REPORT TO

GARDNER WETHERILL ASSOCIATES

ON

DETAILED SITE INVESTIGATION (STAGE 2)

FOR

PROPOSED POLICE STATION

AT

51 BROMIDE STREET, BROKEN HILL, NSW

Date: 12 March 2020
Ref: E32665PHrpt2

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DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E32665PHrpt2	Final Report	12 March 2020

Executive Summary

Gardner Wetherill Associates ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed police station at 51 Bromide Street, Broken Hill ('the site').

The DSI included a review of a previous Environmental Site Assessment (ESA), review of geotechnical borehole logs and soil sampling from 16 testpits. The site has historically been part of a railway (tramway) and was converted into an outdoor mining equipment display and ride on miniature train track.

The ESA included a review of historical site information, a walkover site inspection and soil sampling from eight boreholes (BH1 to BH8 shown on Figure 2).

The s10.7 certificate included the following statement from Council: "This land may contain levels of heavy metals associated with Broken Hill being a mining town". The laboratory analysis results indicated that concentrations of lead were present in the surficial soils that exceeded the human health based SAC at BH1 and BH7 (refer to Figure 3).

At the time of both inspections, the site was largely vacant, except for a small scale railway that ran along the perimeter of the site, a small railway shed and some scattered trees.

Potential contamination sources were identified at the site including fill material, lead impacted dust, hazardous building materials (including asbestos), use of pesticides and possible storage of oils and/or fuels in the shed in the north-east section of the site.

The fill material at the site has been impacted by lead, carcinogenic PAHs and asbestos at concentrations above the human health based SAC. JKE consider that remediation will be required to render the site suitable for the proposed development.

A RAP should be prepared for the site. It should be noted that under Clause 14 of State Environment Planning Policy 55 (SEPP55), remediation in Broken Hill falls under Category 2 remediation work if remediation is carried out or to be carried out under the Public Land Remediation Program administered by the Broken Hill Environmental Lead Centre. Therefore, a separate Development Application (DA) will not be required for remediation at this site. At this stage the most likely form of remediation at the site would be 'cap and containment' of the contamination. Based on this, long-term management of the site will be required.

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**
Bureau of Meteorology	**BOM**
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**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Fibre Cement Fragment(s)	**FCF**
General Approval of Immobilisation	**GAI**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSL**
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**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCBs**
Per-and Polyfluoroalkyl Substances	**PFAS**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**

Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
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**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**

1 INTRODUCTION

Gardner Wetherill Associates ('the client') commissioned JK Environments (JKE) to undertake a Detailed Site Investigation (DSI) for the proposed police station at 51 Bromide Street, Broken Hill ('the site'). The site location is shown on Figure 1. The DSI was limited to the proposed development area only which occupies the south-west section of the property, as shown on Figure 2. For the purpose of this report, the assessment area has been referred to as 'the site', whilst the whole property has been referred to as 'the lot'.

This report has been prepared as part of due diligence assessment for the proposed development.

A geotechnical investigation was undertaken in conjunction with this assessment by JK Geotechnics (JKG). The results of the investigation are presented in a separate report (Ref: 32665AGrpt2)[1]. This report should be read in conjunction with the JKG report.

JKE have previously undertaken a Stage 1 environmental site assessment at the site. A summary of this information has been included in Section 2.

1.1 Proposed Development Details

No specific development details have been provided at this stage, however, we understand that a small police station is proposed at the site. We have assumed that no gardens or landscaped areas are proposed.

1.2 Aims and Objectives

The primary aims of the assessment 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 contamination conditions. The assessment objectives were to:

- Assess the current site conditions and use(s) via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil contamination conditions via implementation of a sampling and analysis program;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

An assessment of groundwater conditions was outside the scope of this DSI.

[1] Referred to as JKG report

1.3 Scope of Work

The assessment was undertaken generally in accordance with a JKE proposal (Ref: EP50577PH) of 28 October 2019 and written acceptance from the client of 13 January 2020. The scope of work included the following:

- Review of site information;
- Preparation of a CSM;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[2], other guidelines made under or with regards to the Contaminated Land Management Act (1997)[3] and State Environmental Planning Policy No.55 – Remediation of Land (1998)[4]. 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)

[4] *State Environmental Planning Policy No. 55 – Remediation of Land 1998* (NSW) (referred to as SEPP55)

2 SITE INFORMATION

2.1 Background

2.1.1 Environmental Site Assessment

The ESA included a review of historical site information, a walkover site inspection and soil sampling from eight boreholes (BH1 to BH8 shown on Figure 2).

At the time of the inspection, the site was largely vacant, except for a small scale railway that ran along the perimeter of the site, a small railway shed and some scattered trees.

The review of historical information indicated the following site uses:

- Pre-1965 to at least 1975 - Railway (tramway) corridor including a railway line and some sheds in the south-east section of the site;
- 1985 - A small excavation was located in the east section of the otherwise vacant site;
- 1995 to 2004 - The site was developed as an outdoor mining equipment display and a small gauge track was constructed around the perimeter of the site. A small shed was constructed in the north-east section of the site, over the railway. Stockpiled soil was apparent across the site during the development works; and
- 2004 to present - The site has operated as an outdoor mining equipment display and ride on children's railway.

Fill was encountered at the surface in all boreholes and extended to the termination of the boreholes at a maximum depth of approximately 0.3m below ground level (BGL). The fill typically comprised silty sandy clay with inclusions of igneous gravel and cobbles. BH5 included a trace of asphaltic concrete (AC) pavement.

The s10.7 certificate included the following statement from Council: "This land may contain levels of heavy metals associated with Broken Hill being a mining town". The laboratory analysis results indicated that concentrations of lead were present in the surficial soils that exceeded the human health based SAC at BH1 and BH7 (refer to Figure 3). However, statistical analysis has indicated that the 95% UCL was less than the human health-based SAC.

The risk to human health in the present site configuration and in the context of the proposed land use (police station) was considered to be low. However, the assessment was vertically limited and no assessment of deeper fill or natural soil was undertaken. Disturbance of the surficial fill could potentially increase the risk to the receptors if there is an increase in heavy metals concentrations at depth.

Further assessment (i.e. a detailed/Stage 2 assessment) was recommended to adequately assess the potential risks associated with the identified contamination sources. As a minimum, the additional assessment should include:

- Additional sampling locations (test pits) to better assess the risk posed by fill material and hazardous building materials and to meet the minimum sampling density specified in the Sampling Design Guidelines 1995. Sampling should include the area of the former excavation identified in the 1981 aerial photograph;
- Deeper sampling to adequately characterise the nature and depth of fill material at the site; and

- Targeted sampling in the footprint of, or immediately adjacent to, the in the shed in the north-east section of the site.

2.1.2 Geotechnical Investigation

JK Geotechnics has undertaken a Geotechnical Investigation at the site that included drilling eight boreholes across the site with a mechanically operated drill rig. The boreholes encountered fill to depths of approximately 0.1m to 1.2mBGL, underlain by sandy silty clay and schist bedrock at depth.

No groundwater was encountered in any of the boreholes to a maximum depth of approximately 6mBGL. The deepest boreholes (between 5.2m and 6m deep) were checked for groundwater seepage between four and seven hours after completion and were found to be dry.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner:	Broken Hill City Council
Site Address:	51 Bromide Street, Broken Hill
Lot & Deposited Plan:	Part of Lot 5893 DP 241855
Current Land Use:	Vacant
Proposed Land Use:	Commercial
Local Government Authority:	Broken Hill City Council
Current Zoning:	B2 – Local Centre
Site Area (m^2) (approx.):	6,600
Geographical Location (decimal degrees) (approx.):	Latitude: -31.96017 Longitude: 141.45922
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.3 Site Location and Regional Setting

The site is located in a mixed residential and commercial area of Broken Hill. The site is bounded by Blende Street to the south-east, Kaolin Street to the south-west and Beryl Street to the north-west. The remainder of the lot bounds the site to the north-east.

2.4 Topography

The regional topography is characterised by generally flat areas with slight undulations. The site itself has a gentle slope towards the south-west at less than 1°.

2.5 Site Inspection

A walkover inspection of the site was undertaken by JKE on 17 September 2019. The inspection was limited to accessible areas of the site and immediate surrounds.

A summary of the inspection findings are outlined in the following subsections:

2.5.1 Current Site Use and/or Indicators of Former Site Use

At the time of the inspection, the site was largely vacant, except for a small scale railway that ran along the perimeter of the site, a small railway shed and some scattered trees.

2.5.2 Buildings, Structures and Roads

The small gauge railway extended around the perimeter of the site and included a small timber and metal clad shed in the north-east section used to store miniature trains. The shed was locked at the time of inspection, therefore, no internal inspection was undertaken.

Some mining equipment was on display at the south-western end of the site. Each piece of equipment was mounted on a small concrete pad.

2.5.3 Boundary Conditions, Soil Stability and Erosion

A low height chainwire fence extended around the site. The majority of the site was unpaved with some sections of gravel on the surface. Some AC may have been present beneath the gravel/fill in the south section of the site.

2.5.4 Visible or Olfactory Indicators of Contamination

No obvious indicators of contamination were observed on the site.

2.5.5 Presence of Drums/Chemicals, Waste and Fill Material

No obvious chemical storage was observed on the site, however, the propulsion method of the trains was unclear. It is likely that some diesel or petroleum was used and/or stored at the site. The most likely location for chemical storage was the shed at the north-east site boundary.

Fill material was considered likely to be present across the entire site.

2.5.6 Drainage and Services

No drainage infrastructure was observed at the site. Surface water would be expected to infiltrate into the exposed soils at the site. Any overflow would be expected to flow to the south-west and enter drainage along Kaolin Street.

2.5.7 Sensitive Environments

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

2.5.8 Landscaped Areas and Visible Signs of Plant Stress

Vegetation on the site consisted of small, scattered trees. No obvious signs of plant stress were observed in these trees.

2.6 Surrounding Land Use

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

- North – a residential area that typically included single level houses constructed of brick, fibro, metal and timber;
- South – a residential area that typically included single level houses constructed of brick, fibro, metal and timber together with a small scale nursery and some commercial accommodation;
- East – a recreational reserve that included parkland and mining equipment displays including to Kintore Headframe and an adjacent soil stockpile; and
- West – Broken Hill High School that included playing fields and an agricultural area.

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

2.7 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the assessment in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. Major services were not identified that would be expected to act as preferential pathways for contamination migration.

2.8 Interview with Site Personnel

Shane Stacey from Vertex Power and Process (the site services locators we used on the project prior to drilling) commented that the site was formerly part of a railway and that the old railway line ran approximately through the centre of the site along the long axis (south-west to north-east).

2.9 Section 10.7 Planning Certificate

The section 10.7 (2 and 5) planning certificates were reviewed for the assessment. Copies of the certificates are attached in the appendices. A summary of the relevant information is outlined below:

- The land is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM Act 1997;
- The land is not the subject of a Site Audit Statement (SAS);
- This land may contain levels of heavy metals associated with Broken Hill being a mining town. Council has not undertaken testing specific to this property in relation to this matter;
- The land is not located within an acid sulfate soil (ASS) risk area; and
- The land is located in a heritage conservation area. The property is located within the Argent Street Heritage Conservation Area.

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

Regional geological information presented in the Lotsearch report (reviewed as part of the ESA) indicated that the site is underlain by Sillimanite gneiss, andalusite-, chiastolite-, mica-, schist, phyylite, quartzite, sandstone and slate.

3.2 Acid Sulfate Soil (ASS) Risk and Planning

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

3.3 Hydrogeology

Hydrogeological information presented in the Lotsearch report indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes local aquifers of generally low productivity. There were a total of 10 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 600m from the site;
- All of the bores within the report buffer were registered for monitoring purposes;
- There were no nearby bores within the report buffer registered for domestic or irrigation uses; and
- The drillers log information from the closest registered bores typically identified clayey sand soil overlying shallow Amphibolite/Granite bedrock. Standing water levels (SWLs) in the bores ranged from 3.2m BGL to 6.5mBGL.

The site inspection and desktop information reviewed for this assessment indicated that the subsurface conditions at the site are likely to consist of fill and relatively low permeability (loamy) soils overlying shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. There is a reticulated water supply in the area and consumption of groundwater is not expected to occur. Use of groundwater is not proposed as part of the development.

Considering the local topography and surrounding land features, JKE would generally expect groundwater to flow towards the south-west.

3.4 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is a seasonal creek located over 2km to the north-west of the site. This is up-gradient or potentially cross gradient from site and is not considered to be a potential receptor.

5 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 10.

5.1 Potential Contamination Sources/AEC and CoPC

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

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

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. A former excavation in the east section of the site may include a section of deep fill. Elevated concentrations of lead was encountered in surficial fill during the ESA.	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.
Dust - Lead has been historically mined in Broken Hill and due to the dry climate has been transported via dust to much of the town.	Lead
Fuel storage – The small railway shed may include storage of fuel or oils associated with the ride on railway.	Lead, TRH, BTEX and PAHs
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities.	Asbestos, lead and PCBs

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

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

Table 5-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination. Lead has been historically mined in Broken Hill and due to the dry climate has been transported via dust to much of the town.
Affected media	Soil has been identified as the primary affected medium. The potential for groundwater impacts is considered to be relatively low. However, groundwater would need to be considered in the event significant contamination was identified in soil. An assessment of lead dust impacts on the receptors was outside the scope of this DSI. This is an issue which should be addressed as a regional public health initiative.
Receptor identification	Human receptors include future site occupants/users in a commercial/industrial land use setting, construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users. Although there is a potential for children to visit the site under the current land use setting, and for children to attend site during future use of the site as a police station, such exposure scenarios would be infrequent and any exposure would be of very short duration. On this basis, children have not been identified as receptors for the assessment of on-site soil contamination risks. Post development, the risk of exposure to the site soil will be further minimised. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the proposed landscaped areas). JKE note that such areas are not proposed as part of the development, however, these receptors have been considered as a conservative measure.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary/direct contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens, inhalation of airborne asbestos fibres during soil disturbance, inhalation of lead dust particles, 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 buildings where slab-on-ground construction occurs (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 • Inhalation of lead dust particles.
Presence of preferential pathways for contaminant movement	No obvious preferential pathways for contaminant migration were observed at the site.

6 SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 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) and the Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[5]. The seven-step DQO approach for this project is outlined in the following sub-sections.

The DQO process is validated in part by the Data Quality Assurance/Quality Control (QA/QC) Evaluation. The Data (QA/QC) Evaluation is summarised in Section 8.1 and the detailed evaluation is provided in the appendices.

6.1.1 Step 1 - State the Problem

The CSM identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. The Stage 1 assessment encountered elevated concentrations of lead in surface soils at two locations. Investigation data is required to better assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required.

A waste classification is required prior to off-site disposal of excavated soil/bedrock.

The DQOs were developed by the author of this report and checked by the reviewer. Both the author and reviewer were joint decision-makers in relation to Step 2 of the DQO process.

6.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the assessment are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?
- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?
- Is the site characterisation sufficient to provide adequate confidence in the above decisions?
- Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

6.1.3 Step 3 - Identify Information Inputs

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

- Existing relevant environmental data from previous reports;
- Site information, including site observations and site history documentation;

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

- Sampling of potentially affected media, including soil and fibre cement fragments (FCF);
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining;
- Laboratory analysis of soils and fibre cement for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

6.1.4 Step 4 - Define the Study Boundary

The sampling for the DSI was confined to the site boundaries as shown in Figure 2 and was limited vertically to a depth of approximately 2.1m BGL (spatial boundary). The sampling was completed on 4 and 5 February 2020 (temporal boundary). The assessment of potential risk to adjacent land users has been made based on data collected within the site boundary.

Sampling was not undertaken within the existing footprint of the small storage shed due to access constraints.

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

6.1.5.1 Tier 1 Screening Criteria

The laboratory data will be assessed against relevant Tier 1 screening criteria (referred to as SAC), as outlined in Section 7. Exceedances of the SAC do not necessarily indicate a requirement for remediation or a risk to human health and/or the environment. Exceedances are considered in the context of the CSM and valid SPR-linkages.

For this assessment, the individual results have been assessed as either above or below the SAC. Where appropriate, data are assessed against valid statistical parameters to characterise the data population. This may include calculation and application of mean values and/or 95% upper confidence limit (UCL) values for the data set, with regards to the NEPM (2013) framework and other relevant guidelines made under the CLM Act 1997. UCLs are 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.

6.1.5.2 Field and Laboratory QA/QC

Field QA/QC included analysis of intra-laboratory duplicates and trip blank samples. Further details regarding the sampling and analysis undertaken, and the acceptable limits adopted, is provided in the Data Quality (QA/QC) Evaluation in the appendices.

Analysis of a trip spike sample was proposed, however, due to transport issues associated with the site location, no trip spike was analysed for this assessment.

Analysis of an inter-laboratory duplicate was proposed. Our standard inter-laboratory is located in Melbourne and given the time taken to transport samples from Broken Hill to Sydney, JKE decided that additional interstate transport would be disadvantageous to the reliability of the data. An additional intra-laboratory duplicate was analysed to compensate for this. Considering the QA undertaken by the laboratory

as part of their National Association of Testing Authorities, Australia (NATA) accreditation, JKE are of the opinion that the lack of inter-laboratory analysis does not impact the data set or outcome of the assessment.

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the attached 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.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, JKE typically adopt the most conservative concentration reported (or in some cases, consider the data from the affected sample as an estimate).

6.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

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

6.1.6 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 is 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 assessment, the null hypothesis has been adopted which is that, there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis has been adopted for this assessment.

6.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the assessment objectives. Adjustment of the assessment design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data were collected.

The sampling plan and methodology are outlined in the following sub-sections.

6.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 6-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The sampling density for asbestos in soil included sampling at approximately the minimum sampling density recommended in the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009)[6] (endorsed in NEPM 2013). This density was considered adequate as no asbestos was encountered during the Stage 1 assessment. Samples for all contaminants were collected from 16 locations (TP201 to TP216) during the DSI as shown on the attached Figure 2. Based on the site area (6,600m^2), this number of locations corresponded to a sampling density of approximately one sample per 412m^2. This number of locations met the minimum sampling density for hotspot identification, as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[7].
Sampling Plan	Where possible, the sampling locations were placed on a systematic plan with a grid spacing of approximately 20-27m between sampling location. A systematic plan was considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations. Two of the sampling locations were placed to make a preliminary assessment of potential risks associated with the AEC and CoPC identified in the CSM including the storage shed (TP201) and a former excavated area (TP203 and TP210).
Set-out and Sampling Equipment	Sampling locations were set out using a tape measure. In-situ sampling locations were checked for underground services by an external contractor prior to sampling. Samples were collected using an excavator. Samples were obtained from the test pit walls or directly from the bucket by hand. Where sampling occurred from the bucket, JKE collected samples from the central portion of large soil clods, or from material that was unlikely to have come into contact with the bucket.
Sample Collection and Field QA/QC	Soil samples were obtained on 4 and 5 February 2020 in accordance with the standard sampling procedure (SSP) attached in the appendices. Soil samples were collected from the fill and natural profiles based on field observations. The sample depths are shown on the logs attached in the appendices. Samples were placed in glass jars with plastic caps and Teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp was used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by JKE. Fill/spoil at the sampling locations was visually inspected during the works for the presence of fibre cement fragments. The field screening for asbestos quantification included the following: • A representative 10L sample was collected from fill at 1m intervals, or from each distinct fill profile. The bulk sample intervals are shown on the attached borehole/test pit logs; • Each 10L sample was weighed using an electronic scale;

[6] Western Australian (WA) Department of Health (DoH), (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. (referred to as WA DoH 2009)

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

Aspect	Input
	• Each bulk sample was passed through a sieve with a 7.1mm aperture and inspected for the presence of fibre cement; • The condition of fibre cement or any other suspected asbestos materials was noted on the field records; and • If observed, any fragments of fibre cement in the 10L sample or in the spoil were collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content in the 10L samples were undertaken based on the requirements outlined in Schedule B1 of NEPM (2013), as summarised in Section 7.1. A calibration/check of the accuracy of the scale used for weighing the fibre cement fragments was undertaken using a set of calibration weights. Calibration/check records are maintained on file by JKE. The scale used to weigh the 10L samples was not calibrated, however this is not considered significant as this method of providing a weight for the bulk sample is considered to be considerably more accurate than applying a nominal soil density conversion.
Decontami-nation and Sample Preservation	Sampling personnel used disposable nitrile gloves during sampling activities. Re-usable sampling equipment was decontaminated as outlined in the SSP. Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. During overnight storage at Broken Hill, samples were stored in an insulated container with dry ice. On completion of the fieldwork, the samples were packed in insulated containers with both ice and dry ice in preparation for transport to Sydney. The samples arrived in Sydney approximately 5 days after completion of fieldwork and were checked before temporary storage in fridges in the JKE warehouse. Upon delivery the samples were cool to touch and water in the base of the insulated container was cold. Following temporary storage, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

6.3 Analytical Schedule

The analytical schedule (for primary samples) is outlined in the following table:

Table 6-2: Analytical Schedule (Primary Samples)

Analyte/CoPC	Fill Samples	Natural Soil Samples	Fibre Cement Material Samples
Heavy Metals	23	8	-
TRH/BTEX	23	8	-
PAHs	23	8	-
Asbestos	4	-	4
Toxicity characteristic leachate procedure (TCLP) Metals and/or PAHs for waste classification purposes	24	-	-

6.3.1 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 6-3: 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)	236500 and 236500-A

7 SITE ASSESSMENT CRITERIA (SAC)

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

7.1 Soil

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

7.1.1 Human Health

- Health Investigation Levels (HILs) for a 'commercial/industrial' exposure scenario (HIL-D);
- Health Screening Levels (HSLs) for a 'commercial/industrial' exposure scenario (HSL-D). HSLs were calculated based on conservative assumptions including a 'sand' type and a depth interval of 0m to 1m;
- Where exceedances of the HSLs were reported for hydrocarbons (TRH/BTEX and naphthalene), the soil health screening levels 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)[8] were considered; and
- Asbestos was generally assessed on the basis of presence/absence and against the HSL-D criteria. A summary of the asbestos HSL-D criteria is provided in the table below:

Table 7-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-D 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 WA DoH (2009) guidance. The SAC include the following: • <0.05% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. The NEPM (2013) and WA DoH (2009) also specify that the surface should be free of visible asbestos. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): $$\textbf{\% w/w asbestos in soil} = \frac{\textbf{\% asbestos content x bonded ACM (kg)}}{\text{Soil volume (L) x soil density (kg/L)}}$$ However, we are of the opinion that the actual soil volume in a 10L bucket varies considerably due to the presence of voids, particularly when assessing cohesive soils. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows (we note that the units have also converted to grams):

[8] 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*

Guideline	Applicability
	% w/w asbestos in soil = $\frac{\text{**% asbestos content x bonded ACM (g)**}}{\text{Soil weight (g)}}$

7.1.2 Environment (Ecological – terrestrial ecosystems)

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

7.1.3 Management Limits for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) were considered (if required) following evaluation of human health and ecological risks, and risks to groundwater.

