CUSTODY FORM

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 1/3	**FROM:** JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
13.12.22	1	BH201	0.05-0.3	G, A	0	Fill	X											
13.12.22	2	BH201	0.5-0.8	G, A	0	Fill		X										
13.12.22	3	BH201	0.8-0.95	G, A	0	Silty clay		X										
13.12.22	4	BH201	1.5-1.8	G	0	Silty clay												
13.12.22	5	BH202	0.05-0.3	G, A	0	Fill	X											
13.12.22	6	BH202	0.5-0.8	G	0	Silty clay												
13.12.22	7	BH205	0-0.1	G, A	0	Fill	X											
13.12.22	8	BH205	0.5-0.8	G, A	0	Fill		X	X									
13.12.22	9	BH205	1.5-1.8	G	0	Silty clay		X										
13.12.22	10	BH206	0-0.1	G, A	0	Fill	X											
13.12.22	11	BH206	0.5-0.7	G, A	0	Fill												
13.12.22	12	BH206	0.7-0.95	G	0	Silty clay												
13.12.22	13	BH206	1.5-1.7	G	0	Silty clay												
13.12.22	14	BH207	0-0.1	G, A	0	Fill	X											
13.12.22	15	BH207	0.5-0.8	G, A	1.3	Fill		X										
13.12.22	16	BH207	1.0-1.2	G	0	Silty clay		X										
15.12.22	17	TP210	0-0.1	G, A	0	Fill	X											
15.12.22	18	TP211	0.05-1.5	G, A	0	Fill	X		X									
15.12.22	19	TP213	0-0.1	G, A	0	Fill	X											
13.12.22	20	TP214	0.05-0.25	G, A	0	Fill	X											
13.12.22	21	TP214	0.8-0.95	G, A	0	Fill		X										
13.12.22	22	TP214	1.5-1.8	G	0	Silty clay												
15.12.22	23	TP215	0-0.1	G, A	0	Fill	X											
15.12.22	24	TP216	0-0.1	G, A	0	Fill	X											
15.12.22	25	TP217	0-0.1	G, A	0	Fill	X											

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 313438
Date Received: 16/12/22
Time Received: 1530
Received By: CA
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Envirolab Services
35241
21/12/22
12:20
11.2°C
None

Remarks (comments/detection limits required):

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

Relinquished By: MD	Date: 16.12.22	Time: 1530	Received By: christine ELS SYD	Date: 16/12/22
ELS SYD christine 20/12/22 1330				

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 2/3	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
14.12.22	26	TP218	0-0.1	G, A	0	Fill	X											
13.12.22	27	BH219	0.05-0.4	G, A	0	Fill	X											
13.12.22	28	BH219	0.8-0.95	G, A	0	Fill												
13.12.22	29	BH219	1.5-1.8	G, A	0	Fill	X											
13.12.22	30	BH219	2.2-2.5	G, A	0	Silty clay		X										
13.12.22	31	BH219	3.2-3.45	G	0	Silty clay												
15.12.22	32	TP220	0-0.1	G, A	0	Fill	X		X									
13.12.22	33	BH221	0-.15-0.35	G, A	0	Fill	X											
13.12.22	34	BH221	0.8-0.95	G, A	0	Fill												
13.12.22	35	BH221	1.5-1.8	G	0	Silty clay		X										
13.12.22	36	BH222	0.0.5-0.25	G, A	0	Fill	X											
13.12.22	37	BH222	1.1-1.3	G	0	Silty clay		X										
13.12.22	38	BH222	1.5-1.8	G	0	Silty clay												
14.12.22	39	TP223	0-0.1	G, A	0	Fill	X											
14.12.22	40	TP223	0.4-0.6	G, A	0	Fill												
14.12.22	41	TP224	0.05-0.15	G, A	0	Fill												
14.12.22	42	TP224	0.15-0.4	G, A	0	Fill	X											
13.12.22	43	BH225	0.05-0.3	G, A	0	Fill	X											
13.12.22	44	BH225	0.7-0.95	G	0	Silty clay												
14.12.22	45	TP226	0-0.1	G, A	0	Fill	X											
14.12.22	46	TP226	0.4-0.6	G, A	0	Fill	X											
15.12.22	47	TP227	0-0.1	G, A	0	Fill			X									
14.12.22	48	TP229	0-0.1	G, A	0	Fill												
15.12.22	49	TP230	0-0.1	G, A	0	Fill												
14.12.22	50	TP231	0-0.1	G, A	0	Fill												

Remarks (comments/detection limits required):		Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag		
Relinquished By: MD	Date: 16.12.22	Time:	Received By:	Date:

313438
16/12 CH

SAMPLE AND CHAIN OF CUSTODY FORM

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: 3/3	**FROM:** JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD and OB

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 3	Asbestos (500ml)	Asbestos	BTEX							
14.12.22	51	TP232	0-0.1	G, A	0	Fill												
14.12.22	52	TP233	0-0.1	G, A	0	Fill												
14.12.22	53	TP234	0-0.1	G, A	0	Fill			X									
14.12.22	54	TP235	0-0.1	GA	0	Fill												
12.12.22	55	SDUPA-1	NA	G	NA	Soil												
13.12.22	56	SDUPB-1	NA	G	NA	Soil	X											
1 13.12.22	—	SDUPC-1	NA	G	NA	Soil	X		Please Send to Envirolab VIC									
14.12.22	57	SDUPD-1	NA	G	NA	Soil	X											
15.12.22	58	SDUPE-1	NA	G	NA	Soil												
2 15.12.22	—	SDUPF-1	NA	G	NA	Soil	X		Please Send to Envirolab VIC									
15.12.22	59	Surface1.1	0-0.5	A	NA	Fill												
15.12.22	60	FCF-Surface1	NA	A	NA	material				X								
12.15.22	61	TP234 (FCF1-FCF4)	NA	A	NA	material												
14.12.22	62	TP226-spoil	NA	A	NA	Material				X								
13.12.22	63	FRS-A1	NA	#	NA	Water		X										
14.12.22	64	FRS-B1	NA	#	NA	Water		X										
15.12.22	65	TSS-A1	NA	Vial	NA	Sand					X							
13-15.12.22	66	TBS-A1	NA	G	NA	Sand		X										
	67	TP228	0-0.1															
	68	TP233	0.4-0.6															

Remarks (comments/detection limits required): Please wiegh fibre cement fragments # 2xamber bottles, 1 x vial, 1 x hno3	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By: MD	Date: 16.12.22	Time:	Received By:	Date:

313438
16/12 CH

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

CERTIFICATE OF ANALYSIS 313439

Client Details

Client	JK Environments
Attention	Mitchell Delaney
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E35091UPD, Gunnedah**
Number of Samples	6 Water
Date samples received	16/12/2022
Date completed instructions received	19/12/2022

Analysis Details

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

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

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

Report Details

Date results requested by	04/01/2023
Date of Issue	09/01/2023
Reissue Details	This report replaces R00 created on 29/12/2022 due to: Sample ID Amended (Client Request)

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Hannah Nguyen, Metals Supervisor
Josh Williams, Organics and LC Supervisor
Liam Timmins, Organic Instruments Team Leader

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		313439-1	313439-2	313439-3	313439-4	313439-5
Your Reference	UNITS	MW205	MW206	MW219	GWDUPA-1	GW-TB1
Date Sampled		15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
Date analysed	-	19/12/2022	19/12/2022	19/12/2022	19/12/2022	19/12/2022
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	114	106	102	107	110
Surrogate toluene-d8	%	104	103	96	98	99
Surrogate 4-BFB	%	99	88	88	88	89

vTRH(C6-C10)/BTEXN in Water		
Our Reference		313439-6
Your Reference	UNITS	TSW-A1
Date Sampled		15/12/2022
Type of sample		Water
Date extracted	-	19/12/2022
Date analysed	-	19/12/2022
Benzene	µg/L	92%
Toluene	µg/L	90%
Ethylbenzene	µg/L	85%
m+p-xylene	µg/L	96%
o-xylene	µg/L	81%
Surrogate Dibromofluoromethane	%	100
Surrogate toluene-d8	%	95
Surrogate 4-BFB	%	86

svTRH (C10-C40) in Water						
Our Reference	UNITS	313439-1	313439-2	313439-3	313439-4	313439-5
Your Reference		MW205	MW206	MW219	GWDUPA-1	GW-TB1
Date Sampled		15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	21/12/2022	21/12/2022	21/12/2022	21/12/2022	21/12/2022
TRH C_{10} - C_{14}	µg/L	<50	<50	110	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	120	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	230	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	160	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	160	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	160	<50	<50
Surrogate o-Terphenyl	%	108	93	74	82	73