7.1.4 Waste Classification

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

Table 7-2: 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.
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;

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

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

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

Category	Description
	• That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

7.1.4.1 General Approvals of Immobilisation (GAI)

Waste classified as 'hazardous' in accordance with the Waste Classification Guidelines 2014 due to high levels of contaminants is generally not suitable for disposal to a landfill in NSW without treatment. However, if the contaminants are 'immobilised' so that they will not be released into the landfill leachate at levels of concern, then the EPA may grant an immobilisation approval to enable the waste to be landfilled. The immobilisation approvals are issued by the EPA under the Protection of the Environment Operations (Waste) Regulation 2014. A list of the GAI can be found on the NSW EPA website.

Significant amounts of waste ash and gravely slag were available in the late nineteenth and early twentieth centuries as a result of the use of coal for industrial and domestic heating purposes. Widespread use of ash waste (either as ash or mixed with other soil and waste materials) as fill material was common in the suburbs of Sydney at this time. To account for the presence of ash and slag, the NSW EPA has published the following:

Table 7-3: GAIs

Approval Number	Waste Stream	Contaminants	Waste Assessment Requirements
1999/05	Ash, Ash-contaminated natural excavated materials or coal-contaminated natural excavated material.	Polycyclic Aromatic Hydrocarbons (PAHs) including benzo(a)pyrene.	The SCC limits for PAHs and benzo(a)pyrene outlined in the Waste Classification Guidelines 2014 do not apply for the assessment of this waste stream. The material can be classified according to the leachable concentration (TCLP) value of benzo(a)pyrene alone. Disposal restrictions apply for material classified under this GAI.
2009/07	Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials.	Beryllium, Chromium (VI), lead, nickel, PAHs and benzo(a)pyrene.	The SCC limits for these contaminants outlined in the Waste Classification Guidelines 2014 do not apply for the assessment of this waste stream. The material can be classified according to their leachable concentrations (TCLP) values alone.

8 RESULTS

8.1 Summary of Data (QA/QC) Evaluation

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

8.2 Subsurface Conditions

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

Table 8-1: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all testpits and extended to depths of approximately 0.4m to 1.4mBGL. The fill typically comprised sandy clayey silty, silty clayey sand, silty gravelly sand, silty gravel and silty sand with inclusions of concrete and AC fragments, glass, igneous and sandstone gravel, slag and ash. Coal was encountered in the fill in TP207. Fibre Cement Fragments (FCF) were encountered in the fill in TP213 to a depth of approximately 0.35mBGL.
Natural Soil	Sandy clayey silt, silty sandy clay and silty clayey sand natural soil was encountered beneath the fill in all testpits and extended to the termination of all testpits, except TP201, at a maximum depth of approximately 2mBGL. The natural soil was typically orange-brown or red-brown and contained traces of ironstone gravel, ash and root fibres.
Bedrock	Extremely weather schist was encountered beneath the natural soil in TP201 and extended to the termination of the testpit at a depth of approximately 2.1mBGL.
Groundwater	Groundwater seepage was not encountered in the test pits excavated at the site. All testpits remained dry on completion of excavation and a short time after.

8.3 Field Screening

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

Table 8-2: Summary of Field Screening

Aspect	Details
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The majority of results were 0ppm isobutylene equivalents and the maximum result was 0.2ppm, which indicates a lack of PID detectable VOCs.
Bulk Screening for Asbestos	The bulk field screening results are summarised in the attached report tables. ACM in the form of four FCF was encountered in spoil excavated from the upper 0.35m and included the upper 0.1m of fill. Although no ACM was encountered in the bulk sample, the FCF were from the spoil were weighed to allow comparison to the SAC. The ACM concentration in the spoil from TP213 (0-0.35m) would exceed the SAC based on a 10L sample size. All other results were below the SAC.

8.4 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below:

8.4.1 Human Health and Environmental (Ecological) Assessment

Table 8-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	The lead results in several fill samples exceeded the human health based SAC. The highest result was 3,500mg/kg in the TP204 (0.7-0.9m) sample. The lead results in natural soil samples were all less than the human health based SAC. All remaining heavy metals results were below the human health based SAC. Several copper, lead and zinc results exceeded the ecological based SAC. The elevated results were all in fill samples.
TRH	All TRH results were below the human health based SAC, with the exception of two exceedances of TRH above the management limits. The TRH F3 results of 5,300mg/kg and 14,000mg/kg in the TP203 (0.4-0.6m) and TP210 (0.4-0.65m) samples, respectively, exceeded the management limits for commercial/industrial land use. The TRH F3 results in fill samples from TP203, TP204 and TP210 exceeded the ecological based SAC. The TRH F2 result in the TP210 sample also exceeded the SAC.
BTEX	All BTEX results were below the SAC.
PAHs	The carcinogenic PAHs result in fill samples from TP203, TP204 and TP210 exceeded the human health based SAC. The highest result was 260mg/kg in the TP210 (0.4-0.65m) sample. The benzo(a)pyrene results in fill samples from TP203 and TP210 exceeded the ecological based SAC. The remaining PAH results were below the SAC.
Asbestos	All asbestos in soil results were below the SAC (i.e. asbestos was absent in the samples analysed for the investigation). Three FCF samples from TP213 encountered asbestos.
Coal Tar	Fill samples from TP203 and TP210 that contained large amounts of AC pavement fragments were analysed for the presence/absence of coal tar. No coal tar was present in the samples. The results are included in the laboratory report 236500.

8.4.2 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Part 1 of the Waste Classification Guidelines, as summarised previously in this report. The results are presented in the report tables attached in the appendices. A summary of the results is presented in the following table:

Table 8-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	No. of Samples Analysed	No. of Results > CT Criteria	No. of Results > SCC Criteria	Comments
Heavy Metals	31	21	8	Lead concentrations exceeded the CT1 criterion in the majority of fill samples and exceeded the SCC1 criterion in eight fill samples from TP202, TP204, TP208, TP209, TP210 and TP214. The maximum lead concentration was 3,500mg/kg.
TRH	31	1	1	The TRH (C_{10}-C_{36}) result in the TP210 (0.4-0.65m) sample of 14,650mg/kg exceeded the CT1/SCC1 criterion of 10,000mg/kg.
BTEX	31	0	0	-
Total PAHs	31	3	3	The total PAHs results in the TP203 (0.4-0.6m), TP204 (0.7-0.9m) and TP210 0.4-0.65m) fill samples exceeded the SCC1 criterion of 200mg/kg. The TP203 and TP210 results also exceeded the SCC2 criterion of 800mg/kg.
Benzo(a)pyrene	31	18	4	The benzo(a)pyrene results exceeded the CT1 criterion of 0.8mg/kg in 18 fill samples. The TP212 results also exceeded the SCC1 criterion of 10mg/kg. Results from TP203, TP204 and TP210 fill samples exceeded the SCC2 criterion of 23mg/kg.
Asbestos	8	-	-	Asbestos was detected in the four FCF encountered in the fill in TP213. Asbestos was not detected in the four fill soil samples analysed.

Table 8-5: Summary of Soil Laboratory Results Compared to TCLP Criteria

Analyte	No. of Samples Analysed	No. of Results > TCLP Criteria	Comments
Lead	25	3	The fill samples with lead concentrations above the CT1 criterion were analysed for TCLP lead. The results from the TP211 (0-0.1m), TP211 (0.2-0.4m) and SDup 4 (from TP211) fill samples exceeded the TCLP1 criterion of 5mg/L but were below the TCLP2 criterion of 20mg/L.
Benzo(a)pyrene	24	-	The fill samples with benzo(a)pyrene concentrations above the CT1 criterion were analysed for TCLP PAHs (including benzo(a)pyrene). All of the results were below the TCLP1 criterion.

8.4.3 Statistical Analysis

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

- The 95% Upper Confidence Limit (UCL) on the mean value for lead was 1,908mg/kg, which is above the human health based SAC; and
- The 95% UCL for Carcinogenic PAHs was 78.89mg/kg, which is above the human health based SAC.

Concentrations of Carcinogenic PAHs in individual samples also exceeded 250% of the SAC. Based on these failures, no further statistical analysis will be undertaken on this data. UCL calculations were not undertaken on TRH results. Two fill samples encountered TRH F3 results above 250% of the ecological SAC. One fill sample encountered TRH F2 result above 250% of the ecological SAC.

9 WASTE CLASSIFICATION ASSESSMENT

9.1 Preliminary Classification of Fill

Based on the results of the assessment, and at the time of reporting, the fill material in the vicinity of TP213 is classified as **General Solid Waste (non-putrescible) containing Special Waste (asbestos)**. Additional testing will be required in the vicinity of this location to better characterise the material prior to off-site disposal.

Due to the elevated concentration of TRH in the fill in TP210 and the elevated TCLP lead result in TP211, this material is classified as **Restricted Solid Waste (non-putrescible)**. It is likely that the elevated TRH result is associated with the presence of AC fragments in the fill. Additional testing will be required in the vicinity of this location to better characterise the material prior to off-site disposal.

The fill material across the remainder of the site may be classified as **General Solid Waste (non-putrescible) under the GAIs**, subject to further assessment of the extent of the asbestos, TRH and lead leachate impact.

Fill should be disposed of to a facility that is appropriately licensed by the NSW EPA to receive this waste stream. The facility should be contacted to obtain the required approvals prior to commencement of excavation. Fill classified under the GAI can only be disposed at a NSW EPA licensed landfill facility.

We understand that the proposed development in on-grade and that little to no waste soil is to be disposed off-site under this waste classification.

9.2 Classification of Natural Soil and Bedrock

Based on the scope of work undertaken for this assessment, and at the time of reporting, JKE are of the opinion that the natural soil and bedrock at the site is likely to meet the definition of **VENM** for off-site disposal or re-use purposes. However, due to the presence of asbestos, lead, Carcinogenic PAHs and TRH in the overlying fill which is believed to be present from manmade contamination, the VENM classification will need to be confirmed following the removal of all overlying fill.

In accordance with Part 1 of the Waste Classification Guidelines, the VENM is pre-classified as general solid waste and can also be disposed of accordingly to a facility that is licensed to accept it.

10 DISCUSSION

10.1 Tier 1 Risk Assessment and Review of CSM

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

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

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

10.1.1 Soil

The s10.7 certificate included the following statement from Council: "This land may contain levels of heavy metals associated with Broken Hill being a mining town". The NSW Government has established an information portal for lead contamination in Broken Hill (https://leadsmart.nsw.gov.au/). The portal states that due to the dry climate of Broken Hill, lead dust has transferred to the dust, soil, dirt and rainwater tanks in the town.

The laboratory analysis results indicated that concentrations of lead are present in the fill that exceeded the human health based SAC. The lead appears to be associated with fill material and surficial soil. Concentrations of lead in natural soil samples were all less than the human health based SAC.

Concentrations of Carcinogenic PAHs above the human health based SAC were encountered in fill samples from TP203, TP204 and TP210. All of these locations included significant amounts of AC pavement fragments and slag in the fill, which is the likely source of the contamination.

Mid to heavy fraction TRH was encountered in the fill (generally at concentrations less than the human health based SAC) at the site and appeared to be associated with elevated concentrations of PAHs rather than a fuel or oil source.

JKE note that two samples for TRH F3 from TP203 and TP210 were above the management limits. The samples were at depths of approximately 0.4-0.6m and 0.4-0.65m, respectively. Shallower samples (0-0.2m) were obtained from both testpits and the results were less than the management limit.

The management limits are taken from Section 5.3.1 of the *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale*, Canadian Council of Ministers of the Environment 2008. The management limits are based on the following:

- Free-phase risk to groundwater – The Canadian guideline states that for "most petroleum products and soil types, the residual saturation limit occurs with total Petroleum Hydrocarbon (PHC) concentrations of the order of 20,000 mg/kg to 30,000 mg/kg, though it may occur at lower concentrations for light-end products such as gasoline.";
- Risk to workers in trenches – To derive the guidelines and in the absence of relevant acute toxicity endpoints for PHC fractions, occupational exposure limits for gasoline and jet fuel were respectively applied to represent F1 and F2 for screening purposes, although it is acknowledged that these are not

appropriate endpoints for human health risk assessment. The modelling was also based on the assumption that contamination was in direct contact with the trenches. Based on the modelling evaluation, limits of 1,000 mg/kg each for F1 and F2 were deemed protective for both coarse and fine soils; and

- The risk of explosive hazards - Based on the modelling, limits of 1,400 mg/kg and 1,700 mg/kg have been established for F1 in coarse and fine soils, respectively, and a limit of 5,200 mg/kg has been established for F2 in both coarse and fine soils.

JKE consider that the sample exceedances, above the management limit, are not considered to represent a significant risk to human receptors or to groundwater, based on the following comments regarding the above:

- Both sample results were well below the 20,000mg/kg threshold at which the contamination could represent a free-phase risk;
- The TRH F1 and F2 results in all samples were less than the management limits and, therefore, the risk to workers is considered to be negligible; and
- The TRH F1 and F2 results were well below the risk of explosive hazard limits.

Several copper, lead, zinc, TRH and benzo(a)pyrene results were above the ecological based SAC, however, we understand that no gardens or landscaped areas are proposed at the site. Therefore, based on the lack of future receptors at the site, the risk posed by these exceedances is considered to be low. These concentrations should be considered if the proposed development will include landscaped or garden areas.

Leachate results generally indicated that lead and benzo(a)pyrene are not leaching at significant concentrations, with the exception of lead leaching from TP211 fill samples. Based on this, and the general lack of rainfall in the Broken Hill area, the potential for vertical migration of contamination associated with the fill material is considered to be low across the majority of the site.

The lead leaching in TP211 was elevated, however, the leachable concentrations were within the moderate range (less than 20mg/L). Leachate testing is undertaken by mixing a soil sample into a low pH solution to represent worst case conditions that may be found in a landfill. The test conditions are unlikely to be representative of on-site conditions and, therefore, the concentration of lead leaching under the existing on-site conditions is likely to be significantly less.

Although significant contamination was encountered in fill samples at the site, the risk posed by the fill to groundwater is also considered to be low based on the following:

- The leachate results were generally low, with the exception of shallow (less than 0.5m deep) fill samples from TP211;
- The lack of elevated concentrations of contaminants in natural soil samples;
- The TRH F3 concentrations are below the lower threshold for contamination to represent a free phase risk;
- The TRH is considered likely to be associated with AC fragments and slag in the fill rather than an oil or fuel source and is, therefore, unlikely to be mobile; and

- No groundwater was encountered during either the DSI or geotechnical investigation at the site to a maximum depth of approximately 6m. The leachable lead in TP211 is, therefore, at least 5.5m above groundwater.

Asbestos was encountered in the fill in TP213 to a depth of approximately 0.35m. The asbestos was in the form of FCF and was considered to be bonded. The asbestos was present the in top 100mm of fill and was, therefore, considered to exceed the SAC.

The contamination (lead, carcinogenic PAHs and asbestos) present in the fill material at the site represents a risk to human receptors (site occupants and visitors). The risk would increase during any works that causes disturbance of or direct exposure to the fill. The risk to ecological receptors should be further assessed if the proposed development includes landscaped or garden areas.

10.2 Decision Statements

The decision statements are addressed below:

Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?

Yes, the main potential contamination sources were fill material, deposition of lead impacted dust onto surface soil, hazardous building materials (including asbestos), use of pesticides and possible storage of oils and/or fuels in the shed in the north-east section of the site.

Are any results above the SAC?

Yes, lead was encountered in fill across the site at concentrations above the human health-based SAC. Carcinogenic PAHs were encountered in the fill associated with slag and AC pavement inclusions in TP203, TP204 and TP210. TRH F3 was encountered at two locations at concentrations above the management limits.

Asbestos in the form of FCF was encountered in the shallow fill (up to 0.35m) in TP213 and included asbestos in the top 100mm of soil.

Several copper, lead, zinc and TRH results were encountered across the site at concentrations above the ecological-based SAC.

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

The risk to human receptors (site occupants and visitors) posed by the contaminated fill at the site is considered to be sufficient in the current site setting to be deemed unacceptable. This risk is likely to increase during any disturbance of fill at the site, such as during excavation and/or construction works. The main exposure pathway is through ingestion of impacted fill, mainly through poor hygiene practices (not washing hands etc). Secondary exposure pathways included inhalation of dust and absorption. Inhalation is the main exposure pathway for asbestos contamination and lead dust to human receptors.

The risk posed by the contaminants above the ecological SAC is considered to be low due to the lack of ecological receptors in the context of the proposed development.

Is remediation required?

Yes, remediation will be required to render the site suitable for the proposed development.

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

Yes, although the nature of the asbestos impact is likely to be sporadic in terms of distribution across the site, the fill material across the entire site is impacted with contamination and will need to be remediated or managed.

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

The site can be made suitable following preparation of a Remedial Action Plan (RAP) and subsequent remediation/management to reduce the risks posed by contamination to human receptors.

10.3 Data Gaps

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

Table 10-1: Data Gap Assessment

Data Gap	Assessment
No groundwater assessment	Based on the site history and the results reported, the potential for groundwater contamination to pose a risk to the receptors is considered to be low. Additional work to address this data gap is not recommended at this stage. This should be reviewed when proposed development details become available.
Soil sampling density below minimum guideline density for asbestos	The soil sampling density for asbestos was adopted based on no asbestos being encountered during the Stage 1 assessment. As asbestos is now known to be present in fill at the site the sampling density is recommended to double to 32 locations. However, due to the widespread nature of contamination across the site, no further assessment of asbestos contamination is considered to be required at this stage. This should be reviewed when proposed development details become available.
Lead Leachability	The leachable lead concentrations from fill samples in TP211 were elevated. It is very unlikely that the lead will impact groundwater due to the depth of groundwater. No further assessment of this data gap is recommended at this stage.

11 CONCLUSIONS AND RECOMMENDATIONS

The assessment included a review of a previous Stage 1 report and soil samples from 16 testpits. The site has historically been part of a railway (tramway) and was converted into an outdoor mining equipment display and ride on miniature train track.

Potential contamination sources were identified at the site including fill material, lead impacted dust, hazardous building materials (including asbestos), use of pesticides and possible storage of oils and/or fuels in the shed in the north-east section of the site.

The fill material at the site has been impacted by lead, carcinogenic PAHs and asbestos at concentrations above the human health based SAC. JKE consider that remediation will be required to render the site suitable for the proposed development.

A RAP should be prepared for the site. It should be noted that under Clause 14 of State Environment Planning Policy 55 (SEPP55), remediation in Broken Hill falls under Category 2 remediation work if remediation is carried out or to be carried out under the Public Land Remediation Program administered by the Broken Hill Environmental Lead Centre. Therefore, a separate Development Application (DA) will not be required for remediation at this site. At this stage the most likely form of remediation at the site would be 'cap and containment' of the contamination. Based on this, long-term management of the site will be required.

Provided the site is remediated, there is no requirement to report the contamination under the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[12]. This should be reviewed following completion of remediation works.

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

[12] 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)

12 LIMITATIONS

The report limitations are outlined below:

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

Important Information About This Report

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

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

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

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

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

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

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

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

Misinterpretation of Site Assessments by Design Professionals

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

Logs Should not be Separated from the Assessment Report

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

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

Read Responsibility Clauses Closely

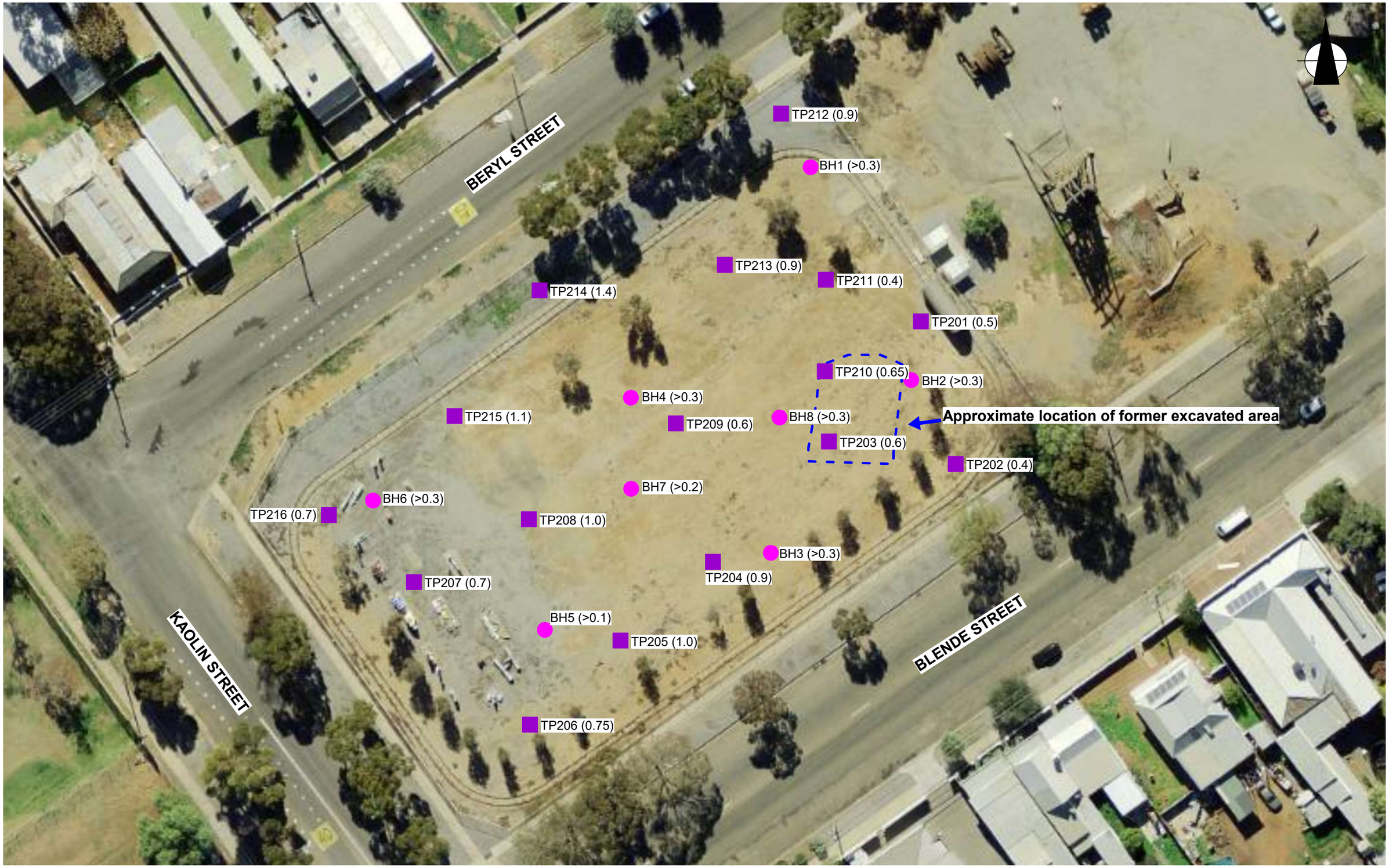
Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use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

Appendix A: Report Figures

Title:	**SITE LOCATION PLAN**
Location:	51 BROMIDE STREET, BROKEN HILL, NSW
Project No: E32665PH	Figure No: 1
	JK ENVIRONMENTS

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Sources: https://maps.six.nsw.gov.au/ and whereis



LEGEND:

———	APPROXIMATE SITE BOUNDARY
BH1 (0.3)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
TP201 (0.5)	TESTPIT LOCATION, NUMBER AND DEPTH OF FILL (m)

0 — 25
Scale Metres

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Sources: Google Earth Pro

Title: **SAMPLE LOCATION PLAN**

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Project No: E32665PH

Figure No: 2

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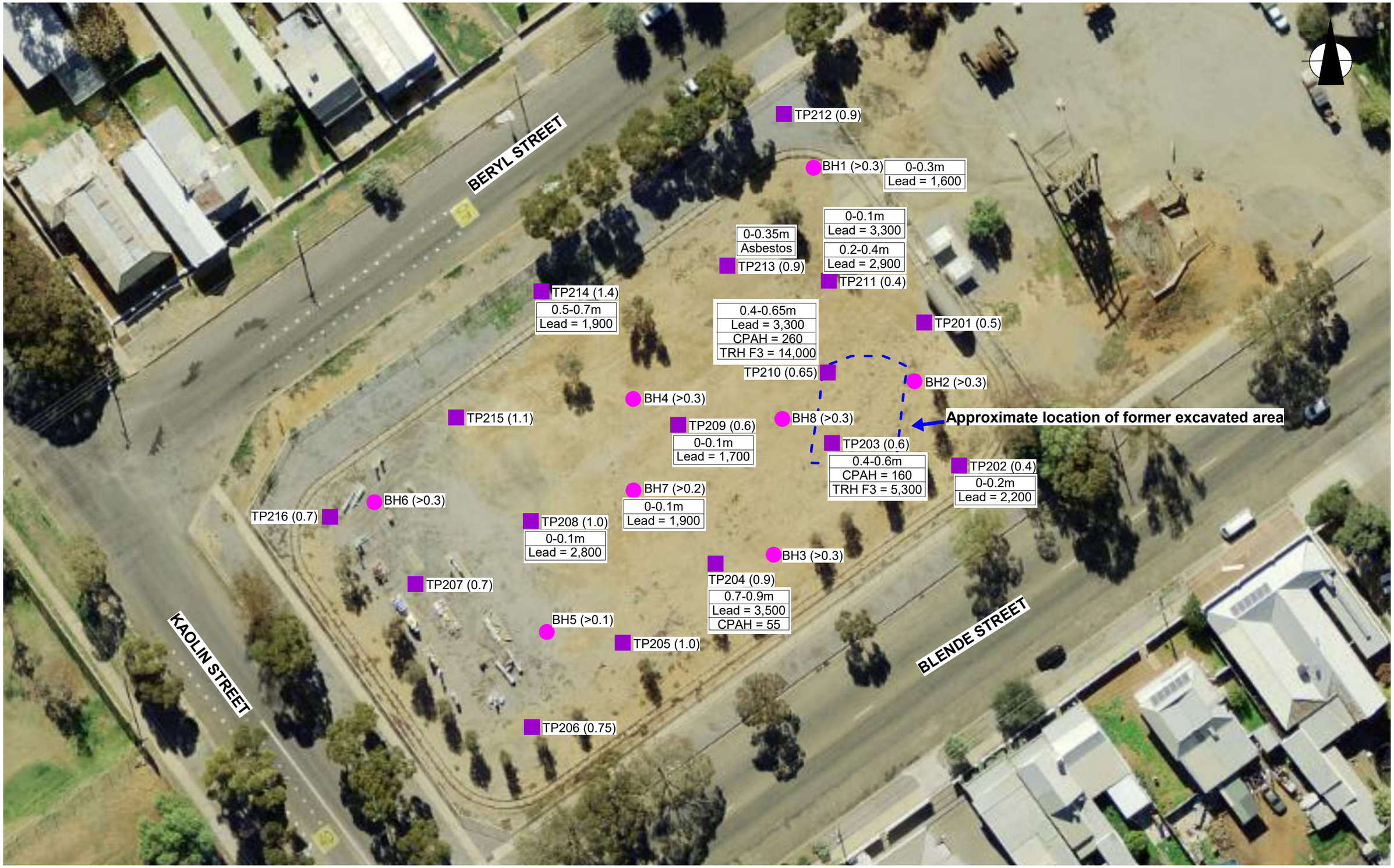

LEGEND:

APPROXIMATE SITE BOUNDARY

BH1 (0.3) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

TP201 (0.5) TESTPIT LOCATION, NUMBER AND DEPTH OF FILL (m)

CONTAMINATION DATA ABOVE HILS
SAMPLE DEPTH AND
CONTAMINANT CONCENTRATION (mg/kg)

0-0.2m
Lead = 2,200

0 25
Scale Metres

Notes: Reference should be made to the report text for a full understanding of this plan.

Image Sources: Google Earth Pro

Title:	**SAMPLE LOCATION PLAN AND CONTAMINATION DATA**
Location:	51 BROMIDE STREET, BROKEN HILL, NSW
Project No: E32665PH	Figure No: 3

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Appendix B: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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

Waste Classification and TCLP Table:

- Data assessed using the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014).
- The assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion.

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TABLE S1
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.
HIL-D: 'Commercial/Industrial'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI	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)			3000	900	3600	240000	1500	730	6000	400000	4000	40	80	2000	2500	45	530	3600	50	2000	7	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
TP201	0-0.2	Fill: sandy clayey silt	**24**	**6.3**	**18**	**51**	**880**	**0.2**	**15**	**960**	**12**	**1.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP201	0-0.2	Laboratory duplicate	**19**	**5.8**	**16**	**50**	**770**	**0.1**	**15**	**950**	**7.8**	**1.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP201	0.6-0.8	Sandy clayey silt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP201	1.8-2.0	Schist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP202	0-0.2	Fill: silty clayey sand	**25**	**9.2**	**15**	**69**	**2200**	**0.3**	**11**	**2400**	**37**	**6.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP202	1.0-1.2	Silty sandy clay	**4**	<0.4	**20**	**19**	**33**	<0.1	**14**	**40**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP203	0-0.2	Fill: silty clayey sand	**10**	**1**	**15**	**33**	**470**	<0.1	**14**	**310**	**17**	**2.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP203	0.4-0.6	Fill: sandy gravel	**8**	**2**	**7**	**35**	**770**	**0.1**	**6**	**490**	**1800**	**160**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP203	1.1-1.3	Silty sandy clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP204	0-0.2	Fill: silty gravelly sand	**19**	**2**	**18**	**41**	**770**	**0.2**	**15**	**550**	**11**	**1.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP204	0.7-0.9	Fill: silty sand	**100**	**3**	**14**	**140**	**3500**	**0.7**	**10**	**960**	**620**	**55**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP205	0-0.2	Fill: silty gravelly sand	**11**	**2**	**16**	**33**	**420**	<0.1	**16**	**220**	**27**	**4.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP205	0.85-1.0	Fill: sandy gravel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP205	1.1-1.3	Silty sandy clay	**5**	<0.4	**23**	**22**	**24**	<0.1	**17**	**42**	**1.5**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP206	0-0.2	Fill: silty gravelly sand	**16**	**1**	**18**	**36**	**530**	<0.1	**15**	**340**	**18**	**2.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP206	0.8-1.0	Silty sandy clay	<4	**2**	**23**	**23**	**21**	<0.1	**15**	**43**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP206	0.8-1.0	Laboratory duplicate	**4**	**2**	**24**	**24**	**22**	<0.1	**17**	**46**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP207	0.1-0.3	Fill: silty gravelly sand	**9**	**3**	**19**	**43**	**650**	<0.1	**13**	**430**	**11**	**1.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP207	0.7-0.9	Silty sandy clay	**4**	**3**	**21**	**23**	**42**	<0.1	**15**	**100**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP208	0-0.1	Fill: gravelly sand	**50**	**3**	**20**	**120**	**2800**	**0.3**	**14**	**900**	**45**	**7.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP208	1.0-1.2	Silty sandy clay	**6**	**1**	**22**	**24**	**87**	<0.1	**15**	**150**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP209	0-0.1	Fill: silty gravelly sand	**46**	**2**	**26**	**91**	**1700**	**0.2**	**15**	**590**	**9.7**	**1.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP209	0.7-0.9	Silty sandy clay	**5**	**0.9**	**19**	**19**	**36**	<0.1	**14**	**55**	**0.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP210	0-0.2	Fill: silty gravelly sand	**10**	**1**	**18**	**32**	**450**	<0.1	**14**	**230**	**10**	**1.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP210	0.4-0.65	Fill: sandy gravel	**25**	**11**	**9**	**130**	**3300**	**0.6**	**7**	**2900**	**3200**	**260**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP211	0-0.1	Fill: sandy gravelly silt	**38**	**10**	**12**	**160**	**3300**	**0.8**	**12**	**7000**	**6.4**	**0.9**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP211	0.2-0.4	Fill: silty gravel	**45**	**3**	**8**	**220**	**2900**	**0.2**	**4**	**1800**	**1.7**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP211	0.2-0.4	Laboratory duplicate	**46**	**4**	**10**	**240**	**3200**	**0.2**	**5**	**1900**	**3.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP212	0-0.1	Fill: silty gravelly sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP212	0.1-0.3	Fill: silty gravelly sand	**5**	**0.8**	**9**	**23**	**510**	<0.1	**8**	**150**	**97**	**17**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP212	1.0-1.2	Silty clayey sand	**8**	<0.4	**15**	**18**	**26**	<0.1	**13**	**37**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP213	0-0.2	Fill: gravelly silt	**18**	**2**	**17**	**86**	**1500**	**0.4**	**11**	**920**	**21**	**3.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	Not Detected
TP213	0.4-0.6	Fill: silty gravelly sand	**13**	**2**	**17**	**28**	**410**	<0.1	**13**	**150**	**3.1**	**0.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP214	0-0.2	Fill: silty gravelly sand	**7**	**2**	**16**	**34**	**560**	<0.1	**12**	**480**	**100**	**14**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP214	0.5-0.7	Fill: clayey sand	**15**	**3**	**15**	**65**	**1900**	**0.1**	**11**	**640**	**10**	**1.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP214	1.5-1.7	Silty clayey sand	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP215	0.6-0.8	Fill: clayey gravelly sand	**7**	<0.4	**18**	**20**	**67**	<0.1	**14**	**75**	**1.3**	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP215	1.1-1.36	Silty clayey sand	**6**	<0.4	**16**	**19**	**68**	<0.1	**14**	**40**	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216	0-0.2	Fill: sandy gravelly silt	**6**	**2**	**22**	**34**	**350**	<0.1	**15**	**380**	**13**	**2.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216	0.5-0.7	Fill: silty clayey sand	<4	<0.4	**23**	**30**	**160**	**0.2**	**16**	**150**	**4.7**	**0.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216	0.5-0.7	Laboratory duplicate	<4	<0.4	**20**	**26**	**79**	<0.1	**15**	**93**	**5.2**	**0.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP1	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP2	-	Fill	**10**	**1**	**16**	**55**	**430**	<0.1	**14**	**280**	**26**	**5.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP3	-	Fill	**9**	**0.7**	**17**	**32**	**380**	<0.1	**14**	**200**	**25**	**3.8**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP4	-	Fill	**39**	**9.8**	**13**	**160**	**3400**	**0.8**	**12**	**6200**	**7.7**	**1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP213-spoil-F1	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
TP213-spoil-F2	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
TP213-spoil-F3	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
TP213-spoil-F4	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
TP202	0.5-0.7	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216 - [TRIPLICATE]	0.5-0.7	Fill	<4	<0.4	**22**	**27**	**85**	<0.1	**15**	**100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			39	39	39	39	39	39	39	39	38	38	0	0	0	0	0	0	0	0	0	8
Maximum Value			100	11	26	240	3500	0.8	17	7000	3200	260	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected
Statistical Analysis on Fill Samples																						
Number of Fill Samples			NC	NC	NC	NC	23	NC	NC	NC	NC	23	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	1309	NC	NC	NC	NC	23.78	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	1141.0	NC	NC	NC	NC	61.7	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	95	NC	NC	NC	NC	95	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	1908	NC	NC	NC	NC	79.89	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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

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

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					HSL-D: COMMERCIAL/INDUSTRIAL							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
TP201	0-0.2	Fill: sandy clayey silt	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
TP201	0-0.2	Laboratory duplicate	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
TP201	0.6-0.8	Sandy clayey silt	0m to <1m	Silt	NA	NA	NA	NA	NA	NA	NA	0.1
TP201	1.8-2.0	Schist	1m to <2m	Silt	NA	NA	NA	NA	NA	NA	NA	0
TP202	0-0.2	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP202	1.0-1.2	Silty sandy clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP203	0-0.2	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
TP203	0.4-0.6	Fill: sandy gravel	0m to <1m	Sand	<25	**130**	<0.2	<0.5	<1	<3	<1	0
TP203	1.1-1.3	Silty sandy clay	1m to <2m	Clay	NA	NA	NA	NA	NA	NA	NA	0
TP204	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP204	0.7-0.9	Fill: silty sand	0m to <1m	Sand	<25	**160**	<0.2	<0.5	<1	<3	<1	0
TP205	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP205	0.85-1.0	Fill: sandy gravel	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
TP205	1.1-1.3	Silty sandy clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP206	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP206	0.8-1.0	Silty sandy clay	0m to <1m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
TP206	0.8-1.0	Laboratory duplicate	0m to <1m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0.2
TP207	0.1-0.3	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP207	0.7-0.9	Silty sandy clay	0m to <1m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP208	0-0.1	Fill: gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP208	1.0-1.2	Silty sandy clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP209	0-0.1	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP209	0.7-0.9	Silty sandy clay	0m to <1m	Clay	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP210	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP210	0.4-0.65	Fill: sandy gravel	0m to <1m	Sand	<25	**480**	<0.2	<0.5	<1	<3	<1	0
TP211	0-0.1	Fill: sandy gravelly silt	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP211	0.2-0.4	Fill: silty gravel	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
TP211	0.2-0.4	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0.1
TP212	0-0.1	Fill: silty gravelly sand	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA	0.1
TP212	0.1-0.3	Fill: silty gravelly sand	0m to <1m	Sand	<25	**76**	<0.2	<0.5	<1	<3	<1	0
TP212	1.0-1.2	Silty clayey sand	1m to <2m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP213	0-0.2	Fill: gravelly silt	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP213	0.4-0.6	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP214	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP214	0.5-0.7	Fill: clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP214	1.5-1.7	Silty clayey sand	1m to <2m	Sand	NA	NA	NA	NA	NA	NA	NA	0
TP215	0.6-0.8	Fill: clayey gravelly sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP215	1.1-1.36	Silty clayey sand	1m to <2m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP216	0-0.2	Fill: sandy gravelly silt	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP216	0.5-0.7	Fill: silty clayey sand	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP216	0.5-0.7	Laboratory duplicate	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
SDUP1	-	Fill	0m to <1m	Silt	NA	NA	NA	NA	NA	NA	NA	0
SDUP2	-	Fill	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
SDUP3	-	Fill	0m to <1m	Sand	<25	<50	<0.2	<0.5	<1	<3	<1	0
SDUP4	-	Fill	0m to <1m	Silt	<25	<50	<0.2	<0.5	<1	<3	<1	0
TP213-spoil-F1	-	Fill	0m to <1m		NA	NA	NA	NA	NA	NA	NA	0
TP213-spoil-F2	-	Fill	0m to <1m		NA	NA	NA	NA	NA	NA	NA	0
TP213-spoil-F3	-	Fill	0m to <1m		NA	NA	NA	NA	NA	NA	NA	0
TP213-spoil-F4	-	Fill	0m to <1m		NA	NA	NA	NA	NA	NA	NA	0
TP202	0.5-0.7	Fill	0m to <1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
TP216 - [TRIPLICATE]	0.5-0.7	Fill	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
Total Number of Samples					38	38	38	38	38	38	38	51
Maximum Value					<PQL	480	<PQL	<PQL	<PQL	<PQL	<PQL	0.2

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

HSL SOIL ASSESSMENT CRITERIA

Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
TP201	0-0.2	Fill: sandy clayey silt	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP201	0-0.2	Laboratory duplicate	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP201	0.6-0.8	Sandy clayey silt	0m to <1m	Silt	NA	NA	NA	NA	NA	NA	NA
TP201	1.8-2.0	Schist	1m to <2m	Silt	NA	NA	NA	NA	NA	NA	NA
TP202	0-0.2	Fill: silty clayey sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP202	1.0-1.2	Silty sandy clay	1m to <2m	Clay	480	NL	6	NL	NL	NL	NL
TP203	0-0.2	Fill: silty clayey sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP203	0.4-0.6	Fill: sandy gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP203	1.1-1.3	Silty sandy clay	1m to <2m	Clay	NA	NA	NA	NA	NA	NA	NA
TP204	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP204	0.7-0.9	Fill: silty sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP205	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP205	0.85-1.0	Fill: sandy gravel	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA
TP205	1.1-1.3	Silty sandy clay	1m to <2m	Clay	480	NL	6	NL	NL	NL	NL
TP206	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP206	0.8-1.0	Silty sandy clay	0m to <1m	Clay	310	NL	4	NL	NL	NL	NL
TP206	0.8-1.0	Laboratory duplicate	0m to <1m	Clay	310	NL	4	NL	NL	NL	NL
TP207	0.1-0.3	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP207	0.7-0.9	Silty sandy clay	0m to <1m	Clay	310	NL	4	NL	NL	NL	NL
TP208	0-0.1	Fill: gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP208	1.0-1.2	Silty sandy clay	1m to <2m	Clay	480	NL	6	NL	NL	NL	NL
TP209	0-0.1	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP209	0.7-0.9	Silty sandy clay	0m to <1m	Clay	310	NL	4	NL	NL	NL	NL
TP210	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP210	0.4-0.65	Fill: sandy gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP211	0-0.1	Fill: sandy gravelly silt	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP211	0.2-0.4	Fill: silty gravel	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP211	0.2-0.4	Laboratory duplicate	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP212	0-0.1	Fill: silty gravelly sand	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA
TP212	0.1-0.3	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP212	1.0-1.2	Silty clayey sand	1m to <2m	Sand	370	NL	3	NL	NL	NL	NL
TP213	0-0.2	Fill: gravelly silt	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP213	0.4-0.6	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP214	0-0.2	Fill: silty gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP214	0.5-0.7	Fill: clayey sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP214	1.5-1.7	Silty clayey sand	1m to <2m	Sand	NA	NA	NA	NA	NA	NA	NA
TP215	0.6-0.8	Fill: clayey gravelly sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP215	1.1-1.36	Silty clayey sand	1m to <2m	Sand	370	NL	3	NL	NL	NL	NL
TP216	0-0.2	Fill: sandy gravelly silt	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP216	0.5-0.7	Fill: silty clayey sand	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
TP216	0.5-0.7	Laboratory duplicate	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP1	-	Fill	0m to <1m	Silt	NA	NA	NA	NA	NA	NA	NA
SDUP2	-	Fill	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP3	-	Fill	0m to <1m	Sand	260	NL	3	NL	NL	230	NL
SDUP4	-	Fill	0m to <1m	Silt	250	NL	4	NL	NL	NL	NL
TP213-spoil-F1	-	Fill	0m to <1m			NA		NA	NA		NA
TP213-spoil-F2	-	Fill	0m to <1m			NA		NA	NA		NA
TP213-spoil-F3	-	Fill	0m to <1m			NA		NA	NA		NA
TP213-spoil-F4	-	Fill	0m to <1m			NA		NA	NA		NA
TP202	0.5-0.7	Fill	0m to <1m	Clay	NA	NA	NA	NA	NA	NA	NA
TP216 - [TRIPLICATE]	0.5-0.7	Fill	0m to <1m	Sand	NA	NA	NA	NA	NA	NA	NA