PAHs in Water - Low Level						
Our Reference		313439-1	313439-2	313439-3	313439-4	313439-5
Your Reference	UNITS	MW205	MW206	MW219	GWDUPA-1	GW-TB1
Date Sampled		15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
Naphthalene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	114	103	92	86	85

HM in water - dissolved						
Our Reference		313439-1	313439-2	313439-3	313439-4	313439-5
Your Reference	UNITS	MW205	MW206	MW219	GWDUPA-1	GW-TB1
Date Sampled		15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Date analysed	-	20/12/2022	20/12/2022	20/12/2022	20/12/2022	20/12/2022
Arsenic-Dissolved	µg/L	<1	1	3	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	42	<1	<1
Copper-Dissolved	µg/L	3	<1	2	<1	150
Lead-Dissolved	µg/L	<1	<1	<1	<1	1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	2	4	2	4	<1
Zinc-Dissolved	µg/L	4	1	9	7	52

Miscellaneous Inorganics				
Our Reference		313439-1	313439-2	313439-3
Your Reference	UNITS	MW205	MW206	MW219
Date Sampled		15/12/2022	15/12/2022	15/12/2022
Type of sample		Water	Water	Water
Date prepared	-	19/12/2022	19/12/2022	19/12/2022
Date analysed	-	19/12/2022	19/12/2022	19/12/2022
pH	pH Units	7.5	7.8	8.0
Electrical Conductivity	µS/cm	4,000	1,500	6,700

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			19/12/2022	2	19/12/2022	19/12/2022		19/12/2022	[NT]
Date analysed	-			19/12/2022	2	19/12/2022	19/12/2022		19/12/2022	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	2	<10	<10	0	107	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	2	<10	<10	0	107	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	104	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	111	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	106	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	108	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	107	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	116	2	106	104	2	109	[NT]
Surrogate toluene-d8	%		Org-023	109	2	103	100	3	102	[NT]
Surrogate 4-BFB	%		Org-023	98	2	88	100	13	98	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	313439-2
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			20/12/2022	1	21/12/2022	21/12/2022		20/12/2022	21/12/2022
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	99	78
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	114	89
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	100	77
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	99	78
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	114	89
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	100	77
Surrogate o-Terphenyl	%		Org-020	91	1	108	84	25	95	93

QUALITY CONTROL: PAHs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	[NT]
Date analysed	-			22/12/2022	1	22/12/2022	22/12/2022		22/12/2022	[NT]
Naphthalene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	107	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	107	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	116	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	130	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	125	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	129	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	125	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	138	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	139	1	114	109	4	107	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	313439-2
Date prepared	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Date analysed	-			20/12/2022	1	20/12/2022	20/12/2022		20/12/2022	20/12/2022
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	99	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	100	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	3	3	0	98	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	91	92
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	99	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	102	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			19/12/2022	[NT]	[NT]	[NT]	[NT]	19/12/2022	[NT]
Date analysed	-			19/12/2022	[NT]	[NT]	[NT]	[NT]	19/12/2022	[NT]
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Mitchell Delaney

Sample Login Details	
Your reference	E35091UPD, Gunnedah
Envirolab Reference	313439
Date Sample Received	16/12/2022
Date Instructions Received	19/12/2022
Date Results Expected to be Reported	04/01/2023

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments
#3 labelled "MW219".

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	pH	Electrical Conductivity
MW205	✓	✓	✓	✓	✓	✓
MW206	✓	✓	✓	✓	✓	✓
MW209	✓	✓	✓	✓	✓	✓
GWDUPA-1	✓	✓	✓	✓		
GW-TB1	✓	✓	✓	✓		
TSW-A1	✓					

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

Additional Info

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

COC 19/12 12:26

SAMPLE AND CHAIN OF CUSTODY FORM

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	JKE Job Number: E35091UPD Date Results Required: STANDARD Page: one	**FROM:** JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitch Delaney

Location: Gunnedah

Sampler: MD

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 2	Combo 3L	VOCs	pH / EC	8 Metals	PAHs	TRH/BTEX	BTEX	Hardness			
15.12.22	1	MW205	G, V, H, PVC	NA	Water		X		X								
15.12.22	2	MW206	G, V, H, PVC	NA	Water		X		X								
15.12.22	3	MW209	G, V, H, PVC	NA	Water		X		X								
15.12.22	4	GWDUPA-1	G, V, H	NA	Water		X										
15.12.22	–	GWDUPB-1	G, V, H	NA	Water		X		Please Send to Envirolab VIC								
15.12.22	5	GW-TB1	G, V, H,	NA	Water		X										
15.12.22	6	TSW-A1	V	NA	Water								X				

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 313439
Date Received: 16/12/22
Time Received: 15:30
Received By: HTL
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

All analysis PQLs to ANZECC (2000) Detection Limits Please

Sample Containers:
G - 125mL Amber Glass Bottle
V - BTEX Vial H - HNO3 Wash PVC
PVC - HDPE Plastic Bottles

Relinquished By: MD	Date: 16.12.22	Time:	Received By: ELS STD HTL	Date: 15:30

Appendix F: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[18] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[19]. The NEPM (2013) is consistent with these documents.

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

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

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

B. <u>Precision</u>

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

C. <u>Accuracy</u>

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

D. <u>Representativeness</u>

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

E. <u>Completeness</u>

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

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

[18] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[19] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix G: Data (QA/QC) Evaluation

Data (QA/QC) Evaluation

A. INTRODUCTION

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

1. Field and Laboratory Considerations

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

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

2. Field QA/QC Samples and Analysis

A summary of the field QA/QC samples collected and analysed for this investigation is provided in the following table:

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Intra-laboratory duplicate (soil)	SDUPB-1 (primary sample BH206 0-0.1m)	Approximately 5.8% of primary samples	Heavy metals, TRH/BTEX, PAHs, OCPs, OPPs and PCBs
Intra-laboratory duplicate (soil)	SDUPD-1 (primary sample TP218 0-0.1m)	Approximately 5.8% of primary samples	Heavy metals, TRH/BTEX, PAHs, OCPs, OPPs and PCBs
Inter-laboratory duplicate (soil)	SDUPC-1 (primary sample BH207 0-0.1m)	Approximately 5.8% of primary samples	Heavy metals, TRH/BTEX, PAHs, OCPs, OPPs and PCBs
Inter-laboratory duplicate (soil)	SDUPF-1 (primary sample TP213 0-0.1m)	Approximately 5.8% of primary samples	Heavy metals, TRH/BTEX, PAHs, OCPs, OPPs and PCBs
Intra-laboratory duplicate (groundwater)	GWDUPA-1 (primary sample MW206)	Approximately 33% of primary samples	Heavy metals, TRH/BTEX, PAHs
Inter-laboratory duplicate (groundwater)	GWDUPB-1 (primary sample MW205)	Approximately 33% of primary samples	Heavy metals, TRH/BTEX, PAHs
Trip spike (soil)	TSS-A1 (15/12/22)	One for the investigation to demonstrate adequacy of preservation, storage and transport methods	BTEX

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Filed blank (soil)	TBS-A1 (13-15/12/22)	One for the investigation to demonstrate adequacy of storage and transport methods	Heavy metals, TRH/BTEX, PAHs
Rinsate (soil SPT)	FRS-A1 (13/12/22)	One for the investigation to demonstrate adequacy of decontamination methods associated with soil sampling from the SPT	Heavy metals, TRH/BTEX, PAHs
Rinsate (hand tools)	FRS-B1 (14/12/22)	One for the investigation to demonstrate adequacy of decontamination methods associated with soil sampling with hand tools	Heavy metals, TRH/BTEX, PAHs
Trip spike (water)	TSW-A1 (15/12/22)	One for the investigation to demonstrate adequacy of preservation, storage and transport methods	BTEX
Filed blank (water)	GW-TB1 (15/12/22)	One per day of groundwater sampling	Heavy metals, TRH/BTEX, PAHs

The results for the field QA/QC samples are detailed in the laboratory summary tables attached to the investigation report and are discussed in the subsequent sections of this Data (QA/QC) Evaluation report.