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

Land Use Category				COMMERCIAL/INDUSTRIAL																		
							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) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	1	0.1	25	50	100	100	0.2	0.5	1	1	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																			
TP201	0-0.2	Fill: sandy clayey silt	Fine	NA	NA	NA	**24**	**18**	**51**	**880**	**15**	**960**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.2**
TP201	0-0.2	Laboratory duplicate	Fine	NA	NA	NA	**19**	**16**	**50**	**770**	**15**	**950**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.82**
TP201	0.6-0.8	Sandy clayey silt	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP201	1.8-2.0	Schist	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP202	0-0.2	Fill: silty clayey sand	Coarse	NA	NA	NA	**25**	**15**	**69**	**2200**	**11**	**2400**	<1	NA	<25	<50	**320**	**120**	<0.2	<0.5	<1	<3	**4.4**
TP202	1.0-1.2	Silty sandy clay	Fine	NA	NA	NA	**4**	**20**	**19**	**33**	**14**	**40**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP203	0-0.2	Fill: silty clayey sand	Coarse	NA	NA	NA	**10**	**15**	**33**	**470**	**14**	**310**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.7**
TP203	0.4-0.6	Fill: sandy gravel	Coarse	NA	NA	NA	**8**	**7**	**35**	**770**	**6**	**490**	<1	NA	<25	**130**	**5300**	**740**	<0.2	<0.5	<1	<3	**100**
TP203	1.1-1.3	Silty sandy clay	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP204	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	**19**	**18**	**41**	**770**	**15**	**550**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.2**
TP204	0.7-0.9	Fill: silty sand	Coarse	NA	NA	NA	**100**	**14**	**140**	**3500**	**10**	**960**	<1	NA	<25	**160**	**2900**	**620**	<0.2	<0.5	<1	<3	**35**
TP205	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	**11**	**16**	**33**	**420**	**16**	**220**	<1	NA	<25	<50	**250**	**110**	<0.2	<0.5	<1	<3	**3.1**
TP205	0.85-1.0	Fill: sandy gravel	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP205	1.1-1.3	Silty sandy clay	Fine	NA	NA	NA	**5**	**23**	**22**	**24**	**17**	**42**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
TP206	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	**16**	**18**	**36**	**530**	**15**	**340**	<1	NA	<25	<50	**160**	<100	<0.2	<0.5	<1	<3	**1.8**
TP206	0.8-1.0	Silty sandy clay	Fine	NA	NA	NA	<4	**23**	**23**	**21**	**15**	**43**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP206	0.8-1.0	Laboratory duplicate	Fine	NA	NA	NA	**4**	**24**	**24**	**22**	**17**	**46**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP207	0.1-0.3	Fill: silty gravelly sand	Coarse	NA	NA	NA	**9**	**19**	**43**	**650**	**13**	**430**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.4**
TP207	0.7-0.9	Silty sandy clay	Fine	NA	NA	NA	**4**	**21**	**23**	**42**	**15**	**100**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP208	0-0.1	Fill: gravelly sand	Coarse	NA	NA	NA	**50**	**20**	**120**	**2800**	**14**	**900**	<1	NA	<25	<50	**310**	<100	<0.2	<0.5	<1	<3	**5.1**
TP208	1.0-1.2	Silty sandy clay	Fine	NA	NA	NA	**6**	**22**	**24**	**87**	**15**	**150**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP209	0-0.1	Fill: silty gravelly sand	Coarse	NA	NA	NA	**46**	**26**	**91**	**1700**	**15**	**590**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.1**
TP209	0.7-0.9	Silty sandy clay	Fine	NA	NA	NA	**5**	**19**	**19**	**36**	**14**	**55**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.06**
TP210	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	**10**	**18**	**32**	**450**	**14**	**230**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.1**
TP210	0.4-0.65	Fill: sandy gravel	Coarse	NA	NA	NA	**25**	**9**	**130**	**3300**	**7**	**2900**	<1	NA	<25	**480**	**14000**	**1800**	<0.2	<0.5	<1	<3	**170**
TP211	0-0.1	Fill: sandy gravelly silt	Fine	NA	NA	NA	**38**	**12**	**160**	**3300**	**12**	**7000**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.61**
TP211	0.2-0.4	Fill: silty gravel	Coarse	NA	NA	NA	**45**	**8**	**220**	**2900**	**4**	**1800**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
TP211	0.2-0.4	Laboratory duplicate	Coarse	NA	NA	NA	**46**	**10**	**240**	**3200**	**5**	**1900**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.3**
TP212	0-0.1	Fill: silty gravelly sand	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP212	0.1-0.3	Fill: silty gravelly sand	Coarse	NA	NA	NA	**5**	**9**	**23**	**510**	**8**	**150**	<1	NA	<25	**76**	**830**	**370**	<0.2	<0.5	<1	<3	**12**
TP212	1.0-1.2	Silty clayey sand	Coarse	NA	NA	NA	**8**	**15**	**18**	**26**	**13**	**37**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP213	0-0.2	Fill: gravelly silt	Fine	NA	NA	NA	**18**	**17**	**86**	**1500**	**11**	**920**	<1	NA	<25	<50	**290**	<100	<0.2	<0.5	<1	<3	**2.2**
TP213	0.4-0.6	Fill: silty gravelly sand	Coarse	NA	NA	NA	**13**	**17**	**28**	**410**	**13**	**150**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.3**
TP214	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	**7**	**16**	**34**	**560**	**12**	**480**	<1	NA	<25	<50	**730**	**260**	<0.2	<0.5	<1	<3	**9.7**
TP214	0.5-0.7	Fill: clayey sand	Coarse	NA	NA	NA	**15**	**15**	**65**	**1900**	**11**	**640**	<1	NA	<25	<50	**170**	<100	<0.2	<0.5	<1	<3	**1**
TP214	1.5-1.7	Silty clayey sand	Coarse	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP215	0.6-0.8	Fill: clayey gravelly sand	Coarse	NA	NA	NA	**7**	**18**	**20**	**67**	**14**	**75**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.2**
TP215	1.1-1.36	Silty clayey sand	Coarse	NA	NA	NA	**6**	**16**	**19**	**68**	**14**	**40**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.05
TP216	0-0.2	Fill: sandy gravelly silt	Fine	NA	NA	NA	**6**	**22**	**34**	**350**	**15**	**380**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**1.4**
TP216	0.5-0.7	Fill: silty clayey sand	Coarse	NA	NA	NA	<4	**23**	**30**	**160**	**16**	**150**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.52**
TP216	0.5-0.7	Laboratory duplicate	Coarse	NA	NA	NA	<4	**20**	**26**	**79**	**15**	**93**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.54**
SDUP1	-	Fill	Fine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP2	-	Fill	Coarse	NA	NA	NA	**10**	**16**	**55**	**430**	**14**	**280**	<1	NA	<25	<50	**180**	<100	<0.2	<0.5	<1	<3	**4.1**
SDUP3	-	Fill	Coarse	NA	NA	NA	**9**	**17**	**32**	**380**	**14**	**200**	<1	NA	<25	<50	**260**	<100	<0.2	<0.5	<1	<3	**2.7**
SDUP4	-	Fill	Fine	NA	NA	NA	**39**	**13**	**160**	**3400**	**12**	**6200**	<1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<3	**0.71**
TP213-spoil-F1	-	Fill		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP213-spoil-F2	-	Fill		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP213-spoil-F3	-	Fill		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP213-spoil-F4	-	Fill		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP202	0.5-0.7	Fill		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216 - [TRIPLICA	0.5-0.7	Fill		NA	NA	NA	<4	**22**	**27**	**85**	**15**	**100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples				0	0	0	39	39	39	39	39	39	38	0	38	38	38	38	38	38	38	38	38
Maximum Value				NA	NA	NA	100	26	240	3500	17	7000	<PQL	NA	<PQL	480	14000	1800	<PQL	<PQL	<PQL	<PQL	170

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) plus napthalene	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
TP201	0-0.2	Fill: sandy clayey silt	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP201	0-0.2	Laboratory duplicate	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP201	0.6-0.8	Sandy clayey silt	Fine	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP201	1.8-2.0	Schist	Fine	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP202	0-0.2	Fill: silty clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP202	1.0-1.2	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP203	0-0.2	Fill: silty clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP203	0.4-0.6	Fill: sandy gravel	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP203	1.1-1.3	Silty sandy clay	Fine	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP204	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP204	0.7-0.9	Fill: silty sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP205	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP205	0.85-1.0	Fill: sandy gravel	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP205	1.1-1.3	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP206	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP206	0.8-1.0	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP206	0.8-1.0	Laboratory duplicate	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP207	0.1-0.3	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP207	0.7-0.9	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP208	0-0.1	Fill: gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP208	1.0-1.2	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP209	0-0.1	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP209	0.7-0.9	Silty sandy clay	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP210	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP210	0.4-0.65	Fill: sandy gravel	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP211	0-0.1	Fill: sandy gravelly silt	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP211	0.2-0.4	Fill: silty gravel	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP211	0.2-0.4	Laboratory duplicate	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP212	0-0.1	Fill: silty gravelly sand	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP212	0.1-0.3	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP212	1.0-1.2	Silty clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP213	0-0.2	Fill: gravelly silt	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP213	0.4-0.6	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP214	0-0.2	Fill: silty gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP214	0.5-0.7	Fill: clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP214	1.5-1.7	Silty clayey sand	Coarse	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP215	0.6-0.8	Fill: clayey gravelly sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP215	1.1-1.36	Silty clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP216	0-0.2	Fill: sandy gravelly silt	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP216	0.5-0.7	Fill: silty clayey sand	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
TP216	0.5-0.7	Laboratory duplicate	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
SDUP1	-	Fill	Fine	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SDUP2	-	Fill	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
SDUP3	-	Fill	Coarse	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	1700	3300	75	135	165	180	72
SDUP4	-	Fill	Fine	NA	NA	NA	160	320	110	2000	60	230	370	--	215	170	2500	6600	95	135	185	95	72
TP213-spoil-F1	-	Fill		NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP213-spoil-F2	-	Fill		NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP213-spoil-F3	-	Fill		NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP213-spoil-F4	-	Fill		NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP202	0.5-0.7	Fill		NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TP216 - [TRIPLICA	0.5-0.7	Fill		NA	NA	NA	160	320	110	2000	60	230	--	--	--	--	--	--	--	--	--	--	--

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

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 reference	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**					**0.05**			**0.001**			**0.001**											**0.05**	**0.001**
4/02/2020	TP201	0-0.4	No	10	11.52	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	236500	TP202	0-0.2	1008.42	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/02/2020	TP201	0.4-0.5	No	10	9.54	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	236500	TP211	0-0.1	1294.31	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
4/02/2020	TP202	0-0.5	No	10	10.32	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	236500	TP213	0-0.2	1120.71	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
4/02/2020	TP203	0-0.4	No	10	10.13	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	236500	TP213	0.3-0.35	1205.06	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
4/02/2020	TP203	0.4-0.6	No	10	10.82	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP204	0-0.7	No	10	10.78	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP204	0.7-0.9	No	10	11.45	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP205	0-0.85	No	10	10.24	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP205	0.85-1	No	10	11.48	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP206	0-0.75	No	10	10.82	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP207	0-0.1	No	10	8.66	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP207	0.1-0.7	No	10	10.69	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP208	0-1	No	10	12.16	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP209	0-0.6	No	10	10.24	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP210	0-0.4	No	10	10.46	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP210	0.4-0.6	No	10	10.25	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP211	0-0.2	No	10	10.74	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP211	0.2-0.4	No	10	10.45	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP212	0-0.1	No	10	11.42	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/02/2020	TP212	0.1-0.9	No	10	11.92	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP213	0-0.35	Yes	10	11.58	139.4	20.916	180.6218	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP213	0.35-0.9	No	10	9.36	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP214	0-0.5	No	10	11.74	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP214	0.5-1.4	No	10	10.46	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP215	0-0.6	No	10	10.14	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP215	0.6-1.1	No	10	10.10	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP216	0-0.5	No	10	9.10	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/02/2020	TP216	0.5-0.7	No	10	10.46	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Concentration above the SAC **VALUE**

TABLE S6
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			**COMMERCIAL/INDUSTRIAL**			
Sample Reference	**Sample Depth**	**Soil Texture**				
TP201	0-0.2	Fine	<25	<50	<100	<100
TP201	0-0.2	Fine	<25	<50	<100	<100
TP201	0.6-0.8	Fine	NA	NA	NA	NA
TP201	1.8-2.0	Fine	NA	NA	NA	NA
TP202	0-0.2	Coarse	<25	<50	**320**	**120**
TP202	1.0-1.2	Fine	<25	<50	<100	<100
TP203	0-0.2	Coarse	<25	<50	<100	<100
TP203	0.4-0.6	Coarse	<25	**130**	**5300**	**740**
TP203	1.1-1.3	Fine	NA	NA	NA	NA
TP204	0-0.2	Coarse	<25	<50	<100	<100
TP204	0.7-0.9	Coarse	<25	**160**	**2900**	**620**
TP205	0-0.2	Coarse	<25	<50	**250**	**110**
TP205	0.85-1.0	Coarse	NA	NA	NA	NA
TP205	1.1-1.3	Fine	<25	<50	<100	<100
TP206	0-0.2	Coarse	<25	<50	**160**	<100
TP206	0.8-1.0	Fine	<25	<50	<100	<100
TP206	0.8-1.0	Fine	<25	<50	<100	<100
TP207	0.1-0.3	Coarse	<25	<50	<100	<100
TP207	0.7-0.9	Fine	<25	<50	<100	<100
TP208	0-0.1	Coarse	<25	<50	**310**	<100
TP208	1.0-1.2	Fine	<25	<50	<100	<100
TP209	0-0.1	Coarse	<25	<50	<100	<100
TP209	0.7-0.9	Fine	<25	<50	<100	<100
TP210	0-0.2	Coarse	<25	<50	<100	<100
TP210	0.4-0.65	Coarse	<25	**480**	**14000**	**1800**
TP211	0-0.1	Fine	<25	<50	<100	<100
TP211	0.2-0.4	Coarse	<25	<50	<100	<100
TP211	0.2-0.4	Coarse	<25	<50	<100	<100
TP212	0-0.1	Coarse	NA	NA	NA	NA
TP212	0.1-0.3	Coarse	<25	**76**	**830**	**370**
TP212	1.0-1.2	Coarse	<25	<50	<100	<100
TP213	0-0.2	Fine	<25	<50	**290**	<100
TP213	0.4-0.6	Coarse	<25	<50	<100	<100
TP214	0-0.2	Coarse	<25	<50	**730**	**260**
TP214	0.5-0.7	Coarse	<25	<50	**170**	<100
TP214	1.5-1.7	Coarse	NA	NA	NA	NA
TP215	0.6-0.8	Coarse	<25	<50	<100	<100
TP215	1.1-1.36	Coarse	<25	<50	<100	<100
TP216	0-0.2	Fine	<25	<50	<100	<100
TP216	0.5-0.7	Coarse	<25	<50	<100	<100
TP216	0.5-0.7	Coarse	<25	<50	<100	<100
SDUP1	-	Fine	NA	NA	NA	NA
SDUP2	-	Coarse	<25	<50	**180**	<100
SDUP3	-	Coarse	<25	<50	**260**	<100
SDUP4	-	Fine	<25	<50	<100	<100
Total Number of Samples			38	38	38	38
Maximum Value			<PQL	480	14000	1800

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)
TP201	0-0.2	Fine	800	1000	5000	10000
TP201	0-0.2	Fine	800	1000	5000	10000
TP201	0.6-0.8	Fine	--	--	--	--
TP201	1.8-2.0	Fine	--	--	--	--
TP202	0-0.2	Coarse	700	1000	3500	10000
TP202	1.0-1.2	Fine	800	1000	5000	10000
TP203	0-0.2	Coarse	700	1000	3500	10000
TP203	0.4-0.6	Coarse	700	1000	3500	10000
TP203	1.1-1.3	Fine	--	--	--	--
TP204	0-0.2	Coarse	700	1000	3500	10000
TP204	0.7-0.9	Coarse	700	1000	3500	10000
TP205	0-0.2	Coarse	700	1000	3500	10000
TP205	0.85-1.0	Coarse	--	--	--	--
TP205	1.1-1.3	Fine	800	1000	5000	10000
TP206	0-0.2	Coarse	700	1000	3500	10000
TP206	0.8-1.0	Fine	800	1000	5000	10000
TP206	0.8-1.0	Fine	800	1000	5000	10000
TP207	0.1-0.3	Coarse	700	1000	3500	10000
TP207	0.7-0.9	Fine	800	1000	5000	10000
TP208	0-0.1	Coarse	700	1000	3500	10000
TP208	1.0-1.2	Fine	800	1000	5000	10000
TP209	0-0.1	Coarse	700	1000	3500	10000
TP209	0.7-0.9	Fine	800	1000	5000	10000
TP210	0-0.2	Coarse	700	1000	3500	10000
TP210	0.4-0.65	Coarse	700	1000	3500	10000
TP211	0-0.1	Fine	800	1000	5000	10000
TP211	0.2-0.4	Coarse	700	1000	3500	10000
TP211	0.2-0.4	Coarse	700	1000	3500	10000
TP212	0-0.1	Coarse	--	--	--	--
TP212	0.1-0.3	Coarse	700	1000	3500	10000
TP212	1.0-1.2	Coarse	700	1000	3500	10000
TP213	0-0.2	Fine	800	1000	5000	10000
TP213	0.4-0.6	Coarse	700	1000	3500	10000
TP214	0-0.2	Coarse	700	1000	3500	10000
TP214	0.5-0.7	Coarse	700	1000	3500	10000
TP214	1.5-1.7	Coarse	--	--	--	--
TP215	0.6-0.8	Coarse	700	1000	3500	10000
TP215	1.1-1.36	Coarse	700	1000	3500	10000
TP216	0-0.2	Fine	800	1000	5000	10000
TP216	0.5-0.7	Coarse	700	1000	3500	10000
TP216	0.5-0.7	Coarse	700	1000	3500	10000
SDUP1	-	Fine	--	--	--	--
SDUP2	-	Coarse	700	1000	3500	10000
SDUP3	-	Coarse	700	1000	3500	10000
SDUP4	-	Fine	800	1000	5000	10000

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	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	Total PCBs	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**																									
TP201	0-0.2	Fill: sandy clayey silt	**24**	**6.3**	**18**	**51**	**880**	**0.2**	**15**	**960**	**12**	**1.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
TP201	0-0.2	Laboratory duplicate	**19**	**5.8**	**16**	**50**	**770**	**0.1**	**15**	**950**	**7.8**	**0.82**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP201	0.6-0.8	Sandy clayey silt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP201	1.8-2.0	Schist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP202	0-0.2	Fill: silty clayey sand	**25**	**9.2**	**15**	**69**	**2200**	**0.3**	**11**	**2400**	**37**	**4.4**	NA	NA	NA	NA	NA	<25	<50	**170**	**200**	**370**	<0.2	<0.5	<1	<3	Not Detected
TP202	1.0-1.2	Silty sandy clay	**4**	<0.4	**20**	**19**	**33**	<0.1	**14**	**40**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP203	0-0.2	Fill: silty clayey sand	**10**	**1**	**15**	**33**	**470**	<0.1	**14**	**310**	**17**	**1.7**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP203	0.4-0.6	Fill: sandy gravel	**8**	**2**	**7**	**35**	**770**	**0.1**	**6**	**490**	**1800**	**100**	NA	NA	NA	NA	NA	<25	<50	**3800**	**1800**	**5600**	<0.2	<0.5	<1	<3	NA
TP203	1.1-1.3	Silty sandy clay	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP204	0-0.2	Fill: silty gravelly sand	**19**	**2**	**18**	**41**	**770**	**0.2**	**15**	**550**	**11**	**1.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP204	0.7-0.9	Fill: silty sand	**100**	**3**	**14**	**140**	**3500**	**0.7**	**10**	**960**	**620**	**35**	NA	NA	NA	NA	NA	<25	**91**	**2000**	**1200**	**3291**	<0.2	<0.5	<1	<3	NA
TP205	0-0.2	Fill: silty gravelly sand	**11**	**2**	**16**	**33**	**420**	<0.1	**16**	**220**	**27**	**3.1**	NA	NA	NA	NA	NA	<25	<50	**150**	**140**	**290**	<0.2	<0.5	<1	<3	NA
TP205	0.85-1.0	Fill: sandy gravel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP205	1.1-1.3	Silty sandy clay	**5**	<0.4	**23**	**22**	**24**	<0.1	**17**	**42**	**1.5**	**0.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP206	0-0.2	Fill: silty gravelly sand	**16**	**1**	**18**	**36**	**530**	<0.1	**15**	**340**	**18**	**1.8**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP206	0.8-1.0	Silty sandy clay	<4	**2**	**23**	**23**	**21**	<0.1	**15**	**43**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP206	0.8-1.0	Laboratory duplicate	**4**	**2**	**24**	**24**	**22**	<0.1	**17**	**46**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP207	0.1-0.3	Fill: silty gravelly sand	**9**	**3**	**19**	**43**	**650**	<0.1	**13**	**430**	**11**	**1.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP207	0.7-0.9	Silty sandy clay	**4**	**3**	**21**	**23**	**42**	<0.1	**15**	**100**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP208	0-0.1	Fill: gravelly sand	**50**	**3**	**20**	**120**	**2800**	**0.3**	**14**	**900**	**45**	**5.1**	NA	NA	NA	NA	NA	<25	<50	**180**	**160**	**340**	<0.2	<0.5	<1	<3	NA
TP208	1.0-1.2	Silty sandy clay	**6**	**1**	**22**	**24**	**87**	<0.1	**15**	**150**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP209	0-0.1	Fill: silty gravelly sand	**46**	**2**	**26**	**91**	**1700**	**0.2**	**15**	**590**	**9.7**	**1.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP209	0.7-0.9	Silty sandy clay	**5**	**0.9**	**19**	**19**	**36**	<0.1	**14**	**55**	**0.3**	**0.06**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP210	0-0.2	Fill: silty gravelly sand	**10**	**1**	**18**	**32**	**450**	<0.1	**14**	**230**	**10**	**1.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP210	0.4-0.65	Fill: sandy gravel	**25**	**11**	**9**	**130**	**3300**	**0.6**	**7**	**2900**	**3200**	**170**	NA	NA	NA	NA	NA	<25	**150**	**10000**	**4500**	**14650**	<0.2	<0.5	<1	<3	NA
TP211	0-0.1	Fill: sandy gravelly silt	**38**	**10**	**12**	**160**	**3300**	**0.8**	**12**	**7000**	**6.4**	**0.61**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	Not Detected
TP211	0.2-0.4	Fill: silty gravel	**45**	**3**	**8**	**220**	**2900**	**0.2**	**4**	**1800**	**1.7**	**0.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP211	0.2-0.4	Laboratory duplicate	**46**	**4**	**10**	**240**	**3200**	**0.2**	**5**	**1900**	**3.3**	**0.3**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP212	0-0.1	Fill: silty gravelly 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	NA
TP212	0.1-0.3	Fill: silty gravelly sand	**5**	**0.8**	**9**	**23**	**510**	<0.1	**8**	**150**	**97**	**12**	NA	NA	NA	NA	NA	<25	**59**	**480**	**500**	**1039**	<0.2	<0.5	<1	<3	NA
TP212	1.0-1.2	Silty clayey sand	**8**	<0.4	**15**	**18**	**26**	<0.1	**13**	**37**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP213	0-0.2	Fill: gravelly silt	**18**	**2**	**17**	**86**	**1500**	**0.4**	**11**	**920**	**21**	**2.2**	NA	NA	NA	NA	NA	<25	<50	**220**	**110**	**330**	<0.2	<0.5	<1	<3	Not Detected
TP213	0.4-0.6	Fill: silty gravelly sand	**13**	**2**	**17**	**28**	**410**	<0.1	**13**	**150**	**3.1**	**0.3**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP214	0-0.2	Fill: silty gravelly sand	**7**	**2**	**16**	**34**	**560**	<0.1	**12**	**480**	**100**	**9.7**	NA	NA	NA	NA	NA	<25	<50	**470**	**360**	**830**	<0.2	<0.5	<1	<3	NA
TP214	0.5-0.7	Fill: clayey sand	**15**	**3**	**15**	**65**	**1900**	**0.1**	**11**	**640**	**10**	**1**	NA	NA	NA	NA	NA	<25	<50	**120**	**100**	**220**	<0.2	<0.5	<1	<3	NA
TP214	1.5-1.7	Silty clayey 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	NA
TP215	0.6-0.8	Fill: clayey gravelly sand	**7**	<0.4	**18**	**20**	**67**	<0.1	**14**	**75**	**1.3**	**0.2**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP215	1.1-1.36	Silty clayey sand	**6**	<0.4	**16**	**19**	**68**	<0.1	**14**	**40**	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP216	0-0.2	Fill: sandy gravelly silt	**6**	**2**	**22**	**34**	**350**	<0.1	**15**	**380**	**13**	**1.4**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP216	0.5-0.7	Fill: silty clayey sand	<4	<0.4	**23**	**30**	**160**	**0.2**	**16**	**150**	**4.7**	**0.52**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP216	0.5-0.7	Laboratory duplicate	<4	<0.4	**20**	**26**	**79**	<0.1	**15**	**93**	**5.2**	**0.54**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
SDUP1	-	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDUP2	-	Fill	**10**	**1**	**16**	**55**	**430**	<0.1	**14**	**280**	**26**	**4.1**	NA	NA	NA	NA	NA	<25	<50	**110**	**110**	**220**	<0.2	<0.5	<1	<3	NA
SDUP3	-	Fill	**9**	**0.7**	**17**	**32**	**380**	<0.1	**14**	**200**	**25**	**2.7**	NA	NA	NA	NA	NA	<25	<50	**170**	**130**	**300**	<0.2	<0.5	<1	<3	NA
SDUP4	-	Fill	**39**	**9.8**	**13**	**160**	**3400**	**0.8**	**12**	**6200**	**7.7**	**0.71**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<50	<0.2	<0.5	<1	<3	NA
TP213-spoil-F1	-	Fill	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
TP213-spoil-F2	-	Fill	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
TP213-spoil-F3	-	Fill	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
TP213-spoil-F4	-	Fill	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
TP202	0.5-0.7	Fill	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP216 - [TRIPLI	0.5-0.7	Fill	<4	<0.4	**22**	**27**	**85**	<0.1	**15**	**100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of samples			39	39	39	39	39	39	39	39	38	38	0	0	0	0	0	38	38	38	38	38	38	38	38	38	8
Maximum Value			100	11	26	240	3500	0.8	17	7000	3200	170	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	150	10000	4500	14650	<PQL	<PQL	<PQL	<PQL	Detected

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

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

			Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	B(a)P
PQL - Envirolab Services			0.05	0.01	0.01	0.03	0.0005	0.02	0.001
TCLP1 - General Solid Waste			5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste			20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste			>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	Sample Depth	Sample Description							
TP201	0-0.2	Fill: sandy clayey silt	NA	NA	NA	**0.3**	NA	NA	<0.001
TP201	0-0.2	Laboratory Duplicate	NA	NA	NA	**0.3**	NA	NA	<0.001
TP202	0-0.2	Fill: silty clayey sand	NA	NA	NA	**1.2**	NA	NA	<0.001
TP203	0-0.2	Fill: silty clayey sand	NA	NA	NA	**0.06**	NA	NA	<0.001
TP203	0.4-0.6	Fill: sandy gravel	NA	NA	NA	**0.86**	NA	NA	<0.001
TP204	0-0.2	Fill: silty gravelly sand	NA	NA	NA	**0.1**	NA	NA	<0.001
TP204	0.7-0.9	Fill: silty sand	NA	NA	NA	**0.3**	NA	NA	<0.001
TP205	0-0.2	Fill: silty gravelly sand	NA	NA	NA	<0.03	NA	NA	<0.001
TP206	0-0.2	Fill: silty gravelly sand	NA	NA	NA	**0.09**	NA	NA	<0.001
TP207	0.1-0.3	Fill: silty gravelly sand	NA	NA	NA	**0.2**	NA	NA	<0.001
TP208	0-0.1	Fill: gravelly sand	NA	NA	NA	**1.5**	NA	NA	<0.001
TP209	0-0.1	Fill: silty gravelly sand	NA	NA	NA	**1.2**	NA	NA	<0.001
TP209	0-0.1	Laboratory Duplicate	NA	NA	NA	NA	NA	NA	<0.001
TP210	0-0.2	Fill: silty gravelly sand	NA	NA	NA	**0.04**	NA	NA	<0.001
TP210	0-0.2	Laboratory Duplicate	NA	NA	NA	**0.04**	NA	NA	NA
TP210	0.4-0.65	Fill: sandy gravel	NA	NA	NA	**2.9**	NA	NA	<0.001
TP211	0-0.1	Fill: sandy gravelly silt	NA	NA	NA	**18**	NA	NA	NA
TP211	0.2-0.4	Fill: silty gravel	NA	NA	NA	**10**	NA	NA	NA
TP212	0.1-0.3	Fill: silty gravelly sand	NA	NA	NA	**0.05**	NA	NA	<0.001
TP213	0-0.2	Fill: gravelly silt	NA	NA	NA	**0.3**	NA	NA	<0.001
TP213	0.4-0.6	Fill: silty gravelly sand	NA	NA	NA	**0.2**	NA	NA	<0.001
TP214	0-0.2	Fill: silty gravelly sand	NA	NA	NA	**0.1**	NA	NA	<0.001
TP214	0.5-0.7	Fill: clayey sand	NA	NA	NA	**0.2**	NA	NA	<0.001
TP216	0-0.2	Fill: sandy gravelly silt	NA	NA	NA	**0.1**	NA	NA	<0.001
TP216	0.5-0.7	Laboratory Duplicate	NA	NA	NA	**0.06**	NA	NA	<0.001
TP216	0.5-0.7	Fill: silty clayey sand	NA	NA	NA	**0.06**	NA	NA	<0.001
SDUP2	-	Fill	NA	NA	NA	**0.03**	NA	NA	<0.001
SDUP3	-	Fill	NA	NA	NA	<0.03	NA	NA	<0.001
SDUP4	-	Fill	NA	NA	NA	**15**	NA	NA	<0.001
Total Number of samples			0	0	0	28	0	0	26
Maximum Value			NA	NA	NA	18	NA	NA	<PQL

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

TABLE S9
SOIL QA/QC SUMMARY

			TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene
	PQL Envirolab SYD		25	50	100	100	0.2	0.5	1	2	1
	PQL Envirolab VIC		25	50	100	100	0.2	0.5	1.0	2.0	1.0
Intra	TP203	0-0.2	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP2	-	<25	<50	180	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	115	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	113%	nc	nc	nc	nc	nc	nc
Intra	TP205	0-0.2	<25	<50	250	110	<0.2	<0.5	<1	<2	<1
laboratory	SDUP3	-	<25	<50	260	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	255	80	nc	nc	nc	nc	nc
	RPD %		nc	nc	4%	75%	nc	nc	nc	nc	nc
Intra	TP211	0-0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
laboratory	SDUP4	-	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	<25	NA	NA	<0.2	<0.5	<1	<2	<1
Blank	5/02/20										

			Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene
	PQL Envirolab SYD		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.1	0.1
	PQL Envirolab VIC		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Intra	TP203	0-0.2	0.1	0.6	<0.1	<0.1	0.9	0.4	2.3	2.6	1.6	1.7	2.6	1.7	0.9	0.2	1.1
laboratory	SDUP2	-	<0.1	1.2	<0.1	<0.1	0.5	0.7	2.3	2.6	2.4	2.5	5.3	4.1	1.9	0.4	2.3
duplicate	MEAN		0.075	0.9	nc	nc	0.7	0.55	2.3	2.6	2	2.1	3.95	2.9	1.4	0.3	1.7
	RPD %		67%	67%	nc	nc	57%	55%	0%	0%	40%	38%	68%	83%	71%	67%	71%
Intra	TP205	0-0.2	0.1	1	<0.1	<0.1	1.2	0.7	3.5	3.9	2.9	2.6	4.2	3.1	1.4	0.3	1.7
laboratory	SDUP3	-	0.1	0.9	<0.1	<0.1	1.5	0.7	3.4	3.8	2.6	2.4	3.8	2.7	1.2	0.3	1.6
duplicate	MEAN		0.1	0.95	nc	nc	1.35	0.7	3.45	3.85	2.75	2.5	4	2.9	1.3	0.3	1.65
	RPD %		0%	11%	nc	nc	22%	0%	3%	3%	11%	8%	10%	14%	15%	0%	6%
Intra	TP211	0-0.1	<0.1	0.2	<0.1	<0.1	0.5	0.2	1	1.1	0.7	0.6	1	0.61	0.3	<0.1	0.3
laboratory	SDUP4	-	<0.1	0.3	<0.1	<0.1	0.5	0.2	1.3	1.4	0.8	0.8	1	0.71	0.3	<0.1	0.4
duplicate	MEAN		nc	0.25	nc	nc	0.5	0.2	1.15	1.25	0.75	0.7	1	0.66	0.3	nc	0.35
	RPD %		nc	40%	nc	nc	0%	0%	26%	24%	13%	29%	0%	15%	0%	nc	29%
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	5/02/20																

			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	TP203	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	TP205	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	TP211	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	5/02/20																					

			Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total PCBS
	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
	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
Intra	TP203	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP2	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	TP205	0-0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP3	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Intra	TP211	0-0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
laboratory	SDUP4	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %		nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Blank	5/02/20														

			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD		4	0.4	1	1	1	0.1	1	1
	PQL Envirolab VIC		4.0	0.4	1.0	1.0	1.0	0.1	1.0	1.0
Intra	TP203	0-0.2	10	1	15	33	470	<0.1	14	310
laboratory	SDUP2	-	10	1	16	55	430	<0.1	14	280
duplicate	MEAN		10	1	15.5	44	450	nc	14	295
	RPD %		0%	0%	6%	50%	9%	nc	0%	10%
Intra	TP205	0-0.2	11	2	16	33	420	<0.1	16	220
laboratory	SDUP3	-	9	0.7	17	32	380	<0.1	14	200
duplicate	MEAN		10	1.35	16.5	32.5	400	nc	15	210
	RPD %		20%	96%	6%	3%	10%	nc	13%	10%
Intra	TP211	0-0.1	38	10	12	160	3300	0.8	12	7000
laboratory	SDUP4	-	39	9.8	13	160	3400	0.8	12	6200
duplicate	MEAN		38.5	9.9	12.5	160	3350	0.8	12	6600
	RPD %		3%	2%	8%	0%	3%	0%	0%	12%
Field	TB-S1	-	NA	NA	NA	NA	NA	NA	NA	NA
Blank	5/02/20									

Result outside of QA/QC acceptance criteria

Appendix C: Test pit Logs

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP201 1/1

SDUP1: 0.4-0.5m

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Sandy clayey silt, low plasticity, yellow brown, with igneous gravel, trace of concrete fragments, glass and sandstone gravel.	w<PL			BUCKET: 11.52kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
										FILL: Gravelly sand, fine to medium grained, grey and brown, fine to medium grained igneous gravel, with slag, trace of concrete fragments.	D			BUCKET: 9.54kg NO FCF OBSREVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5		ML	Sandy clayey SILT: low plasticity, orange brown.	w<PL			
							1							
							1.5							
									-	Extremely Weathered schist: clayey SAND, fine to medium grained, red brown.	XW			
							2							
										END OF TEST PIT AT 2.1m				
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP202** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Silty clayey sand, fine to medium grained, yellow brown, with igneous gravel, trace of concrete fragments and slag.	D			BUCKET: 10.32kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■				0.5		CL-CI	Silty sandy CLAY: low to medium plasticity, orange brown, fine grained sand, trace of root fibres.	w<PL			
	■						1							
										END OF TEST PIT AT 1.2m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP203 1/1

SDUP2: 0-0.2m

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty clayey sand, fine to medium grained, yellow brown, with igneous gravel, trace of concrete fragments.	D			BUCKET: 10.13kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: Sandy gravel, fine to medium grained, igneous, dark grey to black, asphaltic concrete fragments and slag.				BUCKET: 10.82kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
									CL-CI	Silty sandy CLAY: low to medium plasticity, orange brown.	w<PL			
							1							
										END OF TEST PIT AT 1.3m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP204** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of slag, plastic and root fibres.	D			BUCKET: 10.78kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: Silty sand, fine to medium grained, igneous, grey, with asphaltic concrete fragments, fine to medium grained sand and slag.				BUCKET: 11.45kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■		■		1		CL-CI	Silty sandy CLAY: low to medium plasticity, orange to red brown, fine to medium grained sand.	w<PL			
							1.5			END OF TEST PIT AT 1.4m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP205 1/1

SDUP3: 0-0.2m

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of slag and ash.	D			BUCKET: 10.24kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5							
							1		CL-CI	FILL: Sandy gravel, medium to coarse grained, igneous, grey and brown, trace of asphaltic concrete fragments and slag.	w<PL			BUCKET: 11.48kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
										Silty sandy CLAY: low to medium plasticity, red brown, fine to medium grained sand.				
							1.5			END OF TEST PIT AT 1.5m				
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP206** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of asphaltic concrete fragments, glass and slag.	D			BUCKET: 10.82kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■		■		0.5							
	■		■						CL-CI	Silty sandy CLAY: low to medium plasticity, red brown, fine grained sand.	w<PL			
	■		■				1							
										END OF TEST PIT AT 1.2m				
							1.5							
							2							
							2.5							
							3							
							3.5							

JKEnvironments

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP207** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty sand, fine to medium grained, grey, trace of igneous gravel.	D			BUCKET: 8.66kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of glass, coal and slag.				BUCKET: 10.69kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							1		CL-CI	Silty sandy CLAY: low to medium plasticity, red brown.	w<PL			
							1.5			END OF TEST PIT AT 1.2m				
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP208** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of slag.	D			BUCKET: 12.16kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■		■		0.5							
	■		■				1		CL-CI	Silty sandy CLAY: low to medium plasticity, red brown, fine grained sand.	w<PL			
										END OF TEST PIT AT 1.3m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP209** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of glass and slag.	D			BUCKET: 10.24kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■		■		0.5							
	■		■				1		CL-CI	Silty sandy CLAY: low to medium plasticity, red brown, fine grained sand.	w<PL			
										END OF TEST PIT AT 1.1m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP210** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty gravelly sand, fine to medium grained, yellow brown, fine to medium grained igneous gravel, trace of slag.	D			BUCKET: 10.46kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: Sandy gravel, fine to coarse grained, igneous, dark grey, with slag and asphaltic concrete fragments.				BUCKET: 10.25kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
									CL-CI	Silty sandy CLAY: low to medium plasticity, red brown, fine to medium grained sand, trace of root fibres.	w<PL			
							1			END OF TEST PIT AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP211 1/1

SDUP4: 0-0.1m

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Sandy gravelly silt, low plasticity, light brown, fine to medium grained igneous gravel, trace of concrete fragments and slag.	w<PL			BUCKET: 10.74kg NO FCF OBSERVED IN BUCKET
	■		■		■						D			NO FCF OBSERVED IN SPOIL
										FILL: Silty gravel, fine to coarse grained, grey, igneous, with slag and coal.				BUCKET: 10.45kg
	■		■				0.5		CL-CI	Silty sandy CLAY: low to medium plasticity, red brown, fine to medium grained sand, trace of ash.	w<PL			NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							1			END OF TEST PIT AT 1.0m				
							1.5							
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP212** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 4/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty gravelly sand, fine to medium grained, grey, fine to medium grained igneous gravel.	D			BUCKET: 11.42kg NO FCF OBSERVED IN BUSKET NO FCF OBSERVED IN SPOIL
										FILL: Sandy gravelly silt, low plasticity, yellow brown, fine to medium grained igneous gravel, trace of slag and root fibres.	w<PL			BUCKET: 11.92kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5							
							1		-	Silty clayey SAND: fine to medium grained, red brown, low plasticity clay, trace of ironstone gravel.	M			
							1.5			END OF TEST PIT AT 1.5m				
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP213** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 5/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Gravelly silt, low plasticity, light brown, fine to medium grained igneous gravel, trace of concrete fragments, glass, FCF and slag.	w<PL			BUCKET: 11.58kg NO FCF OBSERVED IN BUCKET TP213 TP213-SPOIL F1 TP213-SPOIL F2 TP213-SPOIL F3 TP213-SPOIL F4 AT 0-0.35m
							0.5			FILL: Silty gravelly sand, fine to medium grained, red brown, fine to medium grained sandstone and igneous gravel, trace of wood, ceramic tile fragments and slag.	D			BUCKET: 9.36kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							1		SC	Clayey SAND: fine to medium grained, red brown, low plasticity clay, trace of ironstone gravel.	M			
							1.5							
										END OF TEST PIT AT 1.6m				
							2							
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. TP214 1/1

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 5/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION							0			FILL: Silty gravelly sand, fine to medium grained, grey, fine to medium grained igneous gravel, trace of asphaltic concrete fragments and slag.	D			BUCKET: 11.74kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: CLayey sand, fine to medium grained, yellow brown, trace of steel, glass and slag.				BUCKET: 10.46kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							1							
							1.5		-	Silty clayey SAND: fine to medium grained, red brown, low plasticity clay, trace of ironstone gravel and ash.	M			
							2			END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

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

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 5/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Gravelly silt, low plasticity, light brown, fine to medium grained igneous gravel, trace of plastic and ash.	w<PL			BUCKET: 10.14kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
							0.5			FILL: Clayey gravelly sand, fine to medium grained, brown, fine to medium grained igneous gravel, with clay fines, trace of slag.	M			BUCKET: 10.10kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■				1		-	Silty clayey SAND: fine to medium grained, red brown, low plasticity clay, trace of ironstone gravel.				
							1.5							
							2			END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

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ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Log No. **TP216** **1/1**

Client: GARDNER WETHERILL ASSOCIATES

Project: PROPOSED POLICE STATION

Location: 51 BROMIDE STREET, BROKEN HILL, NSW

Job No.: E32665PH **Method:** TEST PIT **R.L. Surface:**

Date: 5/02/2020 **Datum:**

Plant Type: 6T EXCAVATOR **Logged/Checked by:** H.W./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL -ETION	■		■		■		0			FILL: Sandy gravelly silt, low plasticity, light brown, fine to medium grained sand, with fine to medium grained igneous gravel, trace of slag.	w<PL			BUCKET: 9.10kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■		■		0.5			FILL: Silty clayey sand, fine to medium grained, brown, low plasticity clay, trace of igneous gravel, brick fragments and slag.	M			BUCKET: 10.46kg NO FCF OBSERVED IN BUCKET NO FCF OBSERVED IN SPOIL
	■		■				1		SC	Clayey SAND: fine to medium grained, red brown, low to medium plasticity clay, trace of ironstone gravel.	M			
							1.5			END OF TEST PIT AT 1.5m				
							2							
							2.5							
							3							
							3.5							

Appendix D: Laboratory Reports & COC Documents

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

CERTIFICATE OF ANALYSIS 236500

Client Details

Client	Environmental Investigation Services
Attention	Todd Hore
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E32665PH, Broken Hill**
Number of Samples	65 soil
Date samples received	11/02/2020
Date completed instructions received	11/02/2020

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	18/02/2020
Date of Issue	18/02/2020

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Panika Wongchanda, Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Josh Williams, Senior Chemist
Ken Nguyen, Reporting Supervisor
Lucy Zhu, Asbestos Supervisor
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-1	236500-6	236500-7	236500-8	236500-9
Your Reference	UNITS	TP201	TP202	TP202	TP203	TP203
Depth		0-0.2	0-0.2	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	101	100	112	102	121