3. Data Assessment Criteria

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

Field Duplicates

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

Field/Trip Blanks and Rinsates

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

Trip Spikes

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

Laboratory QA/QC

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

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

RPDs

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

Laboratory Control Samples (LCS) and Matrix Spikes

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

Surrogate Spikes

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

Method Blanks

- All results less than PQL.

B. DATA EVALUATION

1. Sample Collection, Storage, Transport and Analysis

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

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

JKE note that the temperature on receipt of the samples was reported to be up to 11.2°C for soil samples and 11.2°C for groundwater samples. JKE understand that the temperature is measured at the laboratory using an infrared temperature probe by scanning the outside of the sample container (i.e. one sample jar/container at the time of registering the samples). This procedure is not considered to be robust as there is a potential for the outside of the jar to warm to ambient temperature, or at least to increase from that of the internal contents, relatively quickly. On this basis, JKE is of the opinion that the temperatures reported on the Sample Receipts are unlikely to be reliable or representative of the overall batch. This is further supported by the trip spike recovery results (discussed further below) which reported adequate recovery in the range of 110% to 117% for soil and 81% to 96% for groundwater.

Whilst it could be argued that 19% loss of volatiles may have led to these groundwater contaminants being under-reported (i.e. the lower end of the trip spike recovery was 81%), it is noted that all BTEX results and volatile TRHs (F1) were below the PQLs and even a nominal 19% increase of TRH/BTEX concentrations in these samples would not result in exceedances of the SAC.

Envirolab noted that the asbestos results were reported to be consistent with the recommendations in NEPM (2013), however this level of reporting is outside the scope of their NATA accreditation. In the absence of other available analytical methods for asbestos, this was found to be acceptable for the purpose of this investigation.

Review of the project data also indicated that:

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

2. <u>Laboratory PQLs</u>

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC, with the exception of the anthracene PQL for groundwater analysis which was 10 times greater than the ecological SAC. In light of the PAH concentrations reported for soil and groundwater, JKE is of the opinion that this is not significant, and it does not affect the quality of the dataset as a whole or the outcome of the investigation.

3. <u>Field QA/QC Sample Results</u>

Field Duplicates

The results indicated that field precision was acceptable. RPD non-conformances were reported for some analytes as discussed below:

- Elevated RPDs were reported for pyrene, benzo(a)pyrene and lead in SDUPB-1/BH206 (0-0.1m);
- An elevated RPD was reported for lead in SDUPC-1/BH207 (0-0.1m);
- Elevated RPDs were reported for fluoranthene, pyrene, benzo(a)pyrene and mercury in SDUPF-1/TP213 (0-0.1m);
- Elevated RPDs were reported for arsenic and zinc in GWDUPA-1/MW206; and
- Elevated RPDs were reported for mercury, lead and zinc in GWDUPB-1/MW205.

Values outside the acceptable limits have been attributed to results close to the PQLs (primarily in relation to the PAH RPD exceedances in soils), and sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogeneous matrices. As all results were assessed with regards to the SAC, the elevated RPDs have had no adverse impact on the overall assessment of risk.

Field Blanks

One soil field blank was placed in the esky during sampling and transported back to the laboratory. The soil field blank analysis results were all less than the PQLs with the exception of chromium (3mg/kg), lead (2mg/kg) and zinc (1mg/kg). Low level metals concentrations are typical in washed sand which is utilised as blank material. In JKE's experience, the concentrations reported were consistent with background concentrations in a sand matrix and were not indicative of cross-contamination. On this basis, cross contamination between samples that may have significance for data validity did not occur.

One water field blank was placed in the esky during sampling and transported back to the laboratory. The water field blank analysis results were all less than the PQLs with the exception of copper (150 µg/L), lead (1µg/L) and zinc (52µg/L). In JKE's experience, low-level metals concentrations are typical in potable water which is utilised as blank material.

Rinsates

The water rinsate results were all less than the PQLs with the exception of some detection of heavy metals (copper, lead and zinc). As discussed above low-level metals concentrations are typical in potable water which was used to decontaminate (wash down) soil sampling equipment. Significant concentrations of heavy metals (including copper, lead and zinc) were not encountered in the soils samples analysed. Considering the above consider that cross-contamination artefacts associated with sampling equipment were not present and the potential for cross-contamination to have occurred was low.

Trip Spikes

The soil trip spike results ranged from 110% to 117% and groundwater trip spike results ranged from 81% to 96%. The trip spike results indicated that field preservation methods were appropriate.

4. Laboratory QA/QC

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

A review of the laboratory QA/QC data identified the following minor non-conformances:

- Lab report No. 313438: metals precent recovery was not possible due to the inhomogeneous nature of the element/s in the sample/s. However, an acceptable recovery was obtained for the LCS; and
- Lab report No. 35241: low metals spike recovery was encountered in the laboratory blank sample. The sample was re-digested and re-spiked and the low recovery was confirmed. However, an acceptable recovery was obtained for the LCS.

C. DATA QUALITY SUMMARY

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

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

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

Appendix H: Field Work Documents

JKEnvironments

Client:	HI	Job No.:	E35091UPD
Project:	Proposed Alterations and Additions	Well No.:	MW205
Location:	Marquis Street, GUNNEDAH, NSW	Depth (m):	8

WELL FINISH DETAILS

Gatic Cover ☑ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Blue Pump	SWL – Before (m):	1.81
Date:	14/12/22	Time – Before:	4:30 pm
Undertaken By:	MD	SWL – After (m):	2.74
Total Vol. Removed:	45L	Time – After:	4:45
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2L	24.4	5.2	3600	7.06	155
7.5L	22.6	3.2	3510	7.08	153
15L	23	1.9	3524	7.10	167
25L	"	1.6	3540	7.11	162
30L	22.8	1.0	3601	7.09	154
35L	"	0.8	3588	7.09	157
40L	"	"	3597	7.09	157
45L	22.7	0.9	3603	7.09	156

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

YSI Used: 5 extreemly silty

Tested By:	MD	**Remarks:**
Date Tested:	14/12/22	- Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Checked By:	BP	
Date:	17.2.23V	

JKEnvironments

Client:	HI	Job No.:	E35091UPD
Project:	Proposed Alterations and Additions	Well No.:	MW206
Location:	Marquis Street, GUNNEDAH, NSW	Depth (m):	6.0

WELL FINISH DETAILS

Gatic Cover ☑ Standpipe ☐ Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Blue Pump	SWL – Before (m):	1.6 m
Date:	14/12/22	Time – Before:	16:55
Undertaken By:	OB	SWL – After (m):	3.64
Total Vol. Removed:	50L	Time – After:	17:18
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2.5	22.7	4.0	1306	7.5	124.9
5	21.3	2.4	1287	7.7	129.6
7.5	21.2	0.6	1290	7.67	134.8
12.5	21.3	0.8	1273	7.61	135.2
17.5	21.2	0.7	1251	7.48	136.2
22.5	21.0	0.4	1305	7.40	137.4
27.5	20.9	1.4	1349	7.42	138.5
32.5	20.9	2.1	1380	7.43	138.6
37.5	20.9	3.7	1332	7.46	133.6
42.5	21.0	5.5	1284	7.44	138.9
45	21.0	5.4	1284	7.44	138.4
47.5	21.0	5.2	1276	7.43	138.2

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

YSI Used: 5 extremely silty at depth

Tested By:	OB	**Remarks:** - Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date Tested:	14/12/22	
Checked By:	BP	
Date:	17.2.23	

JKEnvironments

Client:	HI	Job No.:	E35091UPD
Project:	Proposed Alterations and Additions	Well No.:	MW219
Location:	Marquis Street, GUNNEDAH, NSW	Depth (m):	8.0

WELL FINISH DETAILS

	Gatic Cover ☑	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Bailer	SWL – Before (m):	7.69
Date:	14/12/22	Time – Before:	–
Undertaken By:	MD	SWL – After (m):	–
Total Vol. Removed:	50ml	Time – After:	–
PID Reading (ppm):	0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (μS/cm)	pH	Eh (mV)
50ml	–	–	–	–	–

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

YSI Used: YSI 5 - Insufficent volume for development.
- relatively clear.

Tested By:	MD	**Remarks:** - Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Date Tested:	14/12/22	
Checked By:	BP	
Date:	17.2.23	

JKEnvironments

Client:	HI	**Job No.:**	E35091UPD
Project:	Proposed Alterations and Additions	**Well No.:**	MW205
Location:	Marquis Street, GUNNEDAH, NSW	**Depth (m):**	8

WELL FINISH

✓	**Gatic Cover**		**Standpipe**		**Other (describe)**

WELL PURGE DETAILS:

Method:	Perastalic Pump	**SWL – Before:**	~~[illegible]~~ 1.84
Date:	15/12/22	**Time – Before:**	13:25
Undertaken By:	MD	**Total Vol Removed:**	2L
Pump Program No:	NA	**PID (ppm):**	0.6

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
2	1.82	0.5		25.4	3.0	3826	7.17	151.2
4	1.84	1		24.1	3.2	3749	7.16	151.1
6	1.86	1.5		23.6	3.3	3705	7.17	149.5
8	1.86	2		23.5	3.2	3699	7.18	148.2

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

Sampling Containers Used: 4 x glass amber, 2 x BTEX vials, 2 x HNO3 plastic, 0 x H2SO4 plastic, 2 x unpreserved plastic

YSI used: 5 GWDUP B-1

Tested By: Mitchell Delaney	**Remarks:**
Date Tested: 15/12/22	- Steady state conditions
Checked By: BP	- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date: 17.2.23	

JKEnvironments

Client:	HI	**Job No.:**	**E35091UPD**
Project:	Proposed Alterations and Additions	**Well No.:**	MW206
Location:	Marquis Street, GUNNEDAH, NSW	**Depth (m):**	6.0

WELL FINISH

✓	**Gatic Cover**		**Standpipe**		**Other (describe)**

WELL PURGE DETAILS:

Method:	Perastaltic Pump	**SWL – Before:**	1.1m
Date:	15/12/22	**Time – Before:**	12.26
Undertaken By:	MD	**Total Vol Removed:**	2.5L
Pump Program No:	NA	**PID (ppm):**	12.7

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
[illegible]	1.23	0.5		22.7	2.6	1403	7.42	160.2
2	1.25	1		22.3	2.3	1379	7.38	164.5
4	1.25	1.5		22.2	2.0	1357	7.37	161.5
6	1.25	2		22.0	1.7	1336	7.36	158.1
8	1.25	2.5		21.9	1.5	1326	7.36	155.2

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

GWDUP A-1

Sampling Containers Used: 4 **x glass amber,** 4 **x BTEX vials,** 2 **x HNO3 plastic,** 0 **x H2SO4 plastic,** 1 **x unpreserved plastic**

YSI used: 5

Tested By: Mitchell Delaney	**Remarks:**
Date Tested: 15/12/22	- Steady state conditions
Checked By: BP	- difference in the pH less than 0.2 units, difference in conductivity less than 10%
Date: 17.2.23	10% and SWL stable/not in drawdown

JKEnvironments

Client:	HI	Job No.:	E35091UPD
Project:	Proposed Alterations and Additions	Well No.:	MW219
Location:	Marquis Street, GUNNEDAH, NSW	Depth (m):	8.0

WELL FINISH

✓	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Perastaltic Pump	SWL – Before:	~~3~~.34
Date:	15/12/22	Time – Before:	11:15
Undertaken By:	MD	Total Vol Removed:	1L
Pump Program No:	~~3~~ NA	PID (ppm):	7500 ppm

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
11:20	7.34	500ml		22.9	5.3	5117	7.73	113.4

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
insufficient volume. Sampled with bailer

Sampling Containers Used: 2 x glass amber, 2 x BTEX vials, 1 x HNO3 plastic, 0 x H2SO4 plastic, 1 x unpreserved plastic

YSI used: 5

PID >500 + increasing slowly

Tested By: Mitchell Delaney	**Remarks:**
Date Tested: 15/12/22	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10%
Checked By: BP	10% and SWL stable/not in drawdown
Date: 17.2.23	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	HI		
Project:	Proposed Alterations and Additions		
Location:	Marquis Street, GUNNEDAH, NSW		
Job Number:	E35091UPD		
DISSOLVED OXYGEN			
Make: YSI No 5		Model: —	
Date of calibration: 14/12/22		Name of Calibrator: MD.	
Span value: 70% to 130%			
Measured value: 8.7 Mg/L			
Measured reading Acceptable (Yes/No):			
pH			
Make: YSI NO5		Model: —	
Date of calibration: 14/10/22		Name of Calibrator: MD	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: July 23	Lot No: 384001
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: May/24	Lot No: 398326
Measured reading of Buffer 1: 7:00			
Measured reading of Buffer 2: 3:89			
Slope: —		Measured reading Acceptable (Yes/No):	
EC			
Make: YSI NO 5		Model: —	
Date: 14/12/22	Name of Calibrator: MD		Temperature: 25.7 °C
Calibration solution: Conductivity Std		Expiry date:	Lot No: 393776
Theoretical conductivity at temperature (see solution container): ~~Aug~~ March 24 µS/cm 1413			
Measured conductivity: 1440 µS/cm		Measured reading Acceptable (Yes/No):	
REDOX			
Make: YSI NO5		Model: —	
Date of calibration: 14/12/22		Name of Calibrator: MD	
Calibration solution: 240 mV		Expiry date: July 27	Lot No: 7920
Theoretical redox value: 240mV			
Measured redox reading: 237.9 mV		Measured reading Acceptable (Yes/No):	

Appendix I: UCL Calculation Sheets

Aldrin & Dieldrin Results for UCL Calculations

Data in mg/kg			Aldrin & Dieldrin
PQL - Envirolab Services			0.1
Sample Reference	**Sample Depth**	**Sample Description**	
BH1	0-0.1	Fill: Silty Clay	1.1
BH2	0-0.1	Fill: Sandy Clay	<0.1
BH3	0-0.1	Fill: Sandy Clay	<0.1
BH4	0-0.1	Fill: Silty Sand	<0.1
BH5	0-0.1	Fill: Silty Sand	<0.1
BH6	0-0.1	Fill: Silty Sand	<0.1
BH7	0.15-0.3	Fill: Sandy Gravel	<0.1
BH8	0-0.1	Fill: Sandy Clay	<0.1
TP1	0-0.1	Fill: Silty Clay	<0.1
TP2	0-0.1	Fill: Gravelly Clay	<0.1
TP3	0-0.1	Fill: Gravelly Clay	<0.1
TP4	0-0.1	Fill: Sandy Clay	<0.1
TP5	0-0.1	Fill: Gravelly Clay	<0.1
TP6	0-0.1	Fill: Gravelly Clay	<0.1
BH201	0.05-0.3	Fill: silty sandy gravel	<0.1
BH202	0.05-0.3	Fill: silty sandy gravel	<0.1
BH205	0-0.1	Fill: silty sand	<0.1
BH206	0-0.1	Fill: silty sand	<0.1
BH207	0-0.1	Fill: silty sand	<0.1
TP210	0-0.1	Fill: silty sandy gravel	**0.4**
TP211	0.05-1.5	Fill: silty clayey sand	<0.1
TP213	0-0.1	Fill: silty sand	<0.1
BH214	0.05-0.25	Fill: silty sand	<0.1
TP215	0-0.1	Fill: gravelly silt	**8.7**
TP216	0-0.1	Fill: gravelly silt	**11.7**
TP217	0-0.1	Fill: silty sandy gravel	<0.1
TP218	0-0.1	Fill: silty clayey sand	<0.1
BH219	0.05-0.4	Fill: silty sand	<0.1
BH219	1.5-1.8	Fill: silty clay	<0.1
TP220	0-0.1	Fill: gravelly silt	**20.3**
BH221	0-.15-0.35	Fill: silty sand	<0.1
BH222	0.0.5-0.25	Fill: silty sand	<0.1
TP223	0-0.1	Fill: silty clayey sand	<0.1
TP224	0.15-0.4	Fill: silty sandy gravel	<0.1
BH225	0.05-0.3	Fill: silty sand clay	<0.1
TP226	0-0.1	Fill: silty clayey sand	<0.1
TP226	0.4-0.6	Fill: silty clayey sand	<0.1
TP228	0-0.1	Fill: silty clayey sand	<0.1
Total Number of Samples			38
Maximum Value			20.3