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-12	236500-14	236500-16	236500-19	236500-20
Your Reference	UNITS	TP204	TP204	TP205	TP205	TP206
Depth		0-0.2	0.7-0.9	0-0.2	1.1-1.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	109	106	112	112	112

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-22	236500-24	236500-25	236500-26	236500-28
Your Reference	UNITS	TP206	TP207	TP207	TP208	TP208
Depth		0.8-1.0	0.1-0.3	0.7-0.9	0-0.1	1.0-1.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	107	129	115	118	120

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-29	236500-31	236500-32	236500-33	236500-35
Your Reference	UNITS	TP209	TP209	TP210	TP210	TP211
Depth		0-0.1	0.7-0.9	0-0.2	0.4-0.65	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	118	106	125	105	116

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-36	236500-39	236500-41	236500-42	236500-44
Your Reference	UNITS	TP211	TP212	TP212	TP213	TP213
Depth		0.2-0.4	0.1-0.3	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	120	119	131	129	120

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-46	236500-47	236500-51	236500-52	236500-53
Your Reference	UNITS	TP214	TP214	TP215	TP215	TP216
Depth		0-0.2	0.5-0.7	0.6-0.8	1.1-1.36	0-0.2
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	120	120	110	102	105

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		236500-54	236500-57	236500-58	236500-59	236500-64
Your Reference	UNITS	TP216	SDUP2	SDUP3	SDUP4	TB-S1
Depth		0.5-0.7	-	-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	117	112	124	98	121

svTRH (C10-C40) in Soil						
Our Reference		236500-1	236500-6	236500-7	236500-8	236500-9
Your Reference	UNITS	TP201	TP202	TP202	TP203	TP203
Depth		0-0.2	0-0.2	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	17/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	170	<100	<100	3,800
TRH C_{29} - C_{36}	mg/kg	<100	200	<100	<100	1,800
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	130
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	130
TRH >C_{16} -C_{34}	mg/kg	<100	320	<100	<100	5,300
TRH >C_{34} -C_{40}	mg/kg	<100	120	<100	<100	740
Total +ve TRH (>C10-C40)	mg/kg	<50	450	<50	<50	6,200
Surrogate o-Terphenyl	%	98	105	98	102	#

svTRH (C10-C40) in Soil						
Our Reference		236500-12	236500-14	236500-16	236500-19	236500-20
Your Reference	UNITS	TP204	TP204	TP205	TP205	TP206
Depth		0-0.2	0.7-0.9	0-0.2	1.1-1.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	13/02/2020	17/02/2020	13/02/2020	13/02/2020	13/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	91	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	2,000	150	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	1,200	140	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	160	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	160	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	2,900	250	<100	160
TRH >C_{34} -C_{40}	mg/kg	<100	620	110	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	3,600	360	<50	160
Surrogate o-Terphenyl	%	98	#	117	94	99

svTRH (C10-C40) in Soil						
Our Reference		236500-22	236500-24	236500-25	236500-26	236500-28
Your Reference	UNITS	TP206	TP207	TP207	TP208	TP208
Depth		0.8-1.0	0.1-0.3	0.7-0.9	0-0.1	1.0-1.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	180	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	160	<100
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	310	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	310	<50
Surrogate o-Terphenyl	%	100	98	94	116	95

svTRH (C10-C40) in Soil						
Our Reference		236500-29	236500-31	236500-32	236500-33	236500-35
Your Reference	UNITS	TP209	TP209	TP210	TP210	TP211
Depth		0-0.1	0.7-0.9	0-0.2	0.4-0.65	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	13/02/2020	13/02/2020	17/02/2020	13/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	150	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	10,000	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	4,500	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	480	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	480	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	14,000	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	1,800	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	16,000	<50
Surrogate o-Terphenyl	%	114	107	102	#	100

svTRH (C10-C40) in Soil						
Our Reference		236500-36	236500-39	236500-41	236500-42	236500-44
Your Reference	UNITS	TP211	TP212	TP212	TP213	TP213
Depth		0.2-0.4	0.1-0.3	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	13/02/2020	17/02/2020	13/02/2020	13/02/2020	13/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	59	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	480	<100	220	<100
TRH C_{29} - C_{36}	mg/kg	<100	500	<100	110	<100
TRH >C_{10} -C_{16}	mg/kg	<50	76	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	76	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	830	<100	290	<100
TRH >C_{34} -C_{40}	mg/kg	<100	370	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	1,300	<50	290	<50
Surrogate o-Terphenyl	%	103	121	107	123	96

svTRH (C10-C40) in Soil						
Our Reference		236500-46	236500-47	236500-51	236500-52	236500-53
Your Reference	UNITS	TP214	TP214	TP215	TP215	TP216
Depth		0-0.2	0.5-0.7	0.6-0.8	1.1-1.36	0-0.2
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	17/02/2020	13/02/2020	14/02/2020	14/02/2020	14/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	470	120	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	360	100	<100	<100	<100
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	730	170	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	260	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	990	170	<50	<50	<50
Surrogate o-Terphenyl	%	#	98	100	98	106

svTRH (C10-C40) in Soil					
Our Reference		236500-54	236500-57	236500-58	236500-59
Your Reference	UNITS	TP216	SDUP2	SDUP3	SDUP4
Depth		0.5-0.7	-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	110	170	<100
TRH C_{29} - C_{36}	mg/kg	<100	110	130	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	180	260	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	180	260	<50
Surrogate o-Terphenyl	%	93	108	113	105

PAHs in Soil						
Our Reference		236500-1	236500-6	236500-7	236500-8	236500-9
Your Reference	UNITS	TP201	TP202	TP202	TP203	TP203
Depth		0-0.2	0-0.2	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	0.1	<0.1	0.1	2.5
Acenaphthylene	mg/kg	0.2	0.8	<0.1	0.6	47
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.4
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	5.9
Phenanthrene	mg/kg	0.7	1.8	<0.1	0.9	220
Anthracene	mg/kg	0.2	0.6	<0.1	0.4	54
Fluoranthene	mg/kg	1.9	5.0	<0.1	2.3	370
Pyrene	mg/kg	1.8	5.4	<0.1	2.6	320
Benzo(a)anthracene	mg/kg	1.0	3.4	<0.1	1.6	170
Chrysene	mg/kg	1.0	3.9	<0.1	1.7	160
Benzo(b,j+k)fluoranthene	mg/kg	2	6.3	<0.2	2.6	180
Benzo(a)pyrene	mg/kg	1.2	4.4	<0.05	1.7	100
Indeno(1,2,3-c,d)pyrene	mg/kg	0.7	2.1	<0.1	0.9	54
Dibenzo(a,h)anthracene	mg/kg	0.2	0.4	<0.1	0.2	12
Benzo(g,h,i)perylene	mg/kg	0.9	2.5	<0.1	1.1	60
Total +ve PAH's	mg/kg	12	37	<0.05	17	1,800
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.9	6.1	<0.5	2.5	160
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.9	6.1	<0.5	2.5	160
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.9	6.1	<0.5	2.5	160
Surrogate p-Terphenyl-d14	%	114	91	91	95	#

PAHs in Soil						
Our Reference		236500-12	236500-14	236500-16	236500-19	236500-20
Your Reference	UNITS	TP204	TP204	TP205	TP205	TP206
Depth		0-0.2	0.7-0.9	0-0.2	1.1-1.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	3.4	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.4	12	1.0	<0.1	0.6
Acenaphthene	mg/kg	<0.1	3.0	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	42	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.6	78	1.2	0.2	1.6
Anthracene	mg/kg	0.3	16	0.7	<0.1	0.5
Fluoranthene	mg/kg	1.6	100	3.5	0.3	2.8
Pyrene	mg/kg	1.7	100	3.9	0.3	2.9
Benzo(a)anthracene	mg/kg	1.1	47	2.9	0.2	1.8
Chrysene	mg/kg	1.0	61	2.6	0.2	1.7
Benzo(b,j+k)fluoranthene	mg/kg	2	64	4.2	0.2	2.6
Benzo(a)pyrene	mg/kg	1.2	35	3.1	0.2	1.8
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6	20	1.4	<0.1	0.8
Dibenzo(a,h)anthracene	mg/kg	0.1	6.0	0.3	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	0.7	27	1.7	<0.1	1
Total +ve PAH's	mg/kg	11	620	27	1.5	18
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.7	55	4.4	<0.5	2.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.7	55	4.4	<0.5	2.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.7	55	4.4	<0.5	2.6
Surrogate p-Terphenyl-d14	%	95	97	95	92	92

PAHs in Soil						
Our Reference		236500-22	236500-24	236500-25	236500-26	236500-28
Your Reference	UNITS	TP206	TP207	TP207	TP208	TP208
Depth		0.8-1.0	0.1-0.3	0.7-0.9	0-0.1	1.0-1.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.5	<0.1	1.3	<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	0.5	<0.1	1.8	<0.1
Anthracene	mg/kg	<0.1	0.3	<0.1	1.2	<0.1
Fluoranthene	mg/kg	<0.1	1.3	<0.1	5.9	<0.1
Pyrene	mg/kg	<0.1	1.4	<0.1	6.9	<0.1
Benzo(a)anthracene	mg/kg	<0.1	1	<0.1	4.7	<0.1
Chrysene	mg/kg	<0.1	0.9	<0.1	4.6	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2	<0.2	7.7	<0.2
Benzo(a)pyrene	mg/kg	<0.05	1.4	<0.05	5.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.8	<0.1	2.6	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	<0.1	0.6	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	1	<0.1	3.0	<0.1
Total +ve PAH's	mg/kg	<0.05	11	<0.05	45	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	1.9	<0.5	7.3	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	1.9	<0.5	7.3	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	1.9	<0.5	7.3	<0.5
Surrogate p-Terphenyl-d14	%	92	88	90	91	90

PAHs in Soil						
Our Reference		236500-29	236500-31	236500-32	236500-33	236500-35
Your Reference	UNITS	TP209	TP209	TP210	TP210	TP211
Depth		0-0.1	0.7-0.9	0-0.2	0.4-0.65	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	<0.1	<0.1	5.0	<0.1
Acenaphthylene	mg/kg	0.3	<0.1	0.4	49	0.2
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	7.5	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	12	<0.1
Phenanthrene	mg/kg	0.4	<0.1	0.4	520	0.5
Anthracene	mg/kg	0.2	<0.1	0.3	93	0.2
Fluoranthene	mg/kg	1.2	0.1	1.4	620	1
Pyrene	mg/kg	1.4	0.1	1.6	580	1.1
Benzo(a)anthracene	mg/kg	1.1	<0.1	1	290	0.7
Chrysene	mg/kg	1.1	<0.1	1.1	300	0.6
Benzo(b,j+k)fluoranthene	mg/kg	2	<0.2	2	300	1
Benzo(a)pyrene	mg/kg	1.1	0.06	1.1	170	0.61
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.1	0.6	89	0.3
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	0.1	18	<0.1
Benzo(g,h,i)perylene	mg/kg	0.6	<0.1	0.8	99	0.3
Total +ve PAH's	mg/kg	9.7	0.3	10	3,200	6.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.5	<0.5	1.6	260	0.8
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.5	<0.5	1.6	260	0.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.5	<0.5	1.6	260	0.9
Surrogate p-Terphenyl-d14	%	89	87	90	107	95

PAHs in Soil						
Our Reference		236500-36	236500-39	236500-41	236500-42	236500-44
Your Reference	UNITS	TP211	TP212	TP212	TP213	TP213
Depth		0.2-0.4	0.1-0.3	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	0.3	<0.1	0.1	<0.1
Acenaphthylene	mg/kg	<0.1	4.0	<0.1	0.9	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	4.1	<0.1	1.1	0.2
Anthracene	mg/kg	<0.1	2.5	<0.1	0.6	0.1
Fluoranthene	mg/kg	0.3	12	<0.1	2.9	0.4
Pyrene	mg/kg	0.3	15	<0.1	3.2	0.5
Benzo(a)anthracene	mg/kg	0.2	9.1	<0.1	2.1	0.3
Chrysene	mg/kg	0.2	8.4	<0.1	2.0	0.3
Benzo(b,j+k)fluoranthene	mg/kg	0.3	16	<0.2	3.2	0.5
Benzo(a)pyrene	mg/kg	0.2	12	<0.05	2.2	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	6.0	<0.1	1.2	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	1.5	<0.1	0.3	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	7.1	<0.1	1.4	0.2
Total +ve PAH's	mg/kg	1.7	97	<0.05	21	3.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	17	<0.5	3.2	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	17	<0.5	3.2	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	17	<0.5	3.2	0.5
Surrogate p-Terphenyl-d14	%	97	94	95	93	89

PAHs in Soil						
Our Reference		236500-46	236500-47	236500-51	236500-52	236500-53
Your Reference	UNITS	TP214	TP214	TP215	TP215	TP216
Depth		0-0.2	0.5-0.7	0.6-0.8	1.1-1.36	0-0.2
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	2.8	0.3	0.1	<0.1	0.5
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	10	0.8	<0.1	<0.1	0.6
Anthracene	mg/kg	2.6	0.2	<0.1	<0.1	0.4
Fluoranthene	mg/kg	16	1.6	0.2	<0.1	1.8
Pyrene	mg/kg	20	1.7	0.2	<0.1	2.0
Benzo(a)anthracene	mg/kg	10	0.9	0.1	<0.1	1.4
Chrysene	mg/kg	9.0	1	0.1	<0.1	1.4
Benzo(b,j+k)fluoranthene	mg/kg	13	2	0.3	<0.2	2.1
Benzo(a)pyrene	mg/kg	9.7	1.0	0.2	<0.05	1.4
Indeno(1,2,3-c,d)pyrene	mg/kg	4.3	0.5	<0.1	<0.1	0.7
Dibenzo(a,h)anthracene	mg/kg	1.1	0.1	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	5.0	0.6	0.1	<0.1	0.8
Total +ve PAH's	mg/kg	100	10	1.3	<0.05	13
Benzo(a)pyrene TEQ calc (zero)	mg/kg	14	1.4	<0.5	<0.5	2.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	14	1.4	<0.5	<0.5	2.1
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	14	1.4	<0.5	<0.5	2.1
Surrogate p-Terphenyl-d14	%	90	86	88	89	88

PAHs in Soil					
Our Reference		236500-54	236500-57	236500-58	236500-59
Your Reference	UNITS	TP216	SDUP2	SDUP3	SDUP4
Depth		0.5-0.7	-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil
Date extracted	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Naphthalene	mg/kg	<0.1	<0.1	0.1	<0.1
Acenaphthylene	mg/kg	0.1	1.2	0.9	0.3
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	0.5	1.5	0.5
Anthracene	mg/kg	0.1	0.7	0.7	0.2
Fluoranthene	mg/kg	0.7	2.3	3.4	1.3
Pyrene	mg/kg	0.7	2.6	3.8	1.4
Benzo(a)anthracene	mg/kg	0.5	2.4	2.6	0.8
Chrysene	mg/kg	0.5	2.5	2.4	0.8
Benzo(b,j+k)fluoranthene	mg/kg	0.9	5.3	3.8	1
Benzo(a)pyrene	mg/kg	0.52	4.1	2.7	0.71
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	1.9	1.2	0.3
Dibenzo(a,h)anthracene	mg/kg	0.1	0.4	0.3	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	2.3	1.6	0.4
Total +ve PAH's	mg/kg	4.7	26	25	7.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.8	5.6	3.8	0.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	5.6	3.8	0.99
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	5.6	3.8	1.0
Surrogate p-Terphenyl-d14	%	101	90	87	90

Acid Extractable metals in soil						
Our Reference		236500-1	236500-6	236500-7	236500-8	236500-9
Your Reference	UNITS	TP201	TP202	TP202	TP203	TP203
Depth		0-0.2	0-0.2	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	24	25	4	10	8
Cadmium	mg/kg	6.3	9.2	<0.4	1	2
Chromium	mg/kg	18	15	20	15	7
Copper	mg/kg	51	69	19	33	35
Lead	mg/kg	880	2,200	33	470	770
Mercury	mg/kg	0.2	0.3	<0.1	<0.1	0.1
Nickel	mg/kg	15	11	14	14	6
Zinc	mg/kg	960	2,400	40	310	490

Acid Extractable metals in soil						
Our Reference		236500-12	236500-14	236500-16	236500-19	236500-20
Your Reference	UNITS	TP204	TP204	TP205	TP205	TP206
Depth		0-0.2	0.7-0.9	0-0.2	1.1-1.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	19	100	11	5	16
Cadmium	mg/kg	2	3	2	<0.4	1
Chromium	mg/kg	18	14	16	23	18
Copper	mg/kg	41	140	33	22	36
Lead	mg/kg	770	3,500	420	24	530
Mercury	mg/kg	0.2	0.7	<0.1	<0.1	<0.1
Nickel	mg/kg	15	10	16	17	15
Zinc	mg/kg	550	960	220	42	340

Acid Extractable metals in soil						
Our Reference		236500-22	236500-24	236500-25	236500-26	236500-28
Your Reference	UNITS	TP206	TP207	TP207	TP208	TP208
Depth		0.8-1.0	0.1-0.3	0.7-0.9	0-0.1	1.0-1.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	<4	9	4	50	6
Cadmium	mg/kg	2	3	3	3	1
Chromium	mg/kg	23	19	21	20	22
Copper	mg/kg	23	43	23	120	24
Lead	mg/kg	21	650	42	2,800	87
Mercury	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Nickel	mg/kg	15	13	15	14	15
Zinc	mg/kg	43	430	100	900	150

Acid Extractable metals in soil						
Our Reference		236500-29	236500-31	236500-32	236500-33	236500-35
Your Reference	UNITS	TP209	TP209	TP210	TP210	TP211
Depth		0-0.1	0.7-0.9	0-0.2	0.4-0.65	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	46	5	10	25	38
Cadmium	mg/kg	2	0.9	1	11	10
Chromium	mg/kg	26	19	18	9	12
Copper	mg/kg	91	19	32	130	160
Lead	mg/kg	1,700	36	450	3,300	3,300
Mercury	mg/kg	0.2	<0.1	<0.1	0.6	0.8
Nickel	mg/kg	15	14	14	7	12
Zinc	mg/kg	590	55	230	2,900	7,000

Acid Extractable metals in soil						
Our Reference		236500-36	236500-39	236500-41	236500-42	236500-44
Your Reference	UNITS	TP211	TP212	TP212	TP213	TP213
Depth		0.2-0.4	0.1-0.3	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	45	5	8	18	13
Cadmium	mg/kg	3	0.8	<0.4	2	2
Chromium	mg/kg	8	9	15	17	17
Copper	mg/kg	220	23	18	86	28
Lead	mg/kg	2,900	510	26	1,500	410
Mercury	mg/kg	0.2	<0.1	<0.1	0.4	<0.1
Nickel	mg/kg	4	8	13	11	13
Zinc	mg/kg	1,800	150	37	920	150

Acid Extractable metals in soil						
Our Reference		236500-46	236500-47	236500-51	236500-52	236500-53
Your Reference	UNITS	TP214	TP214	TP215	TP215	TP216
Depth		0-0.2	0.5-0.7	0.6-0.8	1.1-1.36	0-0.2
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	7	15	7	6	6
Cadmium	mg/kg	2	3	<0.4	<0.4	2
Chromium	mg/kg	16	15	18	16	22
Copper	mg/kg	34	65	20	19	34
Lead	mg/kg	560	1,900	67	68	350
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	12	11	14	14	15
Zinc	mg/kg	480	640	75	40	380

Acid Extractable metals in soil						
Our Reference		236500-54	236500-57	236500-58	236500-59	236500-66
Your Reference	UNITS	TP216	SDUP2	SDUP3	SDUP4	TP216 - [TRIPLICATE]
Depth		0.5-0.7	-	-	-	0.5-0.7
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Arsenic	mg/kg	<4	10	9	39	<4
Cadmium	mg/kg	<0.4	1	0.7	9.8	<0.4
Chromium	mg/kg	23	16	17	13	22
Copper	mg/kg	30	55	32	160	27
Lead	mg/kg	160	430	380	3,400	85
Mercury	mg/kg	0.2	<0.1	<0.1	0.8	<0.1
Nickel	mg/kg	16	14	14	12	15
Zinc	mg/kg	150	280	200	6,200	100

Moisture						
Our Reference		236500-1	236500-6	236500-7	236500-8	236500-9
Your Reference	UNITS	TP201	TP202	TP202	TP203	TP203
Depth		0-0.2	0-0.2	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	4.6	2.8	12	3.3	2.2

Moisture						
Our Reference		236500-12	236500-14	236500-16	236500-19	236500-20
Your Reference	UNITS	TP204	TP204	TP205	TP205	TP206
Depth		0-0.2	0.7-0.9	0-0.2	1.1-1.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	1.6	5.5	2.5	14	5.9

Moisture						
Our Reference		236500-22	236500-24	236500-25	236500-26	236500-28
Your Reference	UNITS	TP206	TP207	TP207	TP208	TP208
Depth		0.8-1.0	0.1-0.3	0.7-0.9	0-0.1	1.0-1.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	16	3.9	16	2.4	13

Moisture						
Our Reference		236500-29	236500-31	236500-32	236500-33	236500-35
Your Reference	UNITS	TP209	TP209	TP210	TP210	TP211
Depth		0-0.1	0.7-0.9	0-0.2	0.4-0.65	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	2.5	12	2.6	2.9	1.9

Moisture						
Our Reference		236500-36	236500-39	236500-41	236500-42	236500-44
Your Reference	UNITS	TP211	TP212	TP212	TP213	TP213
Depth		0.2-0.4	0.1-0.3	1.0-1.2	0-0.2	0.4-0.6
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	0.9	4.7	6.5	2.5	4.3

Moisture						
Our Reference		236500-46	236500-47	236500-51	236500-52	236500-53
Your Reference	UNITS	TP214	TP214	TP215	TP215	TP216
Depth		0-0.2	0.5-0.7	0.6-0.8	1.1-1.36	0-0.2
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	1.0	5.6	7.8	11	4.2

Moisture					
Our Reference		236500-54	236500-57	236500-58	236500-59
Your Reference	UNITS	TP216	SDUP2	SDUP3	SDUP4
Depth		0.5-0.7	-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil
Date prepared	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Date analysed	-	14/02/2020	14/02/2020	14/02/2020	14/02/2020
Moisture	%	4.4	3.7	2.1	1.3

Asbestos ID - soils NEPM - ASB-001						
Our Reference		236500-1	236500-6	236500-35	236500-42	236500-43
Your Reference	UNITS	TP201	TP202	TP211	TP213	TP213
Depth		0-0.2	0-0.2	0-0.1	0-0.2	0.3-0.35
Date Sampled		04/02/2020	04/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	13/02/2020	13/02/2020	13/02/2020	13/02/2020	13/02/2020
Sample mass tested	g	1,193.81	1,008.42	1,294.31	1,120.71	1,205.06
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

Asbestos ID - materials					
Our Reference		236500-60	236500-61	236500-62	236500-63
Your Reference	UNITS	TP213-spoil-F1	TP213-spoil-F2	TP213-spoil-F3	TP213-spoil-F4
Depth		-	-	-	-
Date Sampled		04/02/2020	04/02/2020	04/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil
Date analysed	-	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Mass / Dimension of Sample	-	65x50x5mm	90x55x5mm	85x70x5mm	80x38x5mm
Sample Description	-	Grey fibre cement material	Grey fibre cement material	Grey fibre cement material	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Crocidolite asbestos detected	Chrysotile asbestos detected	Chrysotile asbestos detected Crocidolite asbestos detected	Chrysotile asbestos detected Crocidolite asbestos detected
Trace Analysis	-	[NT]	[NT]	[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.
Org-003	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-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).