Open UCL Report Rev8.1 (Open UCL Beta Ver 3.02)

Report Date & Time: 2023-02-02 05:07:34

Data File Name: Raw Aldrin and Dieldrin results for UCL.xlsx

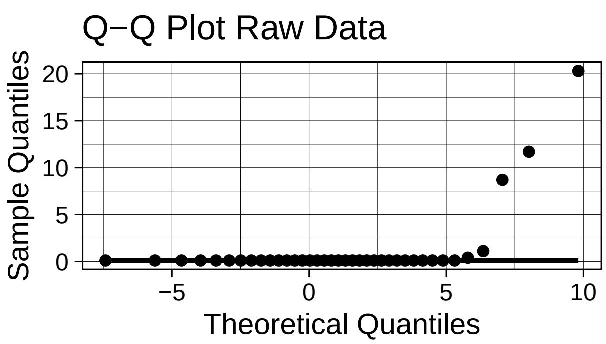
Report Title: Fill Aldrin and Dieldrin Results

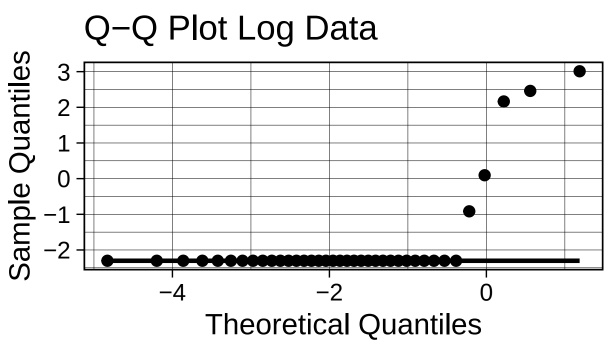
We encourage the reporting of bugs, issues, new ideas and contributions. If you want to report a bug, issue or have an idea to add to Open UCL you can email **openstatsonline@gmail.com**. Or if you are on github you can also use this link to post an issue on the Open UCL Repository.

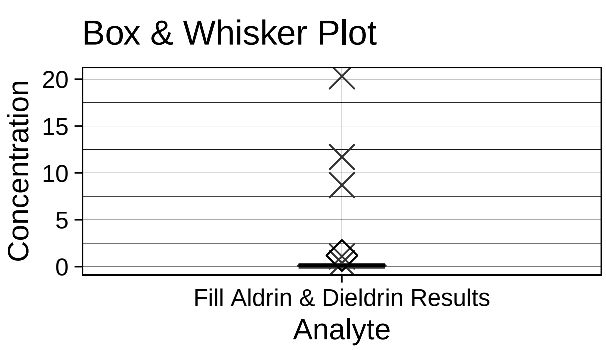
Fill Aldrin & Dieldrin Results

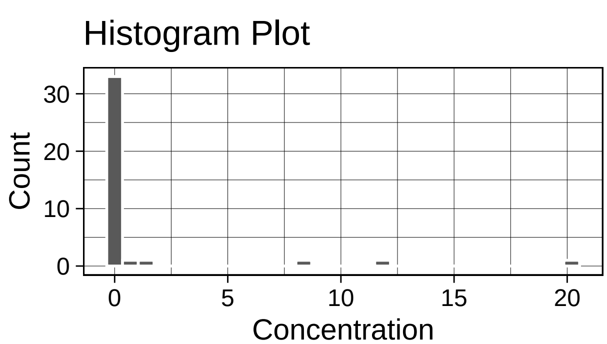
Descriptive Stats	
n	38
min	0.1
max	20.3
range	20.2
mean	1.197
gm	0.162
median	0.1
standard deviation (sd)	3.931
standard error of mean (sem)	0.638
coeficient of variation (cv)	3.283
skewness	3.994
Log Transformed	
Log min	-2.303
Log max	3.011
Log mean	-1.82
Log sd	1.372
Normality Tests	
Shapiro-Wilks Value (raw)	0.316
Shapiro-Wilks p (raw)	0
Shapiro-Wilks Value (log)	0.398
Shapiro-Wilks p (log)	0

Upper Conf Limits	
Confidence Level (%)	95
Students t UCL	2.273
Lands HUCL	0.785
Zou UCL	0.775
Tchebichef (Chebyshev) UCL	3.977
Other Results	
CV High	TRUE
Normality Raw Data	FALSE
Normality Log Data	FALSE
Critical t (95%) 2 Sided	2.026
Margin of Error (MoE)	1.292
Z	7.664
Max Probable Error (MPE%)	107.923
Relative Standard Deviation (%RSD)	328.342









Appendix J: JKE SAQP

REPORT TO

NSW HEALTH INFRASTRUCTURE

ON

SAMPLING, ANALYSIS AND QUALITY PLAN (SAQP)

FOR

DETAILED (STAGE 2) SITE INVESTIGATION

AT

GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW

Date: 16 November 2022

Ref: E335091UPD-SAQP

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For and on behalf of
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DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E35091UPD-SAQP	Draft Report	16 November 2022

Table of Contents

List of Tables

Attachments

Abbreviations

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Before You Dig	**BYD**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Disruption Notice	**DN**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed (Stage 2) Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Environment Protection Authority	**EPA**
Ecological Screening Level	**ESL**
Fibre Cement Fragment(s)	**FCF**
Health Investigation Level	**HILs**
Health Screening Level	**HSL**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential Acid Sulfate Soils	**PASS**
Polychlorinated Biphenyls	**PCBs**
Per-and Polyfluoroalkyl Substances	**PFAS**
Photo-ionisation Detector	**PID**
Preliminary Site Investigation	**PSI**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Source, Pathway, Receptor	**SPR**
Standard Penetration Test	**SPT**

Standing Water Level	**SWL**
Targeted Detailed Site Investigation	**TDSI**
Trip Blank	**TB**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Metres BGL	**mBGL**
Milimetre	**mm**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**

1 INTRODUCTION

NSW Health Infrastructure ('the client') commissioned JK Environments (JKE) to prepare a Sampling, Analysis and Quality Plan (SAQP) for the proposed Detailed (Stage 2) Site Investigation (DSI) associated with the Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW. The site location and site boundary are shown on Figure A, attached in the appendices. The site is located generally in the central section of the wider hospital property.

JKE was previously engaged to undertake a desktop Preliminary (Stage 1) Site Investigation (PSI)[1] for the proposed development. A summary of relevant information from the PSI is presented in Section 2.

1.1 Proposed Development Details

JKE understand that the proposed development includes alterations and additions to the existing hospital which will be carried out in three stages: Early Works; Main Works; and Refurbishment Works. Following partial demolition required for each of the stages, the proposed alterations and additions will include:

- A new single level inpatient unit building situated over the central portion of the hospital grounds, an extension to the existing kitchen building and a new emergency access situated respectively to the south-west and to the east of the new inpatient unit building. The ground floor concrete slab will be suspended between bored piers with the floor slab either supported by sacrificial formwork or formed over a subgrade comprising engineered fill and natural ground, in which case where necessary design surface levels would need to be raised (by placing fill) or lowered (by excavation) by approximately 0.5m Below Ground Level (BGL);
- The existing ward building to the north-east of the new inpatient unit building will be reconfigured and will include works to occupy the existing under croft space. Minor excavation works may be required to approximately 0.2mBGL to accommodate the new concrete slab;
- Additional car parking areas and access roads will be provided over the north-western, north-eastern, southern and south-eastern portions of the site. In the main, the new parking areas will involve extending existing parking areas. We have assumed excavations to a maximum depth of approximately 1mBGL will be required to achieve design surface levels; and
- Landscaping of sections of the site including but not limited to the regarding of the link between the new main entry to the inpatient unit building north-eastwards to the rear (south-eastern side) of the Rural Health Centre. The access ramp will require raising of site surface levels by a maximum of approximately 1.4m.

We understand that the existing day care centre in the south-east section of the site will be demolished as part of the development and a new day care centre is not proposed.