Method ID	Methodology Summary
Org-012/017	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-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	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-016	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-2	236500-6
Date extracted	-			13/02/2020	1	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			14/02/2020	1	14/02/2020	14/02/2020		14/02/2020	14/02/2020
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	93	80
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	93	80
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	77	69
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	92	81
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	96	83
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	99	84
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	97	82
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	125	1	101	107	6	130	108

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	236500-39
Date extracted	-			[NT]	22	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			[NT]	22	14/02/2020	14/02/2020		14/02/2020	14/02/2020
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	22	<25	<25	0	97	92
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	22	<25	<25	0	97	92
Benzene	mg/kg	0.2	Org-016	[NT]	22	<0.2	<0.2	0	86	74
Toluene	mg/kg	0.5	Org-016	[NT]	22	<0.5	<0.5	0	101	88
Ethylbenzene	mg/kg	1	Org-016	[NT]	22	<1	<1	0	100	98
m+p-xylene	mg/kg	2	Org-016	[NT]	22	<2	<2	0	98	99
o-Xylene	mg/kg	1	Org-016	[NT]	22	<1	<1	0	84	96
naphthalene	mg/kg	1	Org-014	[NT]	22	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	22	107	112	5	122	118

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]	36	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	36	14/02/2020	14/02/2020		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	36	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	36	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	36	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	36	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	36	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	36	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	36	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	36	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	36	120	128	6	[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]	54	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	14/02/2020	14/02/2020		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	54	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	54	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	54	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	54	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	54	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	54	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	54	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	54	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	54	117	109	7	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	236500-6
Date extracted	-			13/02/2020	1	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			13/02/2020	1	13/02/2020	13/02/2020		13/02/2020	13/02/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	105	98
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	118	98
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	105	98
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	118	98
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	#
Surrogate o-Terphenyl	%		Org-003	95	1	98	102	4	113	112

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	236500-39
Date extracted	-			[NT]	22	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			[NT]	22	14/02/2020	14/02/2020		13/02/2020	13/02/2020
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	22	<50	<50	0	77	#
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	91	#
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	108	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	22	<50	<50	0	77	#
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	91	#
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	108	#
Surrogate o-Terphenyl	%		Org-003	[NT]	22	100	98	2	106	104

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	36	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	36	13/02/2020	13/02/2020		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	36	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	36	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	36	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	36	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	36	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	36	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	36	103	95	8	[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]	54	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	14/02/2020	14/02/2020		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	54	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	54	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	54	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	54	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	54	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	54	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	54	93	105	12	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	236500-6
Date extracted	-			13/02/2020	1	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			14/02/2020	1	14/02/2020	14/02/2020		14/02/2020	14/02/2020
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	114	113
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	1	0.2	0.2	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	110	116
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	1	0.7	0.5	33	102	71
Anthracene	mg/kg	0.1	Org-012/017	<0.1	1	0.2	0.1	67	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	1	1.9	1.2	45	104	#
Pyrene	mg/kg	0.1	Org-012/017	<0.1	1	1.8	1.2	40	110	#
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	1.0	0.7	35	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	1	1.0	0.7	35	90	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	1	2	1	67	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	1	1.2	0.82	38	94	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	1	0.7	0.5	33	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	0.2	0.1	67	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	1	0.9	0.5	57	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	83	1	114	101	12	94	90

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	236500-39
Date extracted	-			[NT]	22	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			[NT]	22	14/02/2020	14/02/2020		14/02/2020	14/02/2020
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	118	112
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	112	115
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	103	124
Anthracene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	106	#
Pyrene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	110	#
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	90	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	22	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	22	<0.05	<0.05	0	120	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	22	92	91	1	95	82

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	36	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	36	14/02/2020	14/02/2020		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	36	0.1	0.3	100	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	36	0.3	0.6	67	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012/017	[NT]	36	0.3	0.6	67	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	36	0.2	0.3	40	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	36	0.2	0.3	40	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	36	0.3	0.5	50	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	36	0.2	0.3	40	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	36	<0.1	0.2	67	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	36	97	95	2	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	54	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	14/02/2020	14/02/2020		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	54	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	54	0.1	0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	54	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	54	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	54	0.2	0.3	40	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012/017	[NT]	54	0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	54	0.7	0.8	13	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012/017	[NT]	54	0.7	0.7	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	54	0.5	0.5	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	54	0.5	0.5	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	54	0.9	0.9	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	54	0.52	0.54	4	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	54	0.3	0.3	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	54	0.1	0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	54	0.1	0.3	100	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	54	101	102	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	236500-6
Date prepared	-			13/02/2020	1	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			14/02/2020	1	14/02/2020	14/02/2020		14/02/2020	14/02/2020
Arsenic	mg/kg	4	Metals-020	<4	1	24	19	23	103	94
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	6.3	5.8	8	103	79
Chromium	mg/kg	1	Metals-020	<1	1	18	16	12	112	91
Copper	mg/kg	1	Metals-020	<1	1	51	50	2	103	102
Lead	mg/kg	1	Metals-020	<1	1	880	770	13	105	#
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.2	0.1	67	106	##
Nickel	mg/kg	1	Metals-020	<1	1	15	15	0	102	86
Zinc	mg/kg	1	Metals-020	<1	1	960	950	1	105	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	236500-39
Date prepared	-			[NT]	22	13/02/2020	13/02/2020		13/02/2020	13/02/2020
Date analysed	-			[NT]	22	14/02/2020	14/02/2020		14/02/2020	14/02/2020
Arsenic	mg/kg	4	Metals-020	[NT]	22	<4	4	0	104	90
Cadmium	mg/kg	0.4	Metals-020	[NT]	22	2	2	0	102	72
Chromium	mg/kg	1	Metals-020	[NT]	22	23	24	4	106	78
Copper	mg/kg	1	Metals-020	[NT]	22	23	24	4	102	97
Lead	mg/kg	1	Metals-020	[NT]	22	21	22	5	106	##
Mercury	mg/kg	0.1	Metals-021	[NT]	22	<0.1	<0.1	0	75	98
Nickel	mg/kg	1	Metals-020	[NT]	22	15	17	12	103	75
Zinc	mg/kg	1	Metals-020	[NT]	22	43	46	7	104	##

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	36	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	36	14/02/2020	14/02/2020		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	36	45	46	2	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	36	3	4.0	29	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	36	8	10	22	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	36	220	240	9	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	36	2900	3200	10	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	36	0.2	0.2	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	36	4	5	22	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	36	1800	1900	5	[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]	54	13/02/2020	13/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	14/02/2020	14/02/2020		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	54	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	54	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	54	23	20	14	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	54	30	26	14	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	54	160	79	68	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	54	0.2	<0.1	67	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	54	16	15	6	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	54	150	93	47	[NT]	[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.

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.
TRH Soil C10-C40 NEPM - # Percent recovery for the surrogate/matrix spike is not possible to report as the high concentration of analytes in sample/s 236500-6ms,39ms, 9, 14, 33, 46 have caused interference.

PAHs in Soil:
- # Percent recovery for the matrix spike is not possible to report as the high concentration of analytes in samples 236500-9 and 39 have caused interference.
- The RPD for duplicate results is accepted due to the non homogenous nature of sample 236500-1, 3 and 54.

Acid Extractable Metals in Soil:
-The laboratory RPD acceptance criteria has been exceeded for 236500-54 for Pb and Zn. Therefore a triplicate result has been issued as laboratory sample number 236500-66.
-# Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.
-## 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.

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	Environmental Investigation Services
Attention	Todd Hore

Sample Login Details

Your reference	E32665PH, Broken Hill
Envirolab Reference	236500
Date Sample Received	11/02/2020
Date Instructions Received	11/02/2020
Date Results Expected to be Reported	18/02/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	65 soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.5
Cooling Method	Ice
Sampling Date Provided	YES

Comments

MISSING TP202 0.4-0.5 - RECEIVED TP202 0.5-0.7

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	Asbestos ID - materials	On Hold
TP201-0-0.2	✓	✓	✓	✓	✓		
TP201-0.4-0.5							✓
TP201-0.6-0.8							✓
TP201-1.1-1.4							✓
TP201-1.8-2.0							✓
TP202-0-0.2	✓	✓	✓	✓	✓		
TP202-1.0-1.2	✓	✓	✓	✓			
TP203-0-0.2	✓	✓	✓	✓			
TP203-0.4-0.6	✓	✓	✓	✓			
TP203-0.6-0.8							✓
TP203-1.1-1.3							✓
TP204-0-0.2	✓	✓	✓	✓			
TP204-0.5-0.7							✓
TP204-0.7-0.9	✓	✓	✓	✓			
TP204-1.0-1.2							✓
TP205-0-0.2	✓	✓	✓	✓			
TP205-0.5-0.7							✓
TP205-0.85-1.0							✓
TP205-1.1-1.3	✓	✓	✓	✓			
TP206-0-0.2	✓	✓	✓	✓			
TP206-0.5-0.7							✓
TP206-0.8-1.0	✓	✓	✓	✓			
TP207-0-0.1							✓
TP207-0.1-0.3	✓	✓	✓	✓			
TP207-0.7-0.9	✓	✓	✓	✓			
TP208-0-0.1	✓	✓	✓	✓			
TP208-0.5-0.7							✓
TP208-1.0-1.2	✓	✓	✓	✓			
TP209-0-0.1	✓	✓	✓	✓			
TP209-0.5-0.6							✓
TP209-0.7-0.9	✓	✓	✓	✓			
TP210-0-0.2	✓	✓	✓	✓			

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	Asbestos ID - materials	On Hold
TP210-0.4-0.65	✓	✓	✓	✓			
TP210-0.7-0.9							✓
TP211-0-0.1	✓	✓	✓	✓	✓		
TP211-0.2-0.4	✓	✓	✓	✓			
TP211-0.5-0.7							✓
TP212-0-0.1							✓
TP212-0.1-0.3	✓	✓	✓	✓			
TP212-0.5-0.6							✓
TP212-1.0-1.2	✓	✓	✓	✓			
TP213-0-0.2	✓	✓	✓	✓	✓		
TP213-0.3-0.35					✓		
TP213-0.4-0.6	✓	✓	✓	✓			
TP213-1.0-1.2							✓
TP214-0-0.2	✓	✓	✓	✓			
TP214-0.5-0.7	✓	✓	✓	✓			
TP214-1.3-1.4							✓
TP214-1.5-1.7							✓
TP215-0-0.2							✓
TP215-0.6-0.8	✓	✓	✓	✓			
TP215-1.1-1.36	✓	✓	✓	✓			
TP216-0-0.2	✓	✓	✓	✓			
TP216-0.5-0.7	✓	✓	✓	✓			
TP216-0.8-1.0							✓
SDUP1							✓
SDUP2	✓	✓	✓	✓			
SDUP3	✓	✓	✓	✓			
SDUP4	✓	✓	✓	✓			
TP213-spoil-F1						✓	
TP213-spoil-F2						✓	
TP213-spoil-F3						✓	
TP213-spoil-F4						✓	
TB-S1	✓						

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Asbestos ID - soils NEPM - ASB-001	Asbestos ID - materials	On Hold
TP202-0.5-0.7							✓

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

Additional Info

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

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	EIS Job Number: E32665PH Date Results Required: STANDARD Page: 1 of 3	JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Todd Hore

Location:	Broken Hill	Sample Preserved in Esky on Ice
Sampler:	HW	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos (WA method)	Asbestos		
4.2.20	1	TP201	0-0.2	G, A	0.2	F: Sandy clayey silt		X							X			
4.2.20	2	"	0.4-0.5	G, A	0.1	F: Gravelly sand												
4.2.20	3	"	0.6-0.8	G, A2	0.1	Sandy clayey silt												
4.2.20	4	"	1.1-1.4	G	0	Sandy clayey silt												
4.2.20	5	"	1.8-2.0	G	0	Schist												
4.2.20	6	TP202	0-0.2	G, A	0	F: Silty clayey sand		X							X			
4.2.20	NR	"	0.4-0.5	G, A2	0	Silty sandy clay												
4.2.20	7	"	1.0-1.2	G	0	Silty sandy clay		X										
4.2.20	8	TP203	0-0.2	G, A	0.1	F: Silty clayey sand		X										
4.2.20	9	"	0.4-0.6	G, A	0	F: Sandy gravel		X										
4.2.20	10	"	0.6-0.8	G, A2	0	Silty sandy clay												
4.2.20	11	"	1.1-1.3	G	0	Silty sandy clay												
4.2.20	12	TP204	0-0.2	G, A	0	F: Silty gravelly sand		X										
4.2.20	13	"	0.5-0.7	G, A	0	F: Silty gravelly sand												
4.2.20	14	"	0.7-0.9	G, A	0	F: Sandy gravel		X										
4.2.20	15	"	1.0-1.2	G, A2	0	Silty sandy clay												
4.2.20	16	TP205	0-0.2	G, A	0	F: Silty gravelly sand		X										
4.2.20	17	"	0.5-0.7	G, A	0	F: Silty gravelly sand												
4.2.20	18	"	0.85-1.0	G, A	0	F: Sandy gravel												
4.2.20	19	"	1.1-1.3	G, A2	0	Silty sandy clay		X										
4.2.20	20	TP206	0-0.2	G, A	0	F: Silty gravelly sand		X										
4.2.20	21	"	0.5-0.7	G, A	0	F: Silty gravelly sand												
4.2.20	22	"	0.8-1.0	G, A2	0.2	Silty sandy clay		X										
4.2.20	23	TP207	0-0.1	G, A	0	F: Silty sand												
4.2.20	24	"	0.1-0.3	G, A	0	F: Silty gravelly sand		X										

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

Job No: 236500
Date Received: 11/2/20
Time Received: 1530
Received by: CM
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - 500mL Ziplock Asbestos Bag
A2 - 40g Ziplock Asbestos Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	11/2/20	2.20pm	Claire McH	11/2/20

153J

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E32665PH	JKEnvironments
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067	Date Results Required: STANDARD	MACQUARIE PARK, NSW 2113
P: (02) 99106200		P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: Todd Hore
Attention: Aileen	Page: 2 of 3	

Location:	Broken Hill	Sample Preserved in Esky on Ice
Sampler:	HW	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos (WA method)	Asbestos		
4.2.20	25	TP207	0.7-0.9	G, A	0	Silty sandy clay		X										
4.2.20	26	TP208	0-0.1	G, A	0	F: Silty gravelly sand		X										
4.2.20	27	"	0.5-0.7	G, A	0	F: Silty gravelly sand												
4.2.20	28	↓	1.0-1.2	G, A2	0	Silty sandy clay		X										
4.2.20	29	TP209	0-0.1	G, A	0	F: Silty gravelly sand		X										
4.2.20	30	"	0.5-0.6	G, A	0	F: Silty gravelly sand												
4.2.20	31	↓	0.7-0.9	G, A2	0	Silty sandy clay		X										
4.2.20	32	TP210	0-0.2	G, A	0	F: Silty gravelly sand		X										
4.2.20	33	"	0.4-0.65	G, A	0	F: Sandy gravel		X										
4.2.20	34	↓	0.7-0.9	G, A2	0	Silty sandy clay												
5.2.20	35	TP211	0-0.1	G, A	0	F: Sandy gravelly silt		X							X			
5.2.20	36	"	0.2-0.4	G, A	0.1	F: Silty gravel		X										
5.2.20	37	↓	0.5-0.7	G, A2	0	Silty sandy clay												
5.2.20	38	TP212	0-0.1	G, A	0.1	F: Silty gravelly sand												
5.2.20	39	"	0.1-0.3	G, A	0	F: Sandy gravelly silt		X										
5.2.20	40	"	0.5-0.6	G, A	0	F: Sandy gravelly silt												
5.2.20	41	↓	1.0-1.2	G, A2	0	Silty clayey sand		X										
5.2.20	42	TP213	0-0.2	G, A	0	F: Gravelly silt		X							X			
5.2.20	43	"	0.3-0.35	A	NA	F: Gravelly silt									X			
5.2.20	44	"	0.4-0.6	G, A	0	F: Silty gravelly sand		X										
5.2.20	45	↓	1.0-1.2	G, A2	0	Clayey sand												
5.2.20	46	TP214	0-0.2	G, A	0	F: Silty gravelly sand		X										
5.2.20	47	"	0.5-0.7	G, A	0	F: clayey sand		X										
5.2.20	48	"	1.3-1.4	G, A	0	F: clayey sand												
5.2.20	49	↓	1.5-1.7	G, A2	0	Silty clayey sand												

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar; A - Ziplock Asbestos Bag; P - Plastic Bag	# 236500

Relinquished By:	Date:	Time:	Received By:	Date:
	11/2/20	2.20pm	Claire Mch	11/2/20 1530

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	EIS Job Number: E32665PH Date Results Required: STANDARD Page: 3 of 3	**FROM:** JKEnvironments REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Todd Hore

Location: Broken Hill

Sampler: HW

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos (WA method)	Asbestos		
5.2.20	50	TP215	0-0.2	G, A	0.1	F: Gravelly silt												
5.2.20	51		0.6-0.8	G, A	0	F: Clayey gravelly sand		X										
5.2.20	52		1.1-1.3	G, A2	0	Silty clayey sand		X										
5.2.20	53	TP216	0-0.2	G, A	0	F: Silty gravelly sand		X										
5.2.20	54		0.5-0.7	G, A	0	F: Silty gravelly sand		X										
5.2.20	55		0.8-1.0	G, A2	0	Clayey sand												
5.2.20	56	SDUP1		G	NA	Soil												
5.2.20	57	SDUP2		G	NA	Soil		X										
5.2.20	58	SDUP3		G	NA	Soil		X										
5.2.20	59	SDUP4		G	NA	Soil		X										
4.2.20	60	TP213-spoil-F1			NA	FCF										X		
4.2.20	61	TP213-spoil-F2			NA	FCF										X		
4.2.20	62	TP213-spoil-F3			NA	FCF										X		
5.2.20	63	TP213-spoil-F4			NA	FCF										X		
4-5.2.20	64	TB-S1		G	NA	Sand blank								X				
	65	~~BH1~~	~~0.1-0.2~~	PM.														
	66	~~BH1~~	~~0.6-0.8~~															
	67	~~BH2~~	~~0.1-0.2~~															
	68	~~BH2~~	~~0.5-0.7~~			Extra samples												
		~~2027~~	~~cm~~			received CM. 11/2/20.												
65	69	TP202	0.5-0.7		~~04~~/02/20													
	70	~~TPC11~~	~~0.2-0.3~~															

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - 500mL Ziplock Asbestos Bag # 236500.
A2 - 40g Ziplock Asbestos Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	11/2/20	2.20pm	Claire MCM	11/2/20

1530

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 236500-A

Client Details

Client	Environmental Investigation Services
Attention	Todd Hore
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E32665PH, Broken Hill**
Number of Samples	65 soil
Date samples received	11/02/2020
Date completed instructions received	18/02/2020

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	25/02/2020
Date of Issue	25/02/2020

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Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Metals in TCLP USEPA1311						
Our Reference		236500-A-1	236500-A-6	236500-A-8	236500-A-9	236500-A-12
Your Reference	UNITS	TP201	TP202	TP203	TP203	TP204
Depth		0-0.2	0-0.2	0-0.2	0.4-0.6	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
pH of soil for fluid# determ.	pH units	7.6	8.2	9.0	9.0	9.0
pH of soil TCLP (after HCl)	pH units	2.0	2.2	2.3	2.1	2.6
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	6.0	6.0	6.2	6.1	6.2
Lead in TCLP	mg/L	0.3	1.2	0.06	0.86	0.1

Metals in TCLP USEPA1311						
Our Reference		236500-A-14	236500-A-16	236500-A-20	236500-A-24	236500-A-26
Your Reference	UNITS	TP204	TP205	TP206	TP207	TP208
Depth		0.7-0.9	0-0.2	0-0.2	0.1-0.3	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
pH of soil for fluid# determ.	pH units	8.6	9.1	8.9	8.8	8.5
pH of soil TCLP (after HCl)	pH units	2.1	4.7	4.7	2.0	2.2
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	6.1	6.2	6.2	6.1	6.1
Lead in TCLP	mg/L	0.3	<0.03	0.09	0.2	1.5