[1] JK Environments, (2022). *Report to NSW Health Infrastructure on Preliminary (Stage 1) Site Investigation for Gunnedah Hospital Redevelopment at Marquis Street, Gunnedah, NSW*. (Report ref: E35091UPDrpt, dated 1 August 2022) (referred to as PSI)

1.2 Aim and Objectives

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

The DSI objectives are to:

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

1.3 Scope of Work

The SAQP was prepared in accordance with a JKE proposal (Ref: EP57443UPD) of 6 October 2022 and written acceptance from the client of 26 October 2022. The scope of work included a review of the PSI and preparation of an SAQP for the proposed DSI with regards to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[2] and other guidelines made under or with regards to the Contaminated Land Management Act (1997)[3]. A list of reference documents/guidelines is included in the appendices.

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

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

2 SITE INFORMATION

2.1 JKE PSI

In mid-2022 the client commissioned JKE to undertake a PSI for the proposed Gunnedah Hospital redevelopment. The purpose of the PSI was to make a preliminary assessment of site contamination. A geotechnical investigation was undertaken in conjunction with this PSI by JK Geotechnics (JKG). The results of the geotechnical investigation were presented in a separate report (Ref: 35091URrpt).

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 eight boreholes and six testpits, which were nominated by the client.

The identified Areas of Concern (AEC) included: fill material; use of pesticides; hazardous building materials; electrical transformer; diesel generator; and an Incinerator.

The PSI identified fill at most locations. A marginally elevated concentration of nickel was encountered above the ecological criterion in one sample and asbestos (as bonded asbestos containing material - ACM) was found in the subsurface fill soil in another sample obtained from TP2 located in the south-east section of the site. The asbestos concentration was marginally below the Site Assessment Criteria (SAC).

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;*
- *Prepare and implement an Asbestos Management Plan (AMP) for asbestos in soil; and*
- *If the DSI identifies a need for remediation, a Remediation Action Plan (RAP) prepared and implemented."*

Relevant information from the PSI has been considered and documented throughout the SAQP.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner (certificate of title):	Health Administration Corporation
Site Address:	10-24 Anzac Parade, Gunnedah, NSW (site address commonly referred to as Marquis Street, Gunnedah, NSW)
Lot & Deposited Plan:	Part of Lot 3 in DP792209
Current Land Use:	Hospital and associated facilities
Proposed Land Use:	Continued hospital and associated facilities
Local Government Authority:	Gunnedah Shire Council
Current Zoning:	R2: Low Density Residential
Site Area (m^2) (approx.):	15,000
RL (AHD in m) (approx.):	280
Geographical Location (decimal degrees) (approx.):	Latitude: -30.983401 Longitude: 150.251313

2.3 Site Description Summary

The site is located generally in the central section of the wider hospital grounds. The site is located in a predominantly residential and recreational area of Gunnedah and is bound by the wider hospital grounds to the north and west, Anzac Parade to the east and Reservoir Street to the south.

The regional topography slopes slightly towards the north. The site topography is consistent with its surrounds and has a gentle slope towards the north at approximately 1°-2°.

A walkover inspection of the site was undertaken by JKE on 2 June 2022. At the time of the inspection, the site formed part of the Gunnedah District Hospital and Community Health Service Centre property. Activities across the wider property included general hospital use, education and a day care centre.

The site was generally occupied by several buildings that were largely constructed on-grade. The buildings were used for various purposes including hospital wards, surgery, pathology, admin/recreation, food outlet, generator/fuel storage and equipment storage. Carparks and internal driveways on site were paved with asphaltic concrete, whilst other open areas were concrete, brick paved or grassed.

Minor area of exposed fill material (i.e. historically imported or disturbed soils) was observed in raised garden beds and landscaped areas on site. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.

An above ground diesel generator and an incinerator were identified in the south section of the site (refer to Figure A attached). However, there were no visible (e.g. spills, staining) indicators of contamination associated with these features.

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds.

Landscaped and grassed areas were observed in areas of the site not covered by hardstand. Native trees up to approximately 5m high were observed along the southern site boundary and in other landscaped areas. Small shrubs were observed adjacent to some of the hospital buildings. No obvious indicators of plant stress or dieback were observed.

2.4 Surrounding Land Use

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

- North – Wider hospital grounds and Alkira Nursing Home;
- East – Anzac Parade with Gunnedah Aquatic Centre and residential properties beyond;
- South – Reservoir Street with residential properties beyond; and
- West – Wider hospital grounds and Gunnedah High School beyond Marquis Street.

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

2.5 Underground Services

The 'Before You Dig' (BYD) plans were reviewed for the investigation in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration. Local services (i.e. those not shown on the BYD plans) exist and could act as preferential pathways for contamination migration.

2.6 Summary of Geology and Hydrogeology

2.6.1 Regional Geology

Regional geological maps indicated that the site is underlain by Colluvial and residual deposits, with Werrie Basalt located approximately 45m to the east of the site.

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

2.7 Hydrogeology and Groundwater

Hydrogeological information reviewed for the PSI indicated that the regional aquifer on-site and in areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There was a total of 196 registered bores within the report buffer of 2km of the site. The majority of the bores were registered for monitoring purposes. There were a number of bores registered for dewatering purposes to the north of the site.

There is 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.

Considering the local topography and surrounding land features, JKE anticipate groundwater to flow towards the north towards the Namoi River. This water body is a potential receptor of groundwater and excess surface water flows from the site.

2.8 Summary of Site History

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

Table 2-2: Summary of Historical Land Uses/Activities

Year(s)	On-site - Potential Land Use / Activities	Off-site - Potential Land Use / Activities
At least 1956 - current	• Hospital grounds; • Demolition of small buildings in the west and east sections of the site, sometime between approximately 1956 and1975; and • Likely earthworks including filling during construction works between approximately 1956 and 2012.	• Extended hospital grounds and nursing home to the north, maintenance workshop to the south and an ambulance station to the south which was constructed between approximately 2005 and 2012; • School to the west; and • Low density residential to the further to the east and south.

3 SUMMARY OF CONCEPTUAL SITE MODEL

3.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and Contaminations of Potential Concern (CoPC) are presented in the following table:

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

Source / AEC	CoPC
Fill material – The site has been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. The fill depths encountered during the PSI ranged from approximately 0.4m to 1.6mBGL. Asbestos, as bonded ACM, was encountered in fill in TP2. This was below the human health SAC. A marginally elevated concentration of nickel was identified in fill in TP4 above the ecological SAC.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals, OCPs and PCBs.
Hazardous Building Material – Hazardous building materials may be present in or on soil as a result of former building and demolition activities. These materials may also be present in the existing buildings/structures on site. Signage on the external fibre cement sheeting at the southern end of the main hospital building identified that the fibre cement sheeting was an ACM. A hazardous building materials survey by JKE (Ref: E35091BTrpt-HAZ) identified both friable and non-friable asbestos, synthetic mineral fibres, deteriorated lead-based paint and electrical equipment containing PCBs within the existing buildings.	Asbestos, lead and PCBs.
Diesel Generator – An Above ground diesel generator is located in the south section of the site and as shown on Figure A attached in the appendices. Although the diesel is stored within the generator and evidence of staining was not observed during the site inspection, there is considered to be a potential for accidental spills/leaks to have occurred in this area, most likely during refuelling activities.	TRHs, BTEX and PAHs.
Incinerator – An incinerator is located in the south section of the site and as shown on Figure 2 attached in the appendices. There is a potential for localised impacts from spills/leaks when loading waste into the incinerator or from removing waste ash from the incinerator which could have migrated to the soils in the	Heavy metals and PAHs.

Source / AEC	CoPC
vicinity, and also from atmospheric fallout from the incinerated waste settling on nearby ground surface.	

The PSI identified an electrical transformer in the north-west corner of the wider hospital grounds as a potential AEC. However, the site area (i.e. the proposed development area) has been reduced from the area considered in the PSI and the electrical transformer is not considered to be an AEC which warrants further assessment by the proposed DSI.

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

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

Table 3-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination.
Affected media	Soil has been identified as the potentially affected medium. The potential for groundwater impacts is considered to be relatively low. However, to reduce the potential need for remobilisation for secondary phases of investigation, the potential for groundwater contamination is to also be assessed by the DSI.
Receptor identification	Human receptors include site occupants/users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, groundwater users and recreational water users within the Namoi River. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas), and freshwater ecology in the Namoi River.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). Primary and secondary contact with groundwater is also a potential exposure pathway. The potential for exposure would typically be associated with the construction and excavation works, future use of the site, 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.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into the existing or proposed buildings (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; and

	• Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation. Or, migration of groundwater to areas where groundwater abstraction occurs.

4 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives (DQO)

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

4.1.1 Step 1 - State the Problem

The PSI identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Further investigation data is required to characterise the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the project team in the design and delivery of the project as well as by the consent authority in exercising its planning functions in relation to the approval of the development proposal under Chapter 4, Clause 4.6 of SEPP Resilience and Hazards 2021.

4.1.2 Step 2 - Identify the Decisions of the Study

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

- Does the additional historical information identify potential contamination sources/areas of environmental concern at the site?
- Are any of the laboratory results above the site assessment criteria?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?
- What is the preliminary waste classification of the fill material and natural soils sampled and is further sampling/analysis required to confirm the waste classification(s)?
- Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

4.1.3 Step 3 - Identify Information Inputs

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

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

4.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown on Figure A and will be limited vertically to a maximum nominated depth of 8mBGL (spatial boundary). At this stage, the DSI sampling is proposed to be completed between 12 and 16 December 2022 (temporal boundary).

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

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

For this investigation, the following decision rules will apply:

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

4.1.5.1 Tier 1 Screening Criteria for Soil

4.1.5.1.1 Human Health

Soil data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013). Health Investigation Level (HILs) will be based on land use Type C. JKE consider the HIL-C criteria to be appropriate as the NEPM (2013) indicates that the use of commercial/industrial (land use Type D) criteria for hospitals is not appropriate given these criteria do not consider more sensitive receptors such as children. Health Screening Levels (HSL) for asbestos will also be based on land use Type C.

Whilst we acknowledge that the HIL-C criteria are based on a lesser exposure time than is factored into the HIL-D criteria (2hrs/day versus 8hrs/day), the HIL-C criteria are more conservative (i.e. the criteria are lower) than HIL-D and are considered to be appropriate in the context of this development and for the purpose of a Tier 1 risk assessment.

HSLs for assessing hydrocarbon risks from vapour intrusion will be based on land use Type A/B and will be derived conservatively using a sand soil type and a depth interval of 0-1m for the initial data screening. These may be adjusted for depth and soil type where deemed appropriate.

HSLs for direct soil contact will be adopted based on the values presented in the CRC Care Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[4]. Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) will also be considered following evaluation of human health and ecological risks, and risks to groundwater.

4.1.5.1.2 Environment (Ecological – terrestrial ecosystems)

Regarding the ecological screening criteria, the Ecological Investigation Levels (EIL) will be derived using the Ambient Background Concentration (ABC) from the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[5] and using site specific physiochemical data for soil pH, clay content and Cation Exchange Capacity (CEC) to select the Added Contaminant Limit (ACL) values in Schedule B(1) of NEPM (2013). NEPM (2013) recommends that ecological SAC are applied to the top 2m of soil.

4.1.5.2 Tier 1 Screening Criteria for Groundwater

Groundwater data will be compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[6]. Environmental values identified during the PSI included aquatic ecosystems, human uses (i.e. groundwater users and recreational water users) and human-health risks in non-use scenarios (vapour intrusion).

The HSL-A/B criteria will be applied for assessing vapour intrusion risks from groundwater. HSLs will be calculated based on the soil type and the observed depth to groundwater at the time of the DSI fieldwork. Where the NEPM 2013 HSL derivation assumptions don't apply (i.e. groundwater shallower than 2m, or where there is not at least 2m of soil above the observed groundwater level), site-specific criteria will be adopted.

Groundwater Investigation Levels (GILs) for 95% protection of freshwater species will be adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[7]. The 99% trigger values are to be utilised, where required, to account for bioaccumulation. Low and moderate reliability trigger values are also to be adopted for some contaminants where high-reliability trigger values do not exist.

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

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

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

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

4.1.5.3 Quality Assurance/Quality Control (QA/QC)

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

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

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

4.1.5.4 Appropriateness of Practical Quantitation Limits (PQLs)

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

4.1.6 Step 6 – Specify Limits on Decision Errors

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

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For this investigation, the null hypothesis (H_0) is that the 95% UCL for the CoPC (and other considerations for asbestos or groundwater) are greater than the SAC. The alternative hypothesis (H_A) is that the 95% UCL for the CoPC (and other considerations for asbestos and groundwater) are less than the SAC.

Potential outcomes include Type I and Type II errors as follows:

- Type I error of determining that the soil is acceptable for the proposed land use when it is not (wrongly rejects true H_0), includes an alpha (α) risk of 0.05; and
- Type II error of determining that the soil is unacceptable for the proposed land use when it is (wrongly accepts false H_0), includes beta (β) risk of 0.2.

Statistical analysis will not apply to asbestos or groundwater data, therefore these data will be assessed based on a multiple lines of evidence and a risk-based approach.

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

Field Duplicates

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

Field/Trip Blanks and Rinsates

Acceptable targets for trip blank samples will be less than the PQL.

Trip Spikes

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

Laboratory QA/QC

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

A summary of the typical limits is provided below:

RPDs

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

Laboratory Control Samples (LCS) and Matrix Spikes

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

Surrogate Spikes

- 60-140% recovery acceptable for general organics.

Method Blanks

- All results less than PQL.

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

4.1.7 Step 7 - Optimise the Design for Obtaining Data

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

4.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology to be adopted for the DSI is outlined in the table below:

Table 4-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples for the investigation will be collected from a total of 35 locations. The proposed sample locations are shown on Figure A attached in Appendix A. <u>Grid-based Sampling Locations</u> The sampling plan has been designed to meet the minimum sampling density outlined in the NSW EPA Sampling Design Part 1 – Application (2022)[8]. Based on the site area of 15,000m^2, 26 grid-based sampling locations are proposed on a square grid spacing of approximately 24m (locations 201 to 226 inclusive). Based on the above density, the calculated circular hotspot diameter that can be detected to a 95% confidence level is approximately 28.3m (K value of 0.59). <u>Additional Targeted grid-based ACM Sampling Locations</u> ACM was identified in fill in testpit TP2 during the PSI. Therefore, a targeted grid-based sampling is to be adopted in this area of the site to further assess the potential for ACM. A total of nine grid-based sampling locations are proposed (locations 227 to 235 inclusive). The additional sampling locations decrease the square grid spacing for ACM in this area of the site to approximately 17m.
Sampling Plan	The primary sampling locations will be placed on a systematic plan with a grid spacing of approximately 24m between sampling locations. A systematic plan is considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations (UCLs will only be applied were appropriate and in accordance with the DQOs). Soil sample collection will be limited to depths of approximately 0.5m into natural soils/bedrock unless staining or odours are encountered which may trigger deeper sampling into the natural ground.
Set-out and Sampling Equipment	Sampling locations will be set out using hand held GPS unit (with an accuracy of approximately ±0.1m). In-situ sampling locations will be checked for underground services by an external contractor prior to sampling. Samples will be collected using a combination of hand tools, drill rig equipped with spiral flight augers (150mm diameter) and an excavator. Hand tools are generally to be used to collected sampling locations within building footprints. Soil samples will be obtained from a Standard Penetration Test (SPT) split-spoon sampler, directly from the auger, from the walls of testpits or from the excavator bucket.

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

Aspect	Input
Sample Collection and Field QA/QC	The locations are to be logged to an appropriate standard in accordance with NEPM (2013) and all samples will be documented on the logs. Soil samples for contamination are to be collected from the fill and natural profiles based on field observations, and approximately 0.5m into the natural soil profile. Samples for contamination analysis are to be placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for asbestos analysis will be placed in zip-lock plastic bags. During sampling, soil at selected depths will be split into primary and duplicate samples for field QA/QC analysis. The splitting procedure will include alternate filling of the jars with soil.
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp will be used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs will be undertaken on soil samples using the soil sample headspace method. VOC data will be obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by JKE and are to be included in the report. The field screening for asbestos quantification from the sampling locations will include the following: • A bulk sample will be collected from fill at 1m intervals, or from each distinct fill profile to the extent possible; • Each bulk sample will be weighed using an electronic scale; • Each bulk sample will be passed through a sieve with a 7.1mm aperture and inspected for the presence of fibre cement. Alternatively, due to the cohesive nature of the soils, the samples may be placed on a contrasting support (blue tarpaulin) and inspected for the presence of fibre cement. Any soil clumps/nodules are to be disaggregated; • The condition of fibre cement or any other suspected asbestos materials will be noted on the field records; and • If observed, any fragments of fibre cement in the sample will be collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content will be undertaken based on the requirements outlined in Schedule B1 of NEPM (2013).
Decontamination and Sample Preservation	Sampling personnel will use disposable nitrile gloves during sampling activities. Re-usable sampling equipment will be decontaminated using a potable water/decon solution (with rags and scrubbing brush), followed by a rinse with potable water. Soil samples will be preserved by immediate storage in an insulated sample container with ice. On completion of the fieldwork, the contamination samples may be stored temporarily in fridges in the JKE warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

4.3 Groundwater Sampling Plan and Methodology

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

Table 4-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Three groundwater wells will be installed for the DSI at sampling locations 205, 206 and 219 shown on Figure A attached in Appendix A. The wells will be positioned to provide general site coverage. The locations of the monitoring wells have been selected to provide a baseline indication of groundwater flow across the site. However, we note one of the wells (205) will be

Aspect	Input
	positioned in the vicinity of the diesel generator and incinerator. The groundwater flow direction is estimated (based on the regional topography) to occur towards the north. The monitoring well proposed at sampling location 205 is considered to be in the up-gradient areas of the site and would be expected to provide an indication of groundwater flowing onto (beneath) the site from the south. The monitoring well proposed at sampling location 219 is considered to be in area of representative groundwater flowing across (beneath) the site. The monitoring well proposed at sampling location 206 is considered to be to be in area of representative groundwater flowing across (beneath) and beyond the down-gradient site northern boundary.
Monitoring Well Installation Procedure	The monitoring well construction details will be documented on the corresponding borehole log. The wells will be installed to a maximum depth of approximately 8mBGL and generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing installed in the upper section of the well (screw fixed); • A 2mm sand filter pack around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug on top of the sand pack to seal the well; and • A gatic cover installed at the surface with a concrete plug to limit the inflow of surface water. The proposed well construction is considered to be appropriate for screening purposes to assess general aquifer conditions with regards to the recommended monitoring well installation requirements in Schedule B2 of NEPM 2013. The installation depths and screen intervals may vary depending on observations (i.e. water strike) during drilling.
Monitoring Well Development	Prior to development, the monitoring wells will be checked for the presence of Light Non-Aqueous Phase Liquids (LNAPL) using a new disposable bailer and the water level will be measured using an electronic dip meter. The monitoring well head space will also be checked for VOCs using a calibrated PID unit. The monitoring wells will be developed using a submersible electrical pump with single-use tubing. A calibrated water quality meter will be used to measure pH, EC, DO, Eh and temperature. Development will occur until either the well is pumped dry or until steady state conditions are achieved. Groundwater removed from the wells during development will be left in jerry cans on site. For the DSI, steady state conditions are defined as the pH measurements over a one-minute time interval varying by less than 0.2 units, the difference in EC over the same period varying by less than 10%, and the Standing Water Level (SWL) not being in drawdown. The monitoring wells will be allowed to recharge for approximately 2-3 days prior to sampling.
Groundwater Sampling	Prior to sampling, the monitoring wells will be checked for the presence of LNAPL using an inter-phase probe electronic dip meter and a new disposable bailer. The monitoring well head space will also be checked for VOCs using a calibrated PID unit. Samples will be obtained using a peristaltic pump, after purging to achieve steady state conditions. Where steady state conditions cannot be achieved, the wells will be sampled whilst the SWL is in drawdown. Groundwater samples will be obtained directly from the single use tubing and placed in the sample containers. Duplicate samples are to be obtained by alternate filling of sample

Aspect	Input
	containers. This technique will be adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during sampling will be transported to JKE in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal.
Decontami-nation and Sample Preservation	During development (and sampling), the pump will be flushed between monitoring wells with potable water (single-use tubing will be used for each well). The pump tubing will be discarded after each sampling event and replaced. The samples will be preserved with reference to the analytical requirements and placed in an insulated container with ice. On completion of the fieldwork, the samples may be temporarily stored in a fridge at the JKE office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

4.4 Disruption Notice

JKE are to prepared a Disruption Notice (DN) for review by the client and appropriate hospital personnel. The DN will provide further details on the proposed sampling locations, sampling methodologies, sampling equipment and reinstatement following sampling.

At this stage, the DSI sampling is proposed to be completed between 12 and 16 December 2022.

4.5 Laboratory Analysis and Analytical Rationale

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

Table 4-3: Laboratory Details

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

An allowance has been made for the following analysis:

- Up to 25 selected fill/natural soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRHs; BTEX; OCPs and OPPs; and PCBs;
- Up to 15 selected deeper fill/natural soil samples will be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); PAHs; TRH and BTEX;
- Up to five selected fill soil samples will be analysed for asbestos 500ml. The analysis will be reserved for sampling locations/fill soils where suspected Asbestos Containing Materials (ACM) are

encountered, or where there are other indicators such as building/demolition waste inclusions in the fill;

- Up to two selected fill/natural soil samples will be analysed for: pH; cation exchange capacity (CEC); and clay content (%);
- Up to two selected fibre cement fragments, if found on or in soil, will be analysed for asbestos;
- A nominal allowance for TCLP leachability analysis for PAHs and selected metals has been included to provide a preliminary waste classification for the off-site disposal of soil in accordance with NSW EPA *Waste Classification Guidelines - Part 1: Classifying Waste* (2014);
- Up to three groundwater samples will be analysed for the following: heavy metals; TRH/BTEX; low level PAHs; pH; EC; and
- Collection and analysis of QA/QC samples (including intra- and inter-laboratory duplicates, trip blank/spike and rinsate blanks).

The soil analysis will generally be targeted to fill samples. Deeper samples may be analysed based on the results of the fill soils, or if other indicators such as staining or odours are encountered. A staged approach to soil sample analysis will be undertaken to allow for targeting areas based on the results of the initial analysis.

4.6 Reporting Requirements

A DSI report is to be prepared presenting the results of the investigation, generally in accordance with the NSW EPA Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (2020)[9].

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

5 LIMITATIONS

The report limitations are outlined below:

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

Important Information About This Report

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

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

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

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

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

Changes in Subsurface Conditions:

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

This Report is based on Professional Interpretations of Factual Data:

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

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

Investigation Limitations:

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

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

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

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

Read Responsibility Clauses Closely:
As the investigation is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the report, and you are encouraged to read them closely.

Appendix A: Figures

LEGEND

(red dashed line)	APPROXIMATE SITE BOUNDARY
(blue dashed line)	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)
TP101	JK GEOTECHNICAL TEST PIT LOCATION AND NUMBER AND
201	PROPOSED DSI SAMPLING LOCATION NUMBER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.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: GUNNEDAH HOSPITAL, MARQUIS STREET, GUNNEDAH, NSW

Project No: E35091UPD

Figure No: A

JKEnvironments

PLOT DATE: 27/10/2022 1:28:11 PM DWG FILE: S:\5 EIS\5C EIS JOBS\35000'S\E35091UPD GUNNEDAH\CADE35091UPD.DWG

Appendix B: Report Explanatory Notes

QA/QC Definitions

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[10] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[11]. The NEPM (2013) is consistent with these documents.

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

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

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

B. <u>Precision</u>

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

C. <u>Accuracy</u>

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

D. <u>Representativeness</u>

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

E. <u>Completeness</u>

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

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

[10] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)
[11] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

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

F. Comparability

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

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

G. Blanks

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

H. Matrix Spikes

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

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix C: Guidelines and Reference Documents

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

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

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

Contaminated Land Management Act 1997 (NSW)

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

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

National Health and Medical Research Council (NHMRC), (2018). National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011

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

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

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

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

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

NSW EPA, (2022). Sampling Design Part 1 - Application Guidelines

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

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

Protection of the Environment Operations Act 1997 (NSW)

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

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

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

Appendix K: Guidelines and Reference Documents

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

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

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

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

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NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines

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

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Protection of the Environment Operations Act 1997 (NSW)

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

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

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