Metals in TCLP USEPA1311						
Our Reference		236500-A-29	236500-A-32	236500-A-33	236500-A-35	236500-A-36
Your Reference	UNITS	TP209	TP210	TP210	TP211	TP211
Depth		0-0.1	0-0.2	0.4-0.65	0-0.1	0.2-0.4
Date Sampled		04/02/2020	04/02/2020	04/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
pH of soil for fluid# determ.	pH units	8.4	9.5	9.2	8.3	8.5
pH of soil TCLP (after HCl)	pH units	1.9	2.1	1.8	1.9	1.8
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.8	6.2	6.1	5.3	5.3
Lead in TCLP	mg/L	1.2	0.04	2.9	18	10

Metals in TCLP USEPA1311						
Our Reference		236500-A-39	236500-A-42	236500-A-44	236500-A-46	236500-A-47
Your Reference	UNITS	TP212	TP213	TP213	TP214	TP214
Depth		0.1-0.3	0-0.2	0.4-0.6	0-0.2	0.5-0.7
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
pH of soil for fluid# determ.	pH units	9.2	8.2	9.1	9.3	8.5
pH of soil TCLP (after HCl)	pH units	4.6	2.4	1.7	1.9	2.6
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	6.3	6.1	5.1	6.1	6.0
Lead in TCLP	mg/L	0.05	0.3	0.2	0.1	0.2

Metals in TCLP USEPA1311						
Our Reference		236500-A-53	236500-A-54	236500-A-57	236500-A-58	236500-A-59
Your Reference	UNITS	TP216	TP216	SDUP2	SDUP3	SDUP4
Depth		0-0.2	0.5-0.7	-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
pH of soil for fluid# determ.	pH units	9.0	8.5	9.2	9.1	8.6
pH of soil TCLP (after HCl)	pH units	2.0	1.8	2.8	4.8	1.9
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	6.2	5.4	6.2	6.3	5.5
Lead in TCLP	mg/L	0.1	0.06	0.03	<0.03	15

PAHs in TCLP (USEPA 1311)						
Our Reference		236500-A-1	236500-A-6	236500-A-8	236500-A-9	236500-A-12
Your Reference	UNITS	TP201	TP202	TP203	TP203	TP204
Depth		0-0.2	0-0.2	0-0.2	0.4-0.6	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	21/02/2020	21/02/2020	21/02/2020	21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001	0.004	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001	0.008	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001	0.011	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001	0.039	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	0.007	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001	0.014	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	0.011	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.10	NIL (+)VE
Surrogate p-Terphenyl-d14	%	128	115	117	124	115

PAHs in TCLP (USEPA 1311)						
Our Reference		236500-A-14	236500-A-16	236500-A-20	236500-A-24	236500-A-26
Your Reference	UNITS	TP204	TP205	TP206	TP207	TP208
Depth		0.7-0.9	0-0.2	0-0.2	0.1-0.3	0-0.1
Date Sampled		04/02/2020	04/02/2020	04/02/2020	04/02/2020	04/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	21/02/2020	21/02/2020	21/02/2020	21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	0.006	<0.001	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	0.004	<0.001	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	0.007	<0.001	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	0.021	<0.001	<0.001	<0.001	0.001
Anthracene in TCLP	mg/L	0.004	<0.001	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	0.005	<0.001	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	0.004	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	0.052	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.0014
Surrogate p-Terphenyl-d14	%	108	107	123	117	115

PAHs in TCLP (USEPA 1311)						
Our Reference		236500-A-29	236500-A-32	236500-A-33	236500-A-39	236500-A-42
Your Reference	UNITS	TP209	TP210	TP210	TP212	TP213
Depth		0-0.1	0-0.2	0.4-0.65	0.1-0.3	0-0.2
Date Sampled		04/02/2020	04/02/2020	04/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	21/02/2020	21/02/2020	21/02/2020	21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	<0.001	<0.001	0.004	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	0.005	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	0.006	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	0.002	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	0.035	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	0.005	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	0.010	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	0.008	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	0.076	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	91	96	123	111	84

PAHs in TCLP (USEPA 1311)						
Our Reference		236500-A-44	236500-A-46	236500-A-47	236500-A-53	236500-A-54
Your Reference	UNITS	TP213	TP214	TP214	TP216	TP216
Depth		0.4-0.6	0-0.2	0.5-0.7	0-0.2	0.5-0.7
Date Sampled		05/02/2020	05/02/2020	05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	21/02/2020	21/02/2020	21/02/2020	21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001	0.003	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001	0.007	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001	0.004	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	0.003	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.021	NIL (+)VE
Surrogate p-Terphenyl-d14	%	123	76	101	133	119

PAHs in TCLP (USEPA 1311)				
Our Reference		236500-A-57	236500-A-58	236500-A-59
Your Reference	UNITS	SDUP2	SDUP3	SDUP4
Depth		-	-	-
Date Sampled		05/02/2020	05/02/2020	05/02/2020
Type of sample		soil	soil	soil
Date extracted	-	20/02/2020	20/02/2020	20/02/2020
Date analysed	-	21/02/2020	21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	126	112	107

Miscellaneous Inorg - soil			
Our Reference		236500-A-9	236500-A-33
Your Reference	UNITS	TP203	TP210
Depth		0.4-0.6	0.4-0.65
Date Sampled		04/02/2020	04/02/2020
Type of sample		soil	soil
Date prepared	-	19/02/2020	19/02/2020
Date analysed	-	19/02/2020	19/02/2020
Presence of Coal Tar*	-	Absent	Absent

Method ID	Methodology Summary
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
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-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004. Please note that the mass used may be scaled down from the default based on sample mass available.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012/017	Leachates are extracted with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
RTA T542	Determination of Phenol in core samples as per RTA test method T542. This procedure gives and indication of whether a sample of asphalt has been made with coal tar. The coal tar method gives an approximate result with a high degree of uncertainty.

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	236500-A-6
Date extracted	-			20/02/2020	1	20/02/2020	20/02/2020		20/02/2020	20/02/2020
Date analysed	-			20/02/2020	1	20/02/2020	20/02/2020		20/02/2020	20/02/2020
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	1	0.3	0.3	0	100	106

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			[NT]	32	20/02/2020	20/02/2020		20/02/2020	[NT]
Date analysed	-			[NT]	32	20/02/2020	20/02/2020		20/02/2020	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	[NT]	32	0.04	0.04	0	102	[NT]

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	54	20/02/2020	20/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	20/02/2020	20/02/2020		[NT]	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	[NT]	54	0.06	0.06	0	[NT]	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	236500-A-6
Date extracted	-			20/02/2020	1	20/02/2020	20/02/2020		20/02/2020	20/02/2020
Date analysed	-			21/02/2020	1	21/02/2020	21/02/2020		21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	125	115
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	118	123
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	120	121
Anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	114	113
Pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	128	119
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	127	104
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	<0.002	1	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	111	79
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	108	1	128	130	2	121	116

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	236500-A-57
Date extracted	-			[NT]	29	20/02/2020	20/02/2020		20/02/2020	20/02/2020
Date analysed	-			[NT]	29	21/02/2020	21/02/2020		21/02/2020	21/02/2020
Naphthalene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	87	95
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	86	93
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	77	88
Anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	79	99
Pyrene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	82	104
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	98	110
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	[NT]	29	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	110	117
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	[NT]	29	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	29	91	92	1	117	130

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	54	20/02/2020	20/02/2020		[NT]	[NT]
Date analysed	-			[NT]	54	21/02/2020	21/02/2020		[NT]	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012/017	[NT]	54	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012/017	[NT]	54	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	54	119	129	8	[NT]	[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.

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	Environmental Investigation Services
Attention	Todd Hore

Sample Login Details

Your reference	E32665PH, Broken Hill
Envirolab Reference	236500-A
Date Sample Received	11/02/2020
Date Instructions Received	18/02/2020
Date Results Expected to be Reported	25/02/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	65 soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.5
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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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	Lead in TCLP	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	Presence of Coal Tar*	On Hold
TP201-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP201-0.4-0.5																								✓
TP201-0.6-0.8																								✓
TP201-1.1-1.4																								✓
TP201-1.8-2.0																								✓
TP202-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP202-1.0-1.2																								✓
TP203-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP203-0.4-0.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
TP203-0.6-0.8																								✓
TP203-1.1-1.3																								✓
TP204-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP204-0.5-0.7																								✓
TP204-0.7-0.9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP204-1.0-1.2																								✓
TP205-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP205-0.5-0.7																								✓
TP205-0.85-1.0																								✓
TP205-1.1-1.3																								✓
TP206-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

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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	Lead in TCLP	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	Presence of Coal Tar*	On Hold
TP206-0.5-0.7																								✓
TP206-0.8-1.0																								✓
TP207-0-0.1																								✓
TP207-0.1-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP207-0.7-0.9																								✓
TP208-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP208-0.5-0.7																								✓
TP208-1.0-1.2																								✓
TP209-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP209-0.5-0.6																								✓
TP209-0.7-0.9																								✓
TP210-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP210-0.4-0.65	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
TP210-0.7-0.9																								✓
TP211-0-0.1	✓	✓	✓	✓	✓																			
TP211-0.2-0.4	✓	✓	✓	✓	✓																			
TP211-0.5-0.7																								✓
TP212-0-0.1																								✓
TP212-0.1-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP212-0.5-0.6																								✓

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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	Lead in TCLP	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(bjk)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	Presence of Coal Tar*	On Hold
TP212-1.0-1.2																								✓
TP213-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP213-0.3-0.35																								✓
TP213-0.4-0.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP213-1.0-1.2																								✓
TP214-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP214-0.5-0.7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP214-1.3-1.4																								✓
TP214-1.5-1.7																								✓
TP215-0-0.2																								✓
TP215-0.6-0.8																								✓
TP215-1.1-1.36																								✓
TP216-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP216-0.5-0.7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP216-0.8-1.0																								✓
SDUP1																								✓
SDUP2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
SDUP3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
SDUP4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
TP213-spoil-F1																								✓

Jessica Hie

From: Todd Hore <THore@jkenvironments.com.au>
Sent: Tuesday, 18 February 2020 5:08 PM
To: Aileen Hie; Jessica Hie
Subject: 236500

Hey Aileen,
Can you please schedule the following additional analyses for E32665PH, Broken Hill:

- 236500-1 – TCLP lead + PAHs;
- 236500-6 – TCLP lead + PAHs;
- 236500-8 – TCLP lead + PAHs;
- 236500-9 – TCLP lead + PAHs, Coal Tar;
- 236500-12 – TCLP lead + PAHs;
- 236500-14 – TCLP lead + PAHs;
- 236500-16 – TCLP lead + PAHs;
- 236500-20 – TCLP lead + PAHs;
- 236500-24 – TCLP lead + PAHs;
- 236500-26 – TCLP lead + PAHs;
- 236500-29 – TCLP lead + PAHs;
- 236500-32 – TCLP lead + PAHs;
- 236500-33 – TCLP lead + PAHs, Coal Tar;
- 236500-35 – TCLP lead;
- 236500-36 – TCLP lead;
- 236500-39 – TCLP lead + PAHs;
- 236500-42 – TCLP lead + PAHs;
- 236500-44 – TCLP lead + PAHs;
- 236500-46 – TCLP lead + PAHs;
- 236500-47 – TCLP lead + PAHs;
- 236500-53 – TCLP lead + PAHs;
- 236500-54 – TCLP lead + PAHs;
- 236500-57 – TCLP lead + PAHs;
- 236500-58 – TCLP lead + PAHs;
- 236500-59 – TCLP lead + PAHs;

236500-A
Due: 25/2/20
Std TAT.

Please undertake the above on a standard turnaround.

Regards
Todd Hore
Senior Associate | Environmental Engineer

We are excited to announce that we have a full time presence in South-East Queensland, based in Maroochydore. For all enquiries, please contact Paul Roberts (proberts@jkgeotechnics.com.au).

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Appendix E: Report Explanatory Notes

Standard Sampling Procedure

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by JKE. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

A. Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the JKE job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-2017[13].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork where it is safe to do so. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

B. Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.
- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

[13] Standards Australia, (2017), *Geotechnical Site Investigations.* (AS1726-2017)

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

C. Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Measure the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Stericup single-use filters (for heavy metals samples);
  - Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/Temperature meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;
  - Low flow peristaltic pump and associated tubing; and
  - Groundwater sampling forms.
- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow sampling equipment to reduce the disturbance of the water column and loss of volatiles.

- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements is less than 0.2 units, the difference in conductivity is less than 10% and whilst the well is no longer in draw-down.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements specified by the laboratory and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice.
- At the end of each water sampling complete a chain of custody form for samples being sent to the laboratory.

D. <u>Decontamination Procedures for Groundwater Sampling Equipment</u>

- All equipment associated with the groundwater sampling procedure (other than single-use items) are decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

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

A. Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

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

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

B. Precision

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

C. Accuracy

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

D. Representativeness

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

E. Completeness

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

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

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

[15] 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%.

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

I. Surrogate Spikes

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

J. Duplicates

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

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

Appendix F: Data (QA/QC) Evaluation

Data (QA/QC) Evaluation

A. INTRODUCTION

This Data (QA/QC) Evaluation forms part of the validation process for the DQOs documented in Section 6.1 of this report. Checks were made to assess the data in terms of precision, accuracy, representativeness, comparability and completeness. These 'PARCC' parameters are referred to collectively as DQIs and are defined in the Report Explanatory Notes attached in the report appendices.

1. Field and Laboratory Considerations

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

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

2. Field QA/QC Samples and Analysis

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

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Intra-laboratory duplicate (soil)	SDup 2 (primary sample TP203 0-0.2m)	Approximately 10% of primary samples	Heavy metals, TRH/BTEX, PAHs
Intra-laboratory duplicate (soil)	SDup 3 (primary sample TP205 0-0.2m)	As above	Heavy metals, TRH/BTEX, PAHs
Intra-laboratory duplicate (soil)	SDup 4 (primary sample TP211 0-0.1m)	As above	Heavy metals, TRH/BTEX, PAHs
Trip blank (soil)	TB1 (5/2/20)	One for the assessment to demonstrate adequacy of storage and transport methods	BTEX

The results for the field QA/QC samples are detailed in the laboratory summary tables (Table S9) attached to the assessment 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 Blanks

Acceptable targets for field blank samples in this report will be less than the PQL for organic analytes.

Laboratory QA/QC

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

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

RPDs

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

Laboratory Control Samples (LCS) and Matrix Spikes

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

Surrogate Spikes

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

Method Blanks

- All results less than PQL.

B. DATA EVALUATION

1. Sample Collection, Storage, Transport and Analysis

Samples were collected by trained field staff in accordance with the JKE SSP. The SSP was developed to be consistent with relevant guidelines, including NEPM (2013) and other guidelines made under the CLM Act 1997.

Appropriate sample preservation, handling and storage procedures were adopted. Laboratory analysis was undertaken within specified holding times generally in accordance with Schedule B(3) of NEPM (2013) and the laboratory NATA accredited methodologies. Envirolab noted that the asbestos results were reported to be consistent with the recommendations in NEPM (2013), however this level of reporting is outside the scope of their NATA accreditation. In the absence of other available analytical methods for asbestos, this was found to be acceptable for the purpose of this assessment.

JKE note that the temperature on receipt of soil samples was reported to be 11.5°C. 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 are of the opinion that the temperatures reported on the Sample Receipts are unlikely to be reliable or representative of the overall batch.

Samples were transported from Broken Hill to Macquarie Park via road freight. Prior to transportation samples were packed in insulated containers with dry ice and ice. Upon receipt of the samples at Macquarie Park it was noted that ice and dry ice had melted and a small amount of water was present in the bottom of the containers (lower than top of jars). The water was cold and samples were cool to touch. Samples were immediately transferred to fridges, where they were stored for one day prior to repacking and transport to the laboratory. Samples were considered to have remained sufficiently cool to enable appropriate preservation and reliability of results.

Review of the project data also indicated that:

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

2. Laboratory PQLs

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC.

3. Field QA/QC Sample Results

Field Duplicates

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

- Elevated RPDs were reported for copper and several PAH compounds in SDup 2/TP203 (0-0.2m);
- Elevated RPDs were reported for cadmium and TRH (C_{34}-C_{40}) in SDup 3/TP205 (0-0.2m); and
- An Elevated RPD was reported for Acenaphthylene in SDup 4/TP211 (0-0.1m).

Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogeneous matrices. As both the primary and duplicate sample results for the above compounds were less than the SAC, the exceedances are not considered to have had an adverse impact on the data set as a whole.

Field Blanks

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

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 assessment.

A review of the laboratory QA/QC data identified the following minor non-conformances:

- TRH percent recoveries for the surrogate/matrix spikes were not possible to report as the high concentration of analytes in samples 236500-6ms,39ms, 9, 14, 33, 46 have caused interference;
- PAHs percent recovery for the matrix spike was not possible to report as the high concentration of analytes in samples 236500-9 and 39 have caused interference;
- The RPD for duplicate results exceeded the acceptance criteria in samples 236500-1, 3 and 54 and was accepted due to the non homogenous nature of samples;
- The laboratory RPD acceptance criteria has been exceeded for 236500-54 for lead and zinc. Therefore a triplicate result has been issued as laboratory sample number 236500-66;
- Heavy metals percent recovery was not possible to report due to the high concentration of the elements in the samples. However an acceptable recovery was obtained for the LCS; and
- Heavy metals percent recovery was 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.

C. DATA QUALITY SUMMARY

JKE are 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.

Appendix G: Calculation Sheets

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation	ProUCL 5.14/03/2020 9:04:13 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Total Number of Observations	23	Number of Distinct Observations	21
		Number of Missing Observations	1
Minimum	67	Mean	1309
Maximum	3500	Median	770
SD	1141	Std. Error of Mean	237.9
Coefficient of Variation	0.872	Skewness	0.858

Normal GOF Test

Shapiro Wilk Test Statistic	0.832	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.914	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.255	Lilliefors GOF Test
5% Lilliefors Critical Value	0.18	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	1717	95% Adjusted-CLT UCL (Chen-1995)	1745
		95% Modified-t UCL (Johnson-1978)	1724

Gamma GOF Test

A-D Test Statistic	0.705	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.764	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.163	Kolmogorov-Smirnov Gamma GOF Test
5% K-S Critical Value	0.186	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.297	k star (bias corrected MLE)	1.157
Theta hat (MLE)	1009	Theta star (bias corrected MLE)	1131
nu hat (MLE)	59.66	nu star (bias corrected)	53.21
MLE Mean (bias corrected)	1309	MLE Sd (bias corrected)	1217
		Approximate Chi Square Value (0.05)	37.45
Adjusted Level of Significance	0.0389	Adjusted Chi Square Value	36.49

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1859	95% Adjusted Gamma UCL (use when n<50)	1908

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.934	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.11	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.18	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.205	Mean of logged Data	6.744
Maximum of Logged Data	8.161	SD of logged Data	1.034

Assuming Lognormal Distribution

95% H-UCL	2555	90% Chebyshev (MVUE) UCL	2432
95% Chebyshev (MVUE) UCL	2899	97.5% Chebyshev (MVUE) UCL	3547
99% Chebyshev (MVUE) UCL	4820		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1700	95% Jackknife UCL	1717
95% Standard Bootstrap UCL	1695	95% Bootstrap-t UCL	1797
95% Hall's Bootstrap UCL	1710	95% Percentile Bootstrap UCL	1690
95% BCA Bootstrap UCL	1735		

90% Chebyshev(Mean, Sd) UCL	2022	95% Chebyshev(Mean, Sd) UCL	2346
97.5% Chebyshev(Mean, Sd) UCL	2794	99% Chebyshev(Mean, Sd) UCL	3676

Suggested UCL to Use

95% Adjusted Gamma UCL 1908

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

B(a)P

General Statistics

Total Number of Observations	23	Number of Distinct Observations	21
		Number of Missing Observations	1
Minimum	0.25	Mean	23.78
Maximum	260	Median	2.1
SD	61.74	Std. Error of Mean	12.87
Coefficient of Variation	2.597	Skewness	3.29

Normal GOF Test

Shapiro Wilk Test Statistic	0.428	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.914	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.413	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.18	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	45.88	95% Adjusted-CLT UCL (Chen-1995)	54.39
		95% Modified-t UCL (Johnson-1978)	47.36

Gamma GOF Test

A-D Test Statistic	2.626	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.838	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.196	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.348	k star (bias corrected MLE)	0.332
Theta hat (MLE)	68.32	Theta star (bias corrected MLE)	71.7
nu hat (MLE)	16.01	nu star (bias corrected)	15.25
MLE Mean (bias corrected)	23.78	MLE Sd (bias corrected)	41.29
		Approximate Chi Square Value (0.05)	7.439
Adjusted Level of Significance	0.0389	Adjusted Chi Square Value	7.045

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	48.76	95% Adjusted Gamma UCL (use when n<50)	51.49

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.914	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.18	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.386	Mean of logged Data	1.235
Maximum of Logged Data	5.561	SD of logged Data	1.806

Assuming Lognormal Distribution

95% H-UCL	73.82	90% Chebyshev (MVUE) UCL	36.24
95% Chebyshev (MVUE) UCL	45.87	97.5% Chebyshev (MVUE) UCL	59.24
99% Chebyshev (MVUE) UCL	85.51		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	44.95	95% Jackknife UCL	45.88
95% Standard Bootstrap UCL	44.26	95% Bootstrap-t UCL	126.6

95% Hall's Bootstrap UCL	136.6	95% Percentile Bootstrap UCL	45.67
95% BCA Bootstrap UCL	60.82		
90% Chebyshev(Mean, Sd) UCL	62.4	95% Chebyshev(Mean, Sd) UCL	79.89
97.5% Chebyshev(Mean, Sd) UCL	104.2	99% Chebyshev(Mean, Sd) UCL	151.9

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 79.89

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Appendix H: 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

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, (1995). Contaminated Sites Sampling Design Guidelines

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 Office of Environment and Heritage (OEH), (2011). Guidelines for Consultants Reporting on Contaminated Sites

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 No.55 – Remediation of Land 1998 (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, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia