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PMM:jl

Attention: Bernardo Reiter Landa

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Dear Sirs

Due Diligence Contamination Investigation
634 - 652 High Street, 87 - 91 Union Road, Penrith

1. Introduction

This report presents the results of a Due Diligence Contamination Investigation undertaken by Douglas Partners Pty Ltd (DP) for the site at 634 - 652 High Street, 87 - 91 Union Road, Penrith (the site) as shown on the attached Drawing 1. The work was initially commissioned by Mr Matt Curnow on behalf of Toga Penrith Developments Pty Ltd (the client) and was carried out in general accordance DP's proposal SYD170044 dated 23 January 2017 and DP's general conditions of engagement.

The site located at 87-91 Union Road / 634-638 High Street in Penrith is referred to as Site 1 (Stage 1). Toga has the other site at 640-652 High Street Penrith (Site 2) which will be progressed in a separate Development Application. Toga's sites are dissected by John Tipping Grove which is a council owned road. This document has been prepared for the Development Application on Stage 1, at 87-91 Union Road / 634-638 High Street Penrith.

The proposed development at Stage 1 comprises of residential buildings, retail and associated parking. Buildings 1 and 2 are joined together by a common ground floor podium, underground three level basement and podium car parking areas.

The investigation was requested for pre-purchase due diligence purposes.

A preliminary contamination investigation report and a geotechnical investigation report for the site (or part thereof), prepared by others, were made available by the vendor as part of the due diligence process. These reports have been reviewed and summarised in this report, where relevant, as part of this due diligence contamination investigation.

The fieldwork for the investigation was undertaken in conjunction with a geotechnical investigation, which has been reported separately (DP Reference 85867.00.R.001.Rev0).

The objective of the contamination investigation was identify, within the agreed scope, the potential for significant liabilities and cost impacts associated with contamination, on the proposed development.

2. Scope of Works

The scope of work for the investigation included:

- Review of site information, as provided by the client;
- Non-intrusive geophysical scanning to locate the possible underground storage tanks (USTs) on the site;
- Review of the preliminary contamination investigation report made available;
- Site walkover to identify features and site uses, and areas of potential contamination;
- Setting out and levelling of ten bore locations;
- Drilling four geotechnical bores (BH1-BH4) with a sonic drilling rig to depths of between 16.0 m and 17.5 m. Sonic drilling utilises a core barrel that is rotated and vibrated at around 150 Hz to cause the soil to liquefy and 'flow' into the core barrel. Standard penetration tests were undertaken within the soil strata at regular depths to assess the in situ strength of the soils. Conventional HQ sized coring was then conducted to collect continuous samples of the bedrock;
- Opportunistic sampling of soils from the four geotechnical bores for testing for potential contaminants;
- Installation of groundwater wells into three of the bores (labelled BH1, BH2A and BH3) at completion of drilling, and fitting a gatic cover at the ground surface;
- Drilling of an additional six bores (BH4 to BH10) using a 3.5 tonne excavator fitted with a 150 mm solid flight auger until natural material was encountered. Soil samples were recovered at regular intervals for testing for potential contaminants;
- Laboratory analysis of selected soil samples for the following potential contaminants:
    - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
    - Total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons - TPH);
    - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene - BTEX);
    - Polycyclic aromatic hydrocarbons (PAH);
    - Phenols (total);
    - Organochlorine pesticides (OCP);
    - Organophosphate pesticides (OPP);
    - Polychlorinated biphenyls (PCB);
    - Asbestos (40 g samples for screening purposes); and
    - pH and cation exchange capacity (CEC).
- Soil QA / QC analysis including an intra-laboratory replicate, a trip spike (BTEX) and a trip blank (BTEX);

- Development and sampling of the one groundwater monitoring well (BH2) located adjacent to the USTs;
- Laboratory analysis of the groundwater sample for heavy metals, TRH, BTEX, PAH, phenols, OPP, OCP, PCB and hardness; and
- Provision of this letter report detailing the findings of the investigation.

3. Site Information

The site information extracted from the report Benviron Group (2015) *Preliminary Site Investigation, 614-652 High Street and 87-91 Union Road, Penrith* dated September 2015 (BG, 2015), corrected where appropriate, is presented in Table 1 below.

Table 1: Site Information

Item	Details
Site Address	634 - 652A High Street, 87 - 89 Union Road, and 6 John Tipping Grove, Penrith
Legal Description	Lots 1 & 2, DP1202310; Lot 1, DP544302; Lot 36, DP731213; Lot 3, DP242506; Lots 12 & 13, DP717196 and a portion of John Tipping Grove
Parish	Mulgoa
Local Government	Penrith City Council
Zoning	B4 Mixed Use
Site Area	1.44 hectares (approximately)

The site is bounded by High Street to the north, Mulgoa Road to the west, Union Road to the south and an open parking area and high density residential development and a vacant lot to the east.

The site is generally flat with a very slight slope to the west and is situated at an elevation of 28 m AHD. It is understood that stormwater flows into a drainage network across the site however pooling of water was noted across the site during recent field investigations by DP.

It is anticipated that the direction of groundwater flow would be to the west and towards the Nepean River located approximately 800 m west of the site. It is likely that stormwater at the site and region discharges to the Nepean River.

The Geology of Penrith 1:100,000 Geology Sheet indicates the site is underlain by Cranebrook Formation from the Quaternary Period comprising Gravel, sand, silt and clay. The report Geotechnique (2007) *Geotechnical Investigation, Lot 1 in DP 884193, 616 High Street Penrith* dated June 2007 (Geotechnique, 2007) refers to the site being underlain by the Wianamatta Group of rocks consisting of shale, carbonaceous claystone, laminate and sandstone. The bedrock is report to be overlain by fluvial deposits consisting of gravel sand and clay of variable thickness. The profile identified in this current investigation is discussed in Section 8.

A search of NSW Department of Land and Water Acid Sulphate Soil Risk Map indicates that the site is in a region of no known occurrence of acid sulfate soils.

A site walkover was undertaken on Monday 27 February 2017 as part of this current investigation, and the following features were noted:

- The site was occupied by a Sinclair Hyundai Car Dealership with one main building located on High Street;
- Carparking covers the majority of the site to the west of John Tipping Grove;
- Carparking and the service centre / used car salesroom are located on the site to the east of John Tipping Grove;
- The location of a bowser and USTs on the corner of High Street and John Tipping Grove are shown in the site photos and Drawing 1, attached;
- The majority of the outdoor areas are bitumen paved car parks and there is evidence of cracking and ponding on the bitumen;
- A small area of the site to the east of John Tipping Grove is unsealed and grassed; and
- Skip bins were stored at the rear (Union Ave) of the east site.

No significant changes to the site layout have been observed since February 2017, and the site has remained fenced off from the public over that period.

4. Review of Previous Reports

As part of the due diligence investigation, DP was provided with copies of BG (2015) and Geotechnique (2007). Both reports covered a larger land mass than the current investigation area, extending further to the east. BG (2015) also refers to the Geotechnique report of 2007 titled *Environmental Site Assessment for the site at 616 High Street Penrith*, however it appears that the assessment was conducted on the property to the east of the current site.

During the fieldwork for Geotechnique (2007) five bores were drilled to between 12 and 16.8 metres depth using a truck mounted drill rig and various drilling techniques. Bore descriptions provided in Geotechnique (2007) included:

- FILL (0-0.5 m) comprising fine to coarse grained brown gravelly sand, gravelly silty sand with some crushed concrete and bricks;
- ALLUVIUM (sand / silt) (between 1.8 to 3.4 m depth);
- ALLUVIUM (gravel) (between 1.8 and 13 m depth);
- CLAY (between 13 and 13.8 m); and
- SHALE bedrock (below 13 metres).

Groundwater level was assessed to be in excess of 6 m. Various geotechnical recommendations were provided in the report.

The following summarises the pertinent information and findings presented in BG (2015):

- A WorkCover search identified that several tanks were formally located on the site at 616 High Street (outside of the current site) and that these had been removed as part of the previous remediation works;
- A review of the EPA website by Benviron revealed the site was not listed on the database;
- A review of land titles indicates that the site has been owned and used for residential purposes between the early 1930s and 1960s when the sites were generally redeveloped for commercial uses as a car yard; and
- A review of aerial photographs revealed that the site has been vacant and residential up until 1961 when the site was redeveloped for commercial uses (mostly car yard uses) and it remained this way up until 2002.

BG (2007) provided the following conclusions and recommendations:

'Based on the results of this investigation it is considered that the risks to human health and the environment associated with soil contamination at the site are medium to high in the context of the proposed use of the site. The site can be made suitable for the proposed development, subject to the following recommendations:

- *A Detailed Environmental Site Investigation should be undertaken across the entire site in order to clarify the data gaps identified with this report.*
- *A hazardous materials assessment of the buildings should be undertaken prior to demolition being carried out on site.*

If during any potential site works any significant unexpected occurrence us identified site works should cease in that area, at least temporarily, and the environmental consultant should be notified immediately to set up a response to this unexpected occurrence.'

DP notes that BG (2007) does not mention the bowser or potential USTs evidenced from the operational bowser on High Street, and detected using ground penetrating radar.

5. Preliminary Conceptual Site Model

A Conceptual Site Model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e., it enables an assessment of the potential source - pathway - receptor linkages (complete pathways).

5.1 Potential Sources

Based on the previous reports and the site walkover by DP, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified.

S1 – Filling and demolition rubble: Associated with levelling, and site formation, demolition of previous buildings at the site (applies to entire site):

COPC include metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), phenols, volatile organic compounds (VOC), asbestos and synthetic mineral fibres (SMF)

S2 – Historic Land use (car yard, service centre, vehicle repair workshops, bowsers and USTs):

COPC (soil, groundwater and surface water) metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols and VOC

S3 - Off-Site Sources Commercial / industrial land to the north:

COPC (particularly in groundwater and surface water) metals, TPH, BTEX, PAH and VOC

S4 - Existing Buildings (it is possible some of the original foundations, slab and frame that were retained during the site redevelopment contain hazardous building materials):

COPC include lead, PCB, asbestos

5.2 Potential Receptors

Based on the proposed redevelopment the following potential human health and ecological receptors have been identified

Human Health Receptors:

R1 - Construction and maintenance workers;

R2 - Current and future users (commercial/industrial/residential); and

R3 - Adjacent users (commercial/industrial/high rise residential).

Environmental (Ecological) Receptors:

R4 - Groundwater (groundwater);

R5 - Surface water (Nepean River); and

R6 - Terrestrial ecology

5.3 Potential Pathways

The potential pathways for the identified receptors are as follows:

P1 - Ingestion and dermal contact;

P2 - Inhalation of dust and/or vapours;

P3 - Leaching of contaminants and vertical mitigation into groundwater;

P4 - Lateral migration of groundwater providing base flow to watercourses (Nepean River); and

P5 - Contact with terrestrial ecology.

Summary of Potential Complete Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (complete pathways). The possible pathways between the above sources (S1 to S4) and receptors (R1 to R6) are provided in Table 2 below.

Table 2: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor
<u>**Diffuse Sources**</u> **S1: Filling and demolition rubble** Metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols, VOCs, asbestos and SMF **S2 – Historic Land use (caryard , service, USTs)** COPC include metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols and VOC **S3 – Off-Site Sources Site/s** metals, TPH, BTEX, PAH and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)
	P2: Inhalation of dust and/or vapours	R3: Adjacent users (commercial)
	P3: Leaching of contaminants and vertical mitigation into groundwater	R4: Groundwater
	P4: Lateral migration of groundwater providing baseflow to watercourses (Nepean River) P5: Lateral migration of groundwater providing base flow to water bodies	R5: Surface water (Nepean River)
	P6: Contact with terrestrial ecology	R6: Terrestrial ecology
S4: Existing buildings lead, PCB, asbestos and SMF	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)

Based on the conceptual site model, DP has conducted a limited soil and groundwater investigation to assess the potential for broad scale and gross contamination at the site in relation to the historical and current land use and the presence of USTs on the site.

DP notes that as the client intends to demolish the buildings and to excavate the site for construction of the three level basement carpark, the removal of the USTs and fill on the site will be required as part of the proposed works and will result in the removal of these possible sources of contamination from the site.

6. Fieldwork

6.1 Soil Sampling and Monitoring Well Locations and Rationale

A ground penetrating radar was used to identify the presence of USTs in the north-eastern portion of the site, as shown on the attached Drawing 1. The location coincided with the location of the bowser.

The environmental fieldwork comprising drilling, well installation and soil sampling was conducted on 1, 2 and 6 March 2017. Well development and groundwater sampling was undertaken on 14 March 2017. The groundwater sampling forms are attached.

The bore locations are shown on the attached Drawing 1. Bore 2A (drilled due to premature refusal at Bore 2) was located on the hydraulic down-gradient position of the USTs, in order to assess potentially significant leaking from the UST infrastructure. The remaining bores were positioned across the site to maximise lateral coverage (with an agreed ten bores).

A groundwater monitoring well was installed into Bore 2A, in order to assess the condition of groundwater adjacent to the USTs. Groundwater monitoring wells were installed into Bores 1 and 3 for groundwater level monitoring only.

Soil samples were collected from all ten bores. Groundwater samples were collected from the well at Bore 2A.

The bores were drilled to a depth of between 1 m and 16.8 m below ground level. Selected soil samples were analysed for the chemicals of concern listed in Section 5. Samples were selected based on site observations (odour, composition etc.), and their location within the subsoil strata (*i.e.,* fill or natural).

6.2 Groundwater Wells

The three groundwater monitoring wells were constructed of 50 mm diameter acid washed Class 18 PVC casing and machine slotted well screen. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate samples.

The wells were completed with a gravel pack extending to a minimum 0.5 m above the well screen, and then a minimum 0.5 m thick bentonite plug, and backfilled to the surface. All bores were finished with a Gatic cover. Well construction details of the individual monitoring wells are included in the corresponding bore logs (attached) which should be read in conjunction with the attached explanatory notes that define classification methods and terms used to describe the soils and rocks.

6.3 Soil Sampling Procedures

Environmental sampling was performed with reference to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on boree logs (attached) and samples selected for laboratory analysis were recorded on DP chain-of-custody (COC) sheets (attached). The general soil sampling procedure comprised:

- Soil samples were recovered primarily using the SPT sampler, or directly from augers where SPT sampling was not possible. The SPT shoe was cleaned with Decon 90 between samples and lead augers were replaced between samples;
- Use of disposable sampling equipment including disposal nitrile gloves;
- Transfer of samples into laboratory-prepared glass jars and capping immediately with Teflon lined lids;
- Labelling of sampling containers with individual and unique identification, including project number, sample location and sample depth;
- Field screening of replicate soil samples collected in sealed plastic bags for Total Photo-ionisable Compounds (TOPIC) using a calibrated photo-ionisation detector (PID); and
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory.

Envirolab Services Pty Ltd (Envirolab), accredited by NATA for the analysis undertaken, was employed to conduct the sample analysis. The laboratory is required to carry out in-house QC procedures.

6.4 Groundwater Sampling

Subsequent to installation, the groundwater monitoring well at Bore 2A was developed by continuous pumping until dry, or until three well volumes were removed, or until the water was free of sediment/mud as determined by the environmental scientist on site. The purpose of well development was to remove as far as practicable sediment introduced via drilling and to facilitate the connection of the well to the local groundwater regime.

All re-used equipment was decontaminated between samples using a 3% solution of Decon 90 and rinsing with deionised water. The wells were micro-purged using a low flow pump (Geopump) until field parameters (pH, temperature, dissolved oxygen (DO), conductivity, total dissolved solids (TDS) and redox) had stabilised. Once field parameters had stabilised groundwater samples were collected using a low flow pump with adjustable flow rate, with disposable polyethylene tubing using the low flow pump. Samples were placed with a minimum of aeration into appropriately preserved bottles.

Groundwater samples obtained for metal analysis were filtered in the field using an in-line disposable 0.45 µm filter that was changed between samples.

Sample handling and transport to Envirolab for analysis was conducted as described for soil sampling.

6.5 Analytical Rationale

The analytical scheme for soil and groundwater samples was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of potential concern identified by the CSM, being metals, TRH, BTEX, PAH, OCP, OPP, PCB, phenols, VOC and asbestos. The results of the analytical testing were compared with the adopted site assessment criteria (SAC) discussed in Section 7.

In terms of soil samples, the surface, near surface and fill samples were selected for analysis, being the most likely samples to contain contaminants at the sampled locations.

7. Site Assessment Criteria

Should the site be acquired, it is proposed for a new mixed use residential, commercial and retail floor space with a three level basement carpark. A high density residential land use setting has therefore been adopted as the land use in determining the SAC, being the most sensitive (in terms of human and ecological exposure) of the proposed land uses.

Soil and groundwater analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). NEPC (2013) is endorsed by the NSW EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g., Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

7.1 Soils

7.1.1 Health Investigation and Screening Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HILs are applicable to assessing health risk arising via all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HILs apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSLs have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HIL and HSL are:

- **HIL-B** - Residential with minimal opportunities for soil access;
- **HSL-A & B -** Low –high density residential (for vapour intrusion); and
- **HSL-B -** Residential (high-density) (for direct contact).

It is noted that health screening levels for intrusive maintenance workers are listed in CRC CARE (2011), however, these have not be used as SAC for the current investigation as the screening levels are higher than HSL-B and therefore are considered unlikely to be risk drivers for further assessment.

The HSL adopted are predicated on the inputs summarised in Table 3.

Table 3: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation) / Direct contact *	Both potential exposure pathways identified in the CSM. It is noted that direct contact HSLs are generally not the risk drivers for further site assessment for the same contamination source as the HSLs for vapour intrusion (NEPC, 2013).
Soil Type	Sand	Sand filling or sandy filling types were recorded at the site and is the most conservative medium for soil HSLs.
Depth to contamination	0 m to <1 m	Filling comprising sand was present within the top 1 m at the site.

* Developed by CRC CARE (2011)

The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 4.

Table 4: Health Investigation and Screening Levels (HIL and HSL) in mg/kg Unless Otherwise Indicated

Contaminants		HIL- B and HSL- B Direct Contact	HSL- B[3] Vapour Intrusion
Metals	Arsenic	500	-
	Cadmium	150	-
	Chromium (VI)	500	-
	Copper	30,000	-
	Lead	1,200	-
	Manganese	14,000	-
	Mercury (inorganic)	120	-
	Nickel	1,200	-
	Zinc	60,000	-
PAH	Benzo(a)pyrene TEQ[1]	4	-
	Naphthalene	2,200	3
	Total PAH	400	-
TRH	C6 – C10 (less BTEX) [F1]	5,600	45
	>C10-C16 (less Naphthalene) [F2]	4,200	110
	>C16-C34 [F3]	5,800	-
	>C34-C40 [F4]	8,100	-
BTEX	Benzene	140	0.5
	Toluene	21,000	160
	Ethylbenzene	5,900	55
	Xylenes	17,000	40
Phenol	Pentachlorophenol (used as an initial screen)	130	-
OCP	Aldrin + Dieldrin	10	-
	Chlordane	90	-
	DDT+DDE+DDD	600	-
	Endosulfan	400	-
	Endrin	20	-
	Heptachlor	10	-
	HCB	15	-
	Methoxychlor	500	-
OPP	Chlorphyrifos	340	-
PCB[2]		1	-
Cyanide		300	-

Notes:

1 sum of carcinogenic PAH
2 non dioxin-like PCBs only
3 HSL-D vapour intrusion criteria may apply if basement car-park is constructed across the whole site footprint

7.1.2 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g., motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from the *Interactive (Excel) Calculation Spreadsheet* are shown in the following Table 5.

The following assumptions have been used to determine the EILs:

- A protection level of 80% for urban residential areas and public open space has been adopted;
- The EILs will apply to the top 2 m of the soil profile which corresponds to the root zone and habitation zone of many species;
- Given the likely predominant source of soil contaminants (i.e., historical site uses / fill) the contamination is considered as “aged” (>2 years);
- ABCs have been derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters of NSW for the State in which the site is located, and low for traffic volumes; and
- Location specific pH and CEC values have been used as input parameters from three locations (BH1, BH4 and BH8). The average values obtained from these locations were pH 8.4 and CEC 15.5 cmol_c/kg, respectively.

Table 5: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL	Comments
Metals	Arsenic	100	*Adopted pH of 8.4 and CEC of 15.5 cmol$_c$/kg; **A conservative assumed clay content of 10% was adopted.
	Copper*	230	
	Nickel*	230	
	Chromium III**	200	
	Lead	1100	
	Zinc*	690	
PAH	Naphthalene	170	
OCP	DDT	180	

7.1.3 Ecological Screening Levels - Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and benzo(a)pyrene. Site specific data and assumptions as summarised in Table 6 have been used to determine the ESL. The adopted ESL, from Table 1B (6), Schedule B1 of NEPC (2013) are shown in Table 7.

Table 6: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Residential	Proposed land use is mixed use residential, commercial and retail floor space with a three level basement carpark.
Soil Texture	Coarse	Site soils include sand in filling, and coarse is the most conservative medium for soil ESLs.

Table 7: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 - C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	45^	
PAH	Benzo(a)pyrene	0.7	

^ ESL for fine soils adopted as a more conservative criterion.

7.1.4 Management Limits - Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B (7), Schedule B1 of NEPC (2013) are shown in the following Table 8. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential land uses apply; and
- Site soils include sand both in natural soils and filling. A “coarse” soil texture has been adopted and is the most conservative texture for soil Management Limits.

Table 8: Management Limits in mg/kg

Analyte		Management Limit
TRH	C_6 - C_{10} (F1) #	700
	$>C_{10}$-C_{16} (F2) #	1000
	$>C_{16}$-C_{34} (F3)	2500
	$>C_{34}$-C_{40} (F4)	10,000

\# Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

7.1.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and / or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of this investigation, rather, the presence or absence of asbestos, at a limit of reporting of 0.1 g/kg, has been adopted for this assessment as an initial screen.

7.2 Groundwater

The potential receptors of impacted groundwater from the site include:

- Localised groundwater (freshwater); and
- Open water bodies (Nepean River).

Given no registered domestic groundwater bores on site, ingestion via drinking water is excluded as a pathway to human receptors.

7.2.1 Groundwater Investigation Levels

The Groundwater Investigation Levels (GIL) adopted in NEPC (2013) are based on:

- *Australian Drinking Water Guidelines* 2011 (ADWG);
- *Guidelines for Managing Risk in Recreational Waters* 2008 (GMRRW); and
- *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality* 2000 (ANZECC & ARMCANZ).

The adopted GIL for the analytes included in the assessment, and the corresponding source documents, are shown in Table 9.

Table 9: Groundwater Investigation Levels (in µg/L except metals)

Analyte		NEPC (2013) Fresh Waters [a]	Comments
Metals (mg/L)	Arsenic (V) Cadmium Chromium (VI) Copper Lead Manganese Mercury (total) Nickel Zinc	0.013 0.0.0002 0.001 0.0014 0.0034 1.9 0.00006 0.011 0.008	
PAH	Naphthalene Benzo(a)pyrene	16 -	
BTEX	Benzene Toluene Ethylbenzene Xylene (o) Xylene (p) Xylenes (Total)	950 - - 350 200 -	
OCP	Chlordane DDT Endosulfan Endrin Heptachlor Aldrin + Dieldrin Lindane Heptachlor Expoxide	0.03 0.006 0.03 0.01 0.01 - 0.2 -	
PCB	Aroclor 1242 Aroclor 1254	0.3 0.01	
Phenols	Pentachorophenol (used as an initial screen)	3.6	
VOC	Chloroform	370 [b]	Given the exhaustive list of VOC contaminants, only those VOC concentrations detected above the laboratory reporting limits and with GILs have been included in this table
Non-metallic inorganics	Cyanide	7	

Notes:

a Investigation levels apply to typically slightly-moderately disturbed systems

b In cases where no high reliability trigger values are provided, the low reliability trigger values provided in ANZECC &ARMCANZ (2000) were used as screening levels

Hardness of 3100 mgCaCo3/L registered for groundwater samples from this site.

7.2.2 Health Screening Levels - Petroleum Hydrocarbons

The generic HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HSL are:

- **HSL- AB** - Low - high density residential.

In addition, the HSL adopted is predicated on the following inputs prescribed in Table 10.

Table 10: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Groundwater vapour intrusion (inhalation)	Exposure pathway via groundwater vapour intrusion affects the adopted HSL.
Soil Type	Sand	Site soils include sand in filling and is the most conservative medium for soil HSLs.
Depth to contamination	2 - <4 m	Whilst recorded depths to groundwater (prior to sampling) of 5.5 m (Section 8), given the depth of the excavation for the development is currently unknown depth to groundwater has been assumed to be <2 m. As no HSLs are available for depths to contamination of <2 m, criteria for 2 - <4 m have been used as an initial screen.

The adopted groundwater HSL for vapour intrusion, from Table 1A(4), Schedule B1 of NEPC (2013) are shown in the following Table 11.

Table 11: Groundwater Health Screening Levels (HSL) for Vapour Intrusion (µg/L)

Analyte		HSL- AB
TRH	C_6 - C_{10} (less BTEX) [F1]	1000 (10*)
	>C_{10}-C_{16} (less Naphthalene) [F2]	1000 (50*)
BTEX	Benzene	800 (1*)
	Toluene	NL (1*)
	Ethylbenzene	NL (1*)
	Xylene	NL (3*)
PAH	Naphthalene	NL (0.2*)

Note: NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

*LOR adopted as initial screen

7.3 Preliminary Waste Classification and VENM Assessment

The preliminary waste classification was generally conducted with reference to the six step process as set out in NSW EPA *Waste Classification Guidelines* 2014 (EPA, 2014) which is summarised in Table 12 below.

Table 12: Six Step Classification

Step	Classification	Rationale
1. Is it special waste?	No	Waste not considered to be clinical, asbestos or tyre waste.
2. Is it liquid waste?	No	Waste composed of soil matrix (*i.e.,* no liquids)
3. Is the waste "pre-classified"?	No	Waste not observed to contain coal tar, batteries, lead paint or dangerous goods containers.
4. Does the waste have hazardous waste characteristics?	No	Waste not observed to / or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances.
5. Chemical Assessment	Undertaken	Refer to Section 9.1
6. Is the waste putrescible?	No	All observed components of material were composed of materials pre-classified as non-putrescible (*i.e.,* soils). Organic content is assessed to be minor.

Contaminant threshold (CT1, CT2, SCC1 and SCC2) values for the waste classification are presented in the attached Table A1.

With respect to natural materials underlying the filling, NSW EPA (2014) defines Virgin Excavated Natural Material (VENM) as:

"*natural material (such as clay, gravel, sand, soil or rock fines):*

- *That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or process residues, as a result of industrial, commercial, mining or agricultural activities;*
- *That does not contain any sulfidic ores or soils or any 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."

No other criteria for VENM has been approved. Information provided on the NSW EPA website (as on 22 December 2016) further specifies that:

- Generators of VENM must assess the past and present activities on the site. The possibility that a previous land use has caused contamination of a site must be considered when assessing whether an excavated material is VENM;
- By definition, VENM cannot contain any other waste, or be 'made' from processed soils. Excavated material that has been processed in any way cannot be classified as VENM; and

- Classification of excavated material as VENM requires certainty that all aspects of the definition are met. Chemical testing may be required to ascertain whether an excavated material is contaminated with manufactured chemicals or process residues, or whether it contains sulfidic ores or soils.

No further NSW EPA guidelines or Gazettal notices have been published/issued that provide additional criteria for assessing VENM.

General reference was made to published background ranges for Australian soils presented in the attached Table A1.

8. Field Work Observations

The sequence of subsurface materials encountered is described below in increasing depth order:

PAVEMENT:	Typically 20-50 mm of asphaltic concrete or concrete. BH1, BH6 and BH9 encountered no pavement.
FILLING:	Brown and grey sandy gravel filling and clayey sand to depths of 0.1 m to 0.9 m.
Silty CLAY:	Generally stiff, brown silty clay between depths of 0.2 to 2.5 m in BH1, BH3, BH5, BH9 and BH10.
Clayey SAND / Silty SAND:	Generally loose to medium dense, brown, clayey sand and silty sand between depths of 0.1 to 3.5 m in BH1, BH2, BH3, BH6, BH7 and BH8.
GRAVEL	Dense to very dense, brown and grey gravel within a matrix of silty sand below depths of 1.7 m to 3.5 m.
LAMINITE:	Extremely low to low strength laminite (interbedded sandstone and siltstone) below depths of 12.1 m to 13.8 m. Medium and high strength, slightly weathered to fresh laminite below depths of 12.8 m to 14.3 m.

Recorded water levels in the monitoring wells installed at Bores 1, 2A and 3 are shown in Table 13 together with the dates the wells were installed, purged and readings taken.

Non-intrusive geophysical scanning has identified the presence of two USTs in close proximity (possibly in the same pit) at High Street, Penrith. The location is shown in Photographs 9 and 10, and Drawing 1, attached.

Table 13: Summary of Groundwater Measurements in Monitoring Wells

Borehole (Well)	Well Depth (m)	Measured Depth (m) of Groundwater in Monitoring Wells	
		1 March 2017 (During Drilling)	14 March 2017 (Prior to Sampling)
1	16	Groundwater observed at 7 m	NA
2	16	Groundwater observed at 9 m	7.11
3	16.8	No groundwater observed before 4 m	NA

During purging and sampling, no phase separated hydrocarbons or odours were detected. A groundwater sampling form was completed during development and sampling and is attached.

9. Analytical Results Summary

The results of the laboratory analysis undertaken are presented in the following tables attached.

Table A1: Soil Results; and

Table A2: Groundwater Results.

The full NATA laboratory certificates of analysis together with the chain of custody and sample receipt information are attached.

Reported concentrations of BTEX, phenols, OCP, OPP, PCB and asbestos in the soil samples were below the laboratory limits of reporting (LOR) and therefore the SAC. Reported concentrations of TRH were below the SAC for all samples.

Reported concentrations of PAH were below SAC with the exception of

- B(a)P in sample BH10/0.5 - concentration 1.2 mg/kg exceeded the ESL of 0.7 mg/kg

Reported concentrations of metals were below SAC with the exception of:

- Copper in sample BH10/0.5 (2900 mg/kg) and replicate BH10/0.5 (500 mg/kg) - exceeding the EIL (230 mg/kg);
- Lead in sample BH10/0.5 (4400 mg/kg) and replicate BH10/0.5 (3500 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg); and
- Zinc in sample BH10/0.5 (1400 mg/kg) - exceeding the EIL of 690 mg/kg.

Reported concentrations of BTEX, OCP, OPP, PCB, PAH, As, Cd, Cr, Cu, Pb, Hg and Ni in the groundwater samples were below the LOR and therefore the SAC. Reported concentrations of TRH, and zinc were below the SAC.

9.1 Preliminary Waste Classification

All results for soil samples analysed were below the LOR and / or less than the General Solid Waste (GSW) criteria without leaching (CT1) with the exception of exceedances of the following samples:

Lead (CT1: 100 mg/kg):

- BH1/0.5: 110 mg/kg; and
- Replicate BH1/0.5: 170 mg/kg.

Lead (CT2: 400 mg/kg):

- BH10/0.5: 4400 mg/kg; and
- Replicate BH10/0.5: 3500 mg/kg.

Nickel (CT1: 40 mg/kg):

- BD1: 58 mg/kg; and
- BH5/0.5: 44 mg/kg; and
- BH8/0.5: 51 mg/kg.

B(a)P (CT1:0.8 mg/kg):

- BH10/0.5: 1.2 mg/kg.

Selected samples based on location and highest concentrations were analysed using TCLP to determine leachable concentrations. The TCLP results indicated that all samples recorded concentrations within the TCLP1 and SCC1 contaminant thresholds for GSW for metals, with the exception of fill in Bore 10/0.5 with TCLP (Pb) of 44 mg/L which exceeded the SCC2 (23 mg/L). Consequently, filling in the vicinity of BH10 from 0.2 to 0.8 m described as brown silty clay filling with some sand and gravel, has been preliminarily classified separately from the remaining fill at the site.

Based on the results, the filling material encountered at the site is preliminarily classified for off-site disposal purposes as General Solid Waste (non-putrescible), with the exception of the following material:

- Filling - Brown silty clay filling with some sand and gravel, as observed in Bore 10 from 0.2 to 0.8 m is which is classified as Hazardous Waste based on the TCLP results for lead.

DP recommends additional in-situ sampling prior to excavation with particular focus on identification of the material identified in BH10 to confirm waste classification following demolition of structures and removal of hardstand from the site.

9.2 Preliminary VENM Assessment

Three samples collected from natural soils were tested and recorded concentrations within ANZECC background ranges (Table A1). In conjunction with visual field observations, the natural laminite as described in Section 6 are consistent with Virgin Excavated Natural Material (VENM). It is noted that if VENM is to be re-used on a receiver site, VENM should be checked to comply with the receiving site's requirements.

10. Conclusions and Recommendations

Based on the scope of works undertaken in this due diligence contamination investigation, and the subsequent results, it is considered that there are not likely to be any significant contamination risks to human health or the ecology associated with the site. The site can be made suitable for the proposed development, subject to the following:

- The intrusive investigations undertaken were limited and additional investigations will be required to comply with SEPP55 as part of any future development application. The additional investigations will need to provide additional site coverage for both soils and groundwater, with respect to a proposed development layout, and it would be beneficial to more thoroughly identify the soil waste classifications in areas of proposed bulk excavation;
- A remediation action plan (RAP) will be required to document the remediation and validation process associated with the two USTs and associated infrastructure, the lead contaminated soil identified in this current investigation, and any other contaminants identified through the additional investigations recommended above. The RAP will also document the management process associated with any retained fill materials, given the reported ecological investigation and screening level exceedances;
- A pre-demolition hazardous building materials survey must be undertaken prior to demolition of the existing structures and hardstands. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the then current legislation;
- Incorporation of an unexpected finds protocol in the site construction environmental management plan and the RAP; and
- Validation of any remediation undertaken, culminating in a validation report declaring that the site is suitable for the proposed development.

11. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at 634 - 652A High Street, 87 - 89 Union Road, and 6 John Tipping Grove, Penrith in accordance with DP's proposal SYD170044 dated 23 January 2017. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Toga Penrith Developments Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building materials which may contain asbestos were noted on the site.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to parts of the site being inaccessible (below the building footprint). It is therefore considered possible that hazardous building materials, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

p.p.

Paula Maurici
Environmental Scientist

Paul Gorman
Principal

Attachment A:	Notes About this Report
Attachment B:	Drawing 1
Attachment C:	Site Photographs
Attachment D:	Borehole Logs and Descriptive Notes
Attachment E:	Laboratory Certificates, Sample Receipt Advice & Chain of Custody Documentation
Attachment F:	Tables A1 and A2 - Laboratory Test Results
Attachment G:	Quality Assurance and Quality Control Procedures
Attachment H:	Groundwater Sampling Form

Attachment A

Notes About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

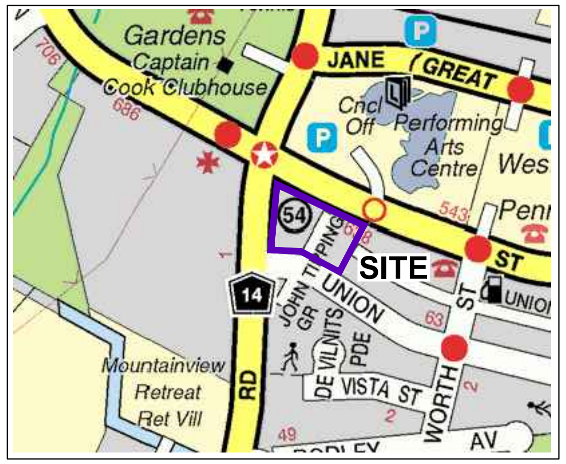
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Attachment B

Drawing 1



Locality Plan

NOTE:

1: Base image from Nearmap.com
(Dated Feb. 2017)

2: Test locations are approximate only and were
located using hand-held GPS.

0 10 20 30 40 50 75 100m

1:1000 @ A3

LEGEND

⊕ Borehole location

W Groundwater monitoring well

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Toga Development and Construction Pty Ltd		
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: 1:1000 @ A3	DATE: 31.3.2017	

TITLE: **Locations of Boreholes and Wells**

Proposed Mixed Use Development, 634-652A High Street,

87-89 Union Road and 6 John Tipping Grove, PENRITH

N

PROJECT No: 85867.01

DRAWING No: 1

REVISION: 0

P:\85867.01 - PENRITH Due Diligence Enviro\7.0 Drawings\7.2 Out\85867.01.D.001.dwg, 12/04/2017 7:01:23 AM

Attachment C

Site Photographs

Photo 1 - bitumen carpark

Photo 2 - Bitumen carpark

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT:	85867.01
	Due Diligence Report	PLATE No:	1
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV:	A
	CLIENT: Toga Development and Construction P/L	DATE:	27-Feb-17

Photo 3 - bitumen carpark

Photo 4 - Bitumen carpark

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 2
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Photo 5 - bitumen carpark with dips and ponding

Photo 6 - Bitumen carpark showing cracked broken areas

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 3
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Photo 7 - unsealed area behind service/sales building on High Street

Photo 8 - service and repairs depot to east of John Tipping Grove

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 4
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17


Photo 9 - Bowser at front ot used car building on High Street

Photo 10 - Marking of UST locations on High Street

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 5
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Photo 11 - Drill rig on site in carpark

Photo 12 - Drill rig on site in carpark

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 6
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Photo 13 - Drilling operations on unsealed area behind building

Photo 14 - Drilling underway in carpark

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 7
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Photo 15 - Drill rig near corner of High and Joh Tipping Grove

Douglas Partners Geotechnics / Environment / Groundwater	Site Photographs	PROJECT: 85867.01
	Due Diligence Report	PLATE No: 8
	640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith	REV: A
	CLIENT: Toga Development and Construction P/L	DATE: 27-Feb-17

Attachment D

Borehole Logs and Descriptive Notes

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

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

  4,6,7
  N=13
- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100\text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

July 2010

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General

■ Asphalt


Road base

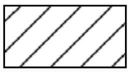

Concrete


Filling

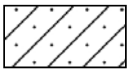
Soils


Topsoil

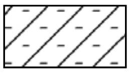

Peat


Clay

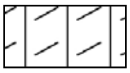

Silty clay

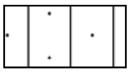

Sandy clay

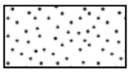

Gravelly clay

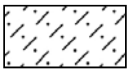

Shaly clay

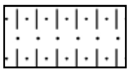

Silt


Clayey silt

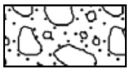

Sandy silt


Sand


Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

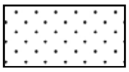

Talus

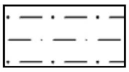
Sedimentary Rocks

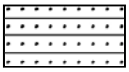

Boulder conglomerate

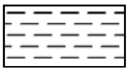

Conglomerate


Conglomeratic sandstone

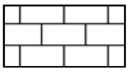

Sandstone


Siltstone

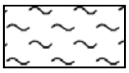

Laminite

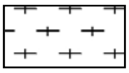

Mudstone, claystone, shale

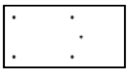
■ Coal


Limestone

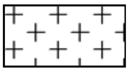
Metamorphic Rocks

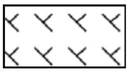

Slate, phyllite, schist

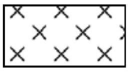

Gneiss


Quartzite

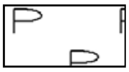
Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia

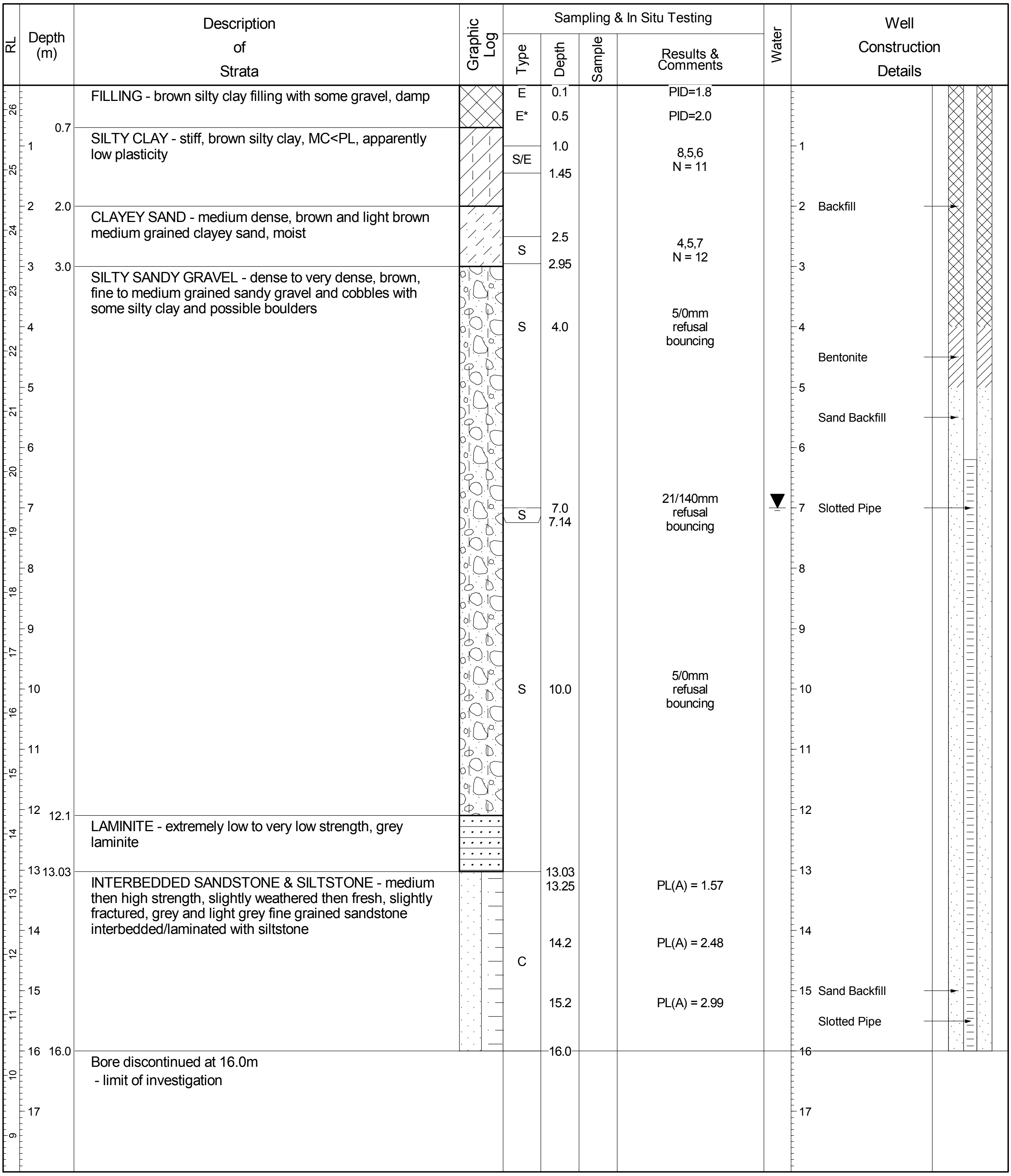

Porphyry

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.4 AHD
EASTING: 285841
NORTHING: 6263031
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85867.00
DATE: 6-3-2017
SHEET 1 OF 1



Depth (m)	Description of Strata	Type	Depth	Results & Comments	Water	Well Construction Details
	FILLING - brown silty clay filling with some gravel, damp	E	0.1	PID=1.8		
		E*	0.5	PID=2.0		
0.7	SILTY CLAY - stiff, brown silty clay, MC<PL, apparently low plasticity	S/E	1.0 1.45	8,5,6 N = 11		
2.0	CLAYEY SAND - medium dense, brown and light brown medium grained clayey sand, moist	S	2.5 2.95	4,5,7 N = 12		Backfill
3.0	SILTY SANDY GRAVEL - dense to very dense, brown, fine to medium grained sandy gravel and cobbles with some silty clay and possible boulders	S	4.0	5/0mm refusal bouncing		Bentonite Sand Backfill
		S	7.0 7.14	21/140mm refusal bouncing	▼	Slotted Pipe
		S	10.0	5/0mm refusal bouncing		
12.1	LAMINITE - extremely low to very low strength, grey laminite					
13.03	INTERBEDDED SANDSTONE & SILTSTONE - medium then high strength, slightly weathered then fresh, slightly fractured, grey and light grey fine grained sandstone interbedded/laminated with siltstone	C	13.03 13.25	PL(A) = 1.57		
			14.2	PL(A) = 2.48		
			15.2	PL(A) = 2.99		Sand Backfill Slotted Pipe
16.0	Bore discontinued at 16.0m - limit of investigation		16.0			

RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 12.5m

TYPE OF BORING: Sonic to 13.0m; HQ-Coring to 16.0m

WATER OBSERVATIONS: Free groundwater observed at 7.0m during drilling

REMARKS: *BD2 taken at 0.5m. Standpipe installed to 16.0m (bentonite 4.0-5.0m; screen 6.2-16.0m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

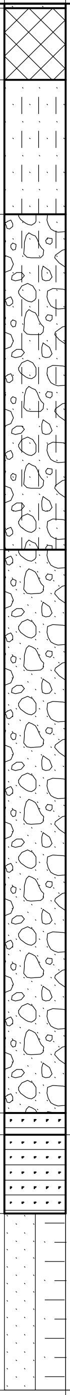
BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

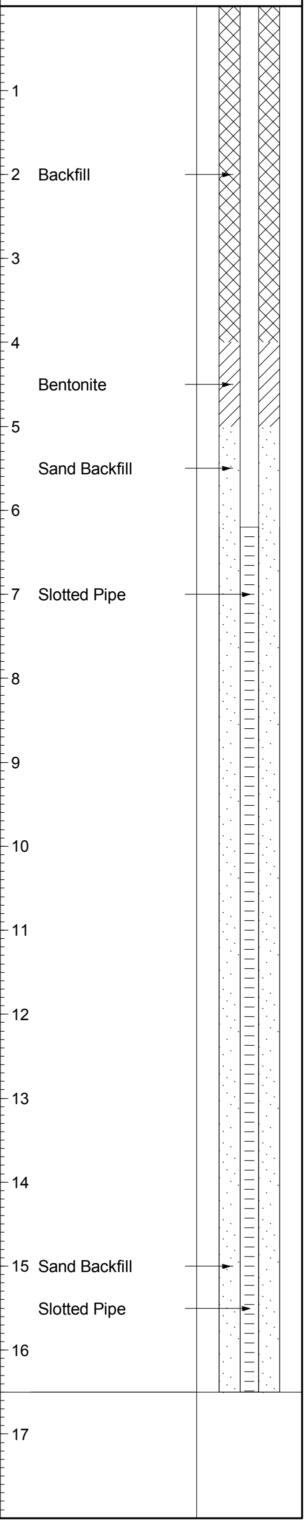
SURFACE LEVEL: 27.3 AHD
EASTING: 285921
NORTHING: 6263009
DIP/AZIMUTH: 90°/--

BORE No: 2A
PROJECT No: 85867.00
DATE: 3 - 6/3/2017
SHEET 1 OF 1

Depth (m)	Description of Strata	Type	Depth	Sample	Results & Comments	Water
0.05	CONCRETE					
0.9	FILLING - light grey-brown, clayey sand, crushed sandstone and roadbase gravel filling					
2.5	SILTY SAND - loose, orange-brown, fine to medium grained silty sand, moist					
6.5	GRAVELLY SILTY SAND/SILTY SANDY GRAVEL - dense, light brown, fine to medium grained sub-rounded to sub-angular river gravel and silty sand, moist					
13.2	SANDY GRAVEL - dense, light brown, fine to medium sandy gravel and cobbles (subrounded, rounded and angular), moist					▼ 14-03-17
13.46	LAMINITE - extremely low to very low strength, grey laminite		13.46			
14.4	LAMINITE - medium strength, slightly weathered, fractured, grey and light grey laminite					
16.5	INTERBEDDED SANDSTONE & SILTSTONE - high strength, fresh, slightly fractured to unbroken, grey and light grey, fine grained sandstone (60%) interbedded/interlaminated with siltstone (40%)	C	14.55 15.65 16.5		PL(A) = 0.73 PL(A) = 1.62	
	Bore discontinued at 16.5m					



Well Construction Details



RIG: Sonic Rig **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 13.46
TYPE OF BORING: 150mm diameter solid flight auger to 1.5m
WATER OBSERVATIONS: No free groundwater observed before adding water at 6.0m. Water measured in standpipe at 7.1m on 14/3/17
REMARKS: Standpipe installed to 16.5m (bentonite 5.0-5.5m; screen 6.2-16.5m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

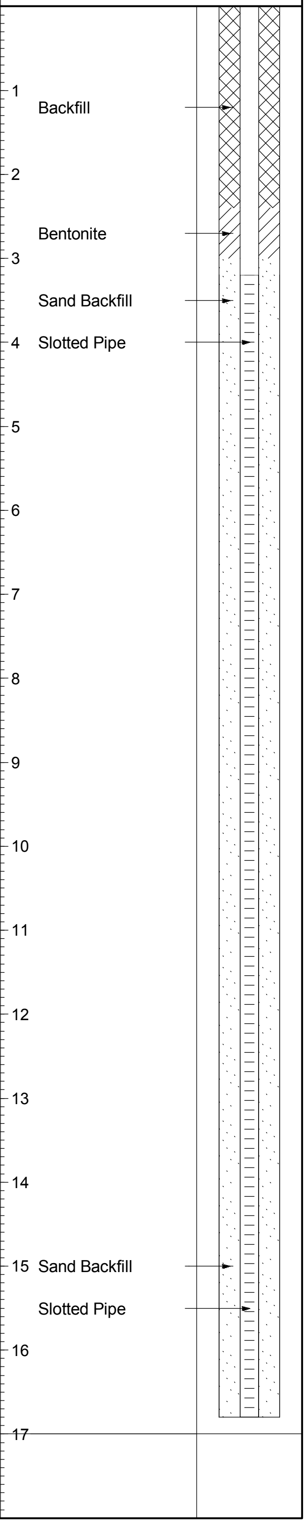
CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.9 AHD
EASTING: 285831
NORTHING: 6262952
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85867.00
DATE: 1-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Depth	Sample	Results & Comments	Water
	0.02	ASPHALTIC CONCRETE		E*	0.1		PID<1	
	0.4	FILLING - brown silty clay filling with some gravel and cobbles and a trace of sand, damp - with some brick rubble from 0.3m		E	0.5		PID<1	
	0.8	FILLING - brown silty clay filling with some brick fragments		S/E	1.0 1.45		3,2,4 N = 6 PID<1	
		SILTY CLAY - firm, brown silty clay, MC<PL, apparently low plasticity						
	2.5	CLAYEY SAND - loose to medium dense, brown and light brown clayey sand, damp to moist		S	2.5 2.95		5,4,4 N = 8	
	3.5	SILTY SANDY GRAVEL - dense to very dense, brown and grey fine to medium sandy gravel and cobbles with some silty clay and possible boulders		S	4.0 4.02		5/20mm refusal bouncing	
				S	7.0 7.02		4/10mm refusal bouncing	
				S	10.0		5/10mm refusal bouncing	
	12.2	LAMINITE - extremely low to very low strength, grey laminite						
	12.85	SHALE - medium strength, slightly weathered, fractured then slightly fractured, grey shale with some fine sandstone laminations			12.85 12.9		PL(A) = 0.5	
					13.6		PL(A) = 0.98	
	13.95	INTERBEDDED SANDSTONE & SILTSTONE - high and very high strength, fresh, unbroken, light grey to grey, fine grained sandstone (50%) interbedded with siltstone (50%)		C	14.2		PL(A) = 3.74	
					15.1		PL(A) = 2.86	
	15.65	LAMINITE - medium strength, fresh, unbroken, light grey to grey laminite with approximately 25% fine grained sandstone laminations		C	15.65 16.2		PL(A) = 0.93	
	17.0	Bore discontinued at 17.0m			17.0			

Well Construction Details



RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** 115m to 12.85m
TYPE OF BORING: Sonic to 12.85m; HQ-Coring to 17.0m
WATER OBSERVATIONS: No free groundwater observed before adding water at 4.0m
REMARKS: Standpipe installed to 16.8m (screen 3.0-16.8m; bentonite 2.4-3.0m; backfill to GL with gatic cover)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.4 AHD
EASTING: 285841
NORTHING: 6263031
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85867.00
DATE: 6-3-2017
SHEET 1 OF 2

Depth (m)	Description of Strata	Degree of Weathering EW HW MW SW FS FR	Graphic Log	Rock Strength Ex Low, Very Low, Low, Medium, High, Very High, Ex High	Water	Fracture Spacing (m) 0.01 0.05 0.10 0.50 1.00	Discontinuities B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	FILLING - brown silty clay filling with some gravel, damp							E E*			PID=1.8 PID=2.0
0.7	SILTY CLAY - stiff, brown silty clay, MC<PL, apparently low plasticity							S/E			8,5,6 N = 11
2.0	CLAYEY SAND - medium dense, brown and light brown medium grained clayey sand, moist							S			4,5,7 N = 12
3.0	SILTY SANDY GRAVEL - dense to very dense, brown, fine to medium grained sandy gravel and cobbles with some silty clay and possible boulders				▼			S S S			5/0mm refusal bouncing 21/140mm refusal bouncing 5/0mm

RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 12.5m

TYPE OF BORING: Sonic to 13.0m; HQ-Coring to 16.0m

WATER OBSERVATIONS: Free groundwater observed at 7.0m during drilling

REMARKS: *BD2 taken at 0.5m. Standpipe installed to 16.0m (bentonite 4.0-5.0m; screen 6.2-16.0m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

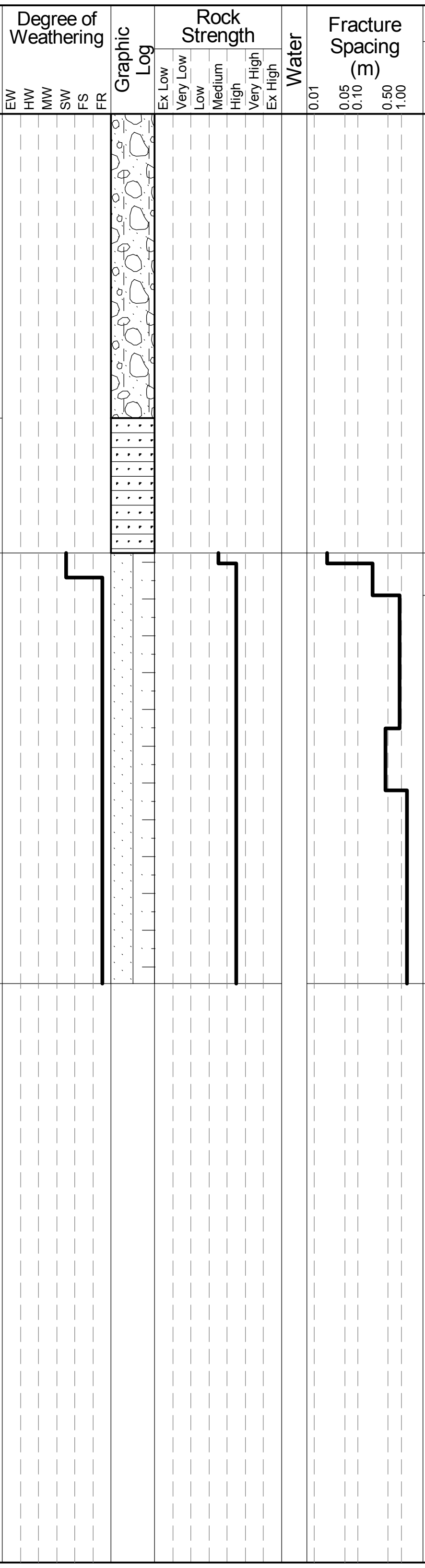
Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.4 AHD
EASTING: 285841
NORTHING: 6263031
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85867.00
DATE: 6-3-2017
SHEET 2 OF 2



RL	Depth (m)	Description of Strata	Discontinuities B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
16 15	11 12	SILTY SANDY GRAVEL - dense to very dense, brown, fine to medium grained sandy gravel and cobbles with some silty clay and possible boulders *(continued)*					refusal bouncing
14	12.1	LAMINITE - extremely low to very low strength, grey laminite	Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
13 12 11	13.03 14 15	INTERBEDDED SANDSTONE & SILTSTONE - medium then high strength, slightly weathered then fresh, slightly fractured, grey and light grey fine grained sandstone interbedded/laminated with siltstone	13.08-13.1m: B0°- 5°, cly 13.32m: J25° 14.42m: B5°, cly, 2m 14.67m: J60°	C	100	99	PL(A) = 1.57 PL(A) = 2.48 PL(A) = 2.99
10 9 8 7	16.0 17 18 19	Bore discontinued at 16.0m - limit of investigation					

RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 12.5m

TYPE OF BORING: Sonic to 13.0m; HQ-Coring to 16.0m

WATER OBSERVATIONS: Free groundwater observed at 7.0m during drilling

REMARKS: *BD2 taken at 0.5m. Standpipe installed to 16.0m (bentonite 4.0-5.0m; screen 6.2-16.0m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)


Douglas Partners
Geotechnics | Environment | Groundwater
Project No: 85867.00
BH ID: BH 1
Depth: 13.03 - 16.00 m
Core Box No.: 1
85867.00 PENRITH 06/03/17 BH1 START CORING 13.03m
13.03
14
15

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285921
NORTHING: 6263009
DIP/AZIMUTH: 90°/--

BORE No: 2A
PROJECT No: 85867.00
DATE: 3 - 6/3/2017
SHEET 1 OF 2

Depth (m)	Description of Strata	Water
0.05	CONCRETE	
	FILLING - light grey-brown, clayey sand, crushed sandstone and roadbase gravel filling	
0.9	SILTY SAND - loose, orange-brown, fine to medium grained silty sand, moist	
2.5	GRAVELLY SILTY SAND/SILTY SANDY GRAVEL - dense, light brown, fine to medium grained sub-rounded to sub-angular river gravel and silty sand, moist	
6.5	SANDY GRAVEL - dense, light brown, fine to medium sandy gravel and cobbles (subrounded, rounded and angular), moist	▼ 14-03-17 (approx. 7.1 m)

Column headings: RL; Depth (m); Description of Strata; Degree of Weathering (EW HW MW SW FS FR); Graphic Log; Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High); Water; Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00); Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault); Sampling & In Situ Testing (Type, Core Rec. %, RQD %, Test Results & Comments)

RL scale: 27, 26, 25, 24, 23, 22, 21, 20, 19, 18; Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9

RIG: Sonic Rig **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 13.46
TYPE OF BORING: 150mm diameter solid flight auger to 1.5m
WATER OBSERVATIONS: No free groundwater observed before adding water at 6.0m. Water measured in standpipe at 7.1m on 14/3/17
REMARKS: Standpipe installed to 16.5m (bentonite 5.0-5.5m; screen 6.2-16.5m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

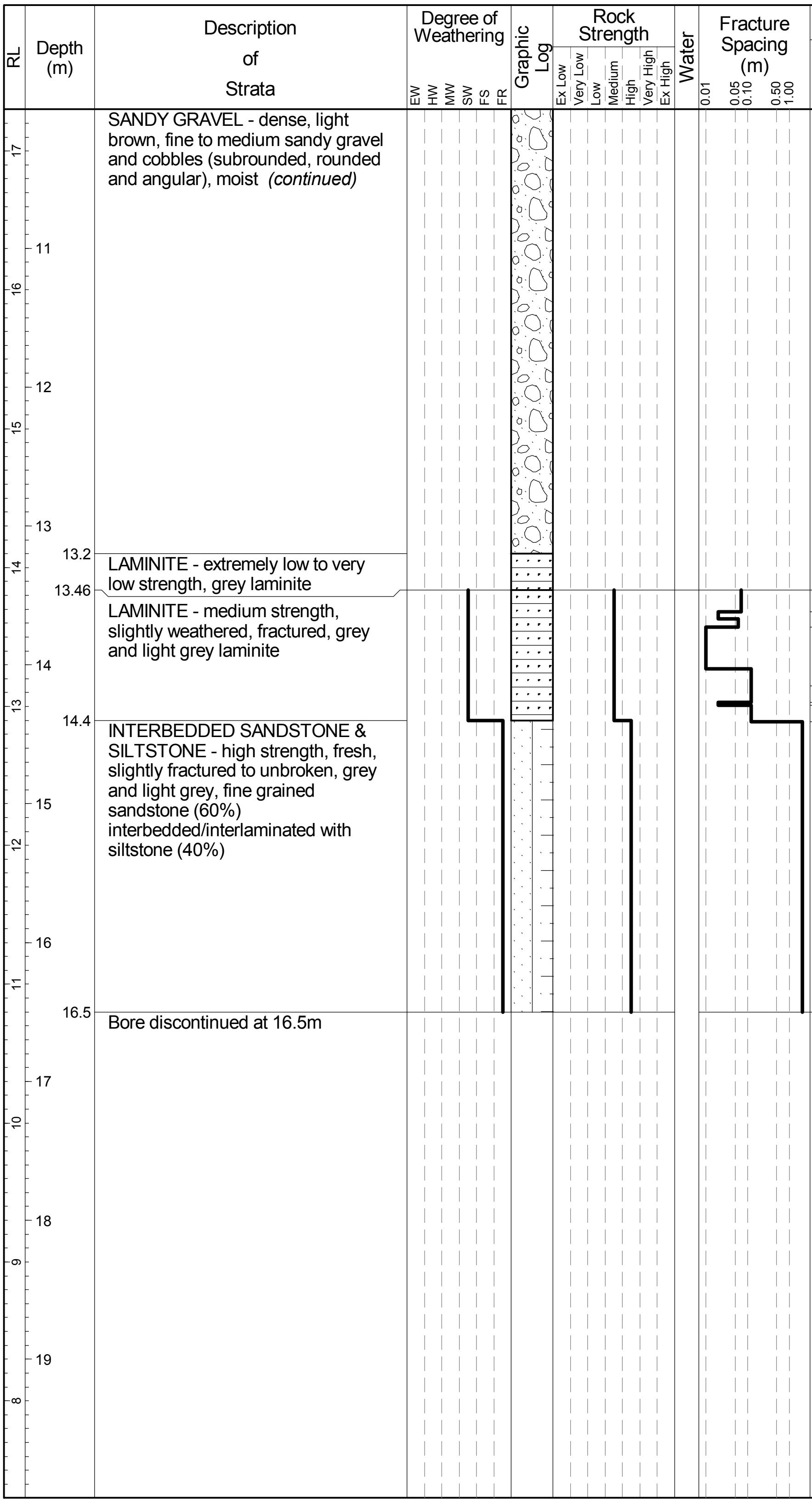
BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285921
NORTHING: 6263009
DIP/AZIMUTH: 90°/--

BORE No: 2A
PROJECT No: 85867.00
DATE: 3 - 6/3/2017
SHEET 2 OF 2

Depth (m)	Description of Strata	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
	SANDY GRAVEL - dense, light brown, fine to medium sandy gravel and cobbles (subrounded, rounded and angular), moist *(continued)*	Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
13.2	LAMINITE - extremely low to very low strength, grey laminite					
13.46	LAMINITE - medium strength, slightly weathered, fractured, grey and light grey laminite	13.53m: B0°- 5°, cly, sm 13.62-13.67m: 3x B0°- 5°, cly sm 13.73-14.03m: 12x B0°- 5°, cly sm 14.15m: B0°, cly, partially he 14.27m: J30°, cly, sm 14.29m: B0°- 5°, cly, sm 14.41m: J20°, cly, sm				
14.4	INTERBEDDED SANDSTONE & SILTSTONE - high strength, fresh, slightly fractured to unbroken, grey and light grey, fine grained sandstone (60%) interbedded/interlaminated with siltstone (40%)		C	100	84	PL(A) = 0.73 PL(A) = 1.62
16.5	Bore discontinued at 16.5m					



RIG: Sonic Rig **DRILLER:** Terratest **LOGGED:** JS **CASING:** HW to 13.46

TYPE OF BORING: 150mm diameter solid flight auger to 1.5m

WATER OBSERVATIONS: No free groundwater observed before adding water at 6.0m. Water measured in standpipe at 7.1m on 14/3/17

REMARKS: Standpipe installed to 16.5m (bentonite 5.0-5.5m; screen 6.2-16.5m)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater


Douglas Partners
Geotechnics / Environment / Groundwater
Project No: 85867.00
BH ID: BH 2A
Depth: 13.46 - 16.50 m
Core Box No.: 1
85867.00 PENRITH BH2A START CORING 13.46m
14
15
16
EOH 16.5m

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.9 AHD
EASTING: 285831
NORTHING: 6262952
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85867.00
DATE: 1-3-2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering EW HW MW SW FS FR	Graphic Log	Rock Strength Ex Low Very Low Low Medium High Very High Ex High	Water	Fracture Spacing (m) 0.01 0.05 0.10 0.50 1.00	Discontinuities B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	0.02	ASPHALTIC CONCRETE							E*			PID<1
	0.4	FILLING - brown silty clay filling with some gravel and cobbles and a trace of sand, damp - with some brick rubble from 0.3m							E			PID<1
26	0.8	FILLING - brown silty clay filling with some brick fragments										
	1	SILTY CLAY - firm, brown silty clay, MC<PL, apparently low plasticity							S/E			3,2,4 N = 6 PID<1
25	2											
	2.5	CLAYEY SAND - loose to medium dense, brown and light brown clayey sand, damp to moist							S			5,4,4 N = 8
24	3											
	3.5	SILTY SANDY GRAVEL - dense to very dense, brown and grey fine to medium sandy gravel and cobbles with some silty clay and possible boulders										
23	4								S			5/20mm refusal bouncing
22	5											
21	6											
20	7								S			4/10mm refusal bouncing
19	8											
18	9											
17									S			5/10mm

RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** 115m to 12.85m

TYPE OF BORING: Sonic to 12.85m; HQ-Coring to 17.0m

WATER OBSERVATIONS: No free groundwater observed before adding water at 4.0m

REMARKS: Standpipe installed to 16.8m (screen 3.0-16.8m; bentonite 2.4-3.0m; backfill to GL with gatic cover)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

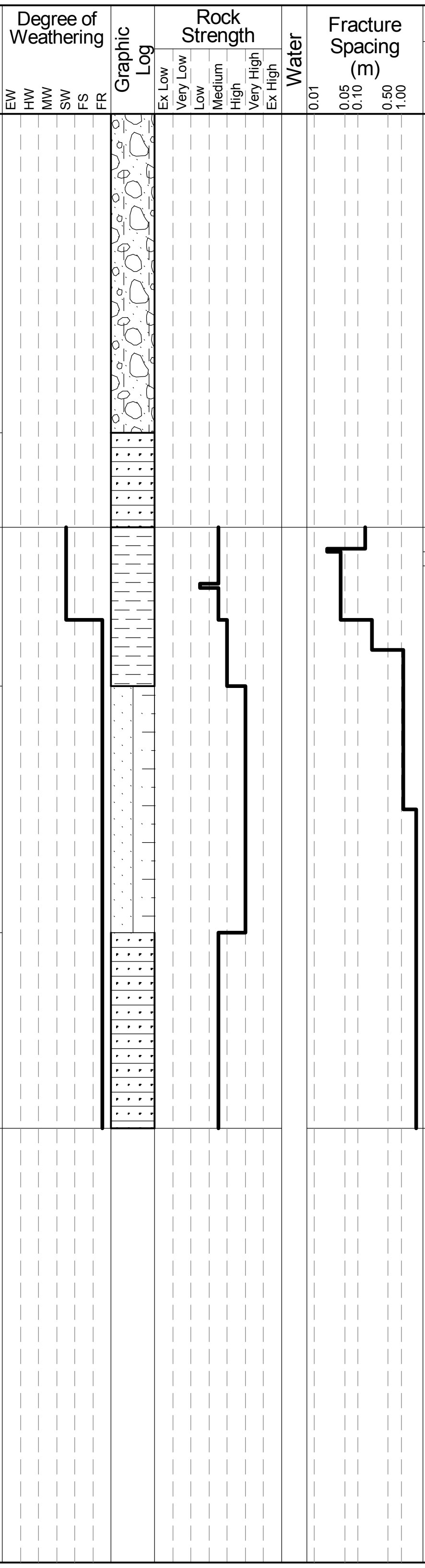
Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.9 AHD
EASTING: 285831
NORTHING: 6262952
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 85867.00
DATE: 1-3-2017
SHEET 2 OF 2



Depth (m)	Description of Strata	Discontinuities B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	SILTY SANDY GRAVEL - dense to very dense, brown and grey fine to medium sandy gravel and cobbles with some silty clay and possible boulders *(continued)*					refusal bouncing
12.2	LAMINITE - extremely low to very low strength, grey laminite	Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
12.85	SHALE - medium strength, slightly weathered, fractured then slightly fractured, grey shale with some fine sandstone laminations	13m: B0°- 5°, cly 13.02m: B0°- 5°, cly 13.12-13.49m: 9x B5°-15°, cly 13.7m: B0°- 5°, fe	C	100	80	PL(A) = 0.5 PL(A) = 0.98
13.95	INTERBEDDED SANDSTONE & SILTSTONE - high and very high strength, fresh, unbroken, light grey to grey, fine grained sandstone (50%) interbedded with siltstone (50%)	14.8m: J80°, cu (partially he)				PL(A) = 3.74 PL(A) = 2.86
15.65	LAMINITE - medium strength, fresh, unbroken, light grey to grey laminite with approximately 25% fine grained sandstone laminations		C	100	100	PL(A) = 0.93
17.0	Bore discontinued at 17.0m					

RIG: Sonic **DRILLER:** Terratest **LOGGED:** JS **CASING:** 115m to 12.85m
TYPE OF BORING: Sonic to 12.85m; HQ-Coring to 17.0m
WATER OBSERVATIONS: No free groundwater observed before adding water at 4.0m
REMARKS: Standpipe installed to 16.8m (screen 3.0-16.8m; bentonite 2.4-3.0m; backfill to GL with gatic cover)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater


Douglas Partners
Geotechnics / Environment / Groundwater
Project No: 85867.00
BH ID: BH 3
Depth: 12.85 – 16.00m
Core Box No.: 1
85867.00
PENRITH
01/03/17
BH 3
START CORING
12.85m
13
14
15


Douglas Partners
Geotechnics / Environment / Groundwater
Project No: 85867.00
BH ID: BH 3
Depth: 16.00 – 17.00 m
Core Box No.: 2
16

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285911
NORTHING: 6262903
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 85867.00
DATE: 1 - 2/3/2017
SHEET 1 OF 2

Depth (m)	Description of Strata	Type	Test Results & Comments
	FILLING - brown and grey, silty clay filling with some gravel and rootlets	E	PID<1
0.2	SILTY CLAY - very stiff, brown and red-brown silty clay MC<PL, apparently low plasticity	E	PID=1.5
		S	13,10,10 N = 20 PID<1
1.7	SILTY SANDY GRAVEL - dense to very dense, fine to medium grained sandy gravel and cobbles with some silty clay and possible boulders	S	5/0mm refusal bouncing
		S	5/0mm refusal bouncing
		S	3,8,20/120mm refusal

RIG: Sonic TS-03 **DRILLER:** Terratest **LOGGED:** JS/SI **CASING:** 115mm steel casing to 13.5m

TYPE OF BORING: Sonic care advance to 14.35m; HQ-Coring to 17.45m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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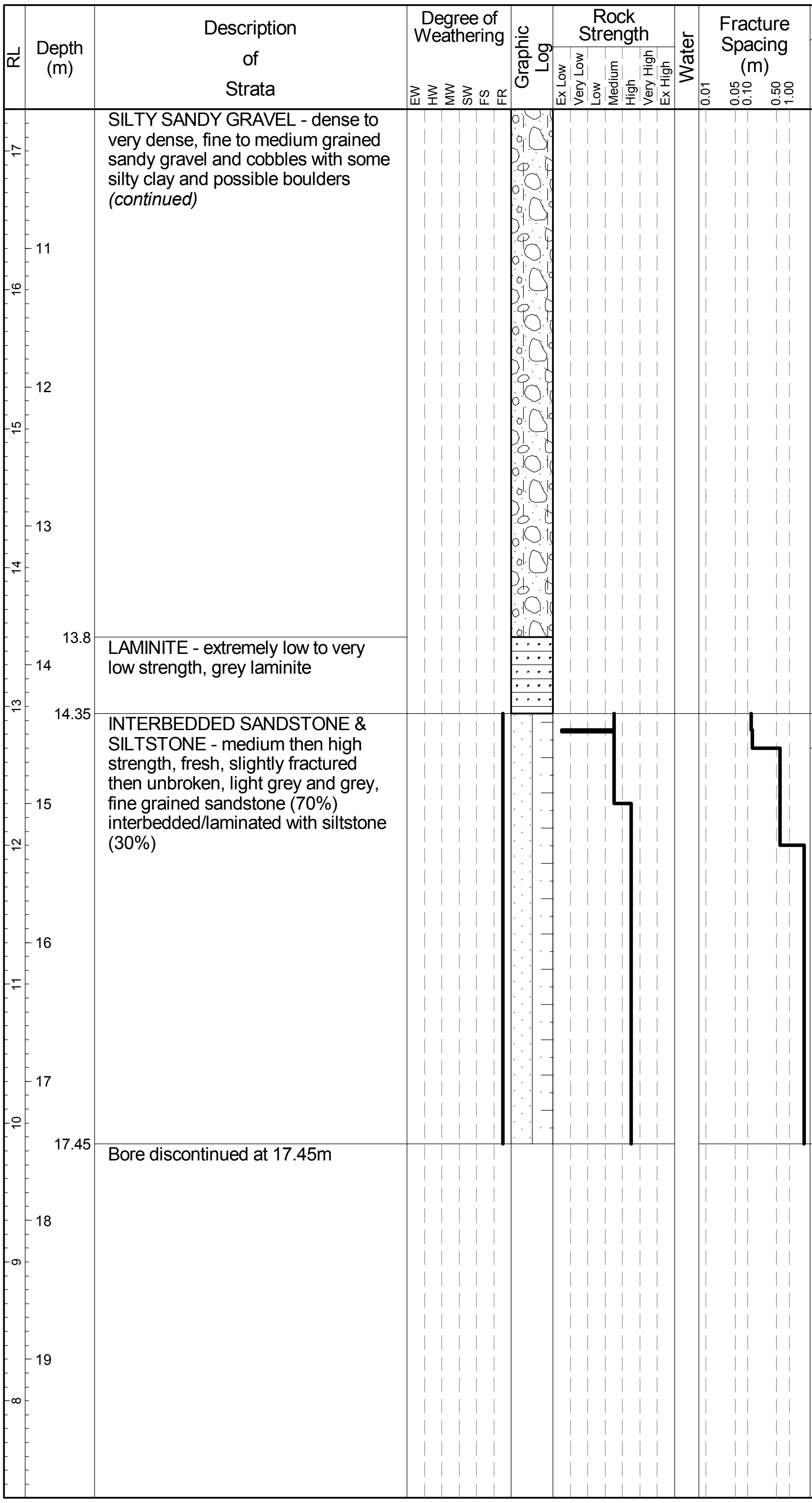
BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285911
NORTHING: 6262903
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 85867.00
DATE: 1 - 2/3/2017
SHEET 2 OF 2

Depth (m)	Description of Strata	Discontinuities B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	SILTY SANDY GRAVEL - dense to very dense, fine to medium grained sandy gravel and cobbles with some silty clay and possible boulders *(continued)*		S			5/0mm refusal bouncing
13.8	LAMINITE - extremely low to very low strength, grey laminite	Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
14.35	INTERBEDDED SANDSTONE & SILTSTONE - medium then high strength, fresh, slightly fractured then unbroken, light grey and grey, fine grained sandstone (70%) interbedded/laminated with siltstone (30%)	14.47m: B0°, cly, 5mm 14.6m: B0°, cly co, 2mm 15.2m: J25°, pl, ro, cln	C	100	99	PL(A) = 0.66 PL(A) = 1.93 PL(A) = 1.9 PL(A) = 1.39
17.45	Bore discontinued at 17.45m					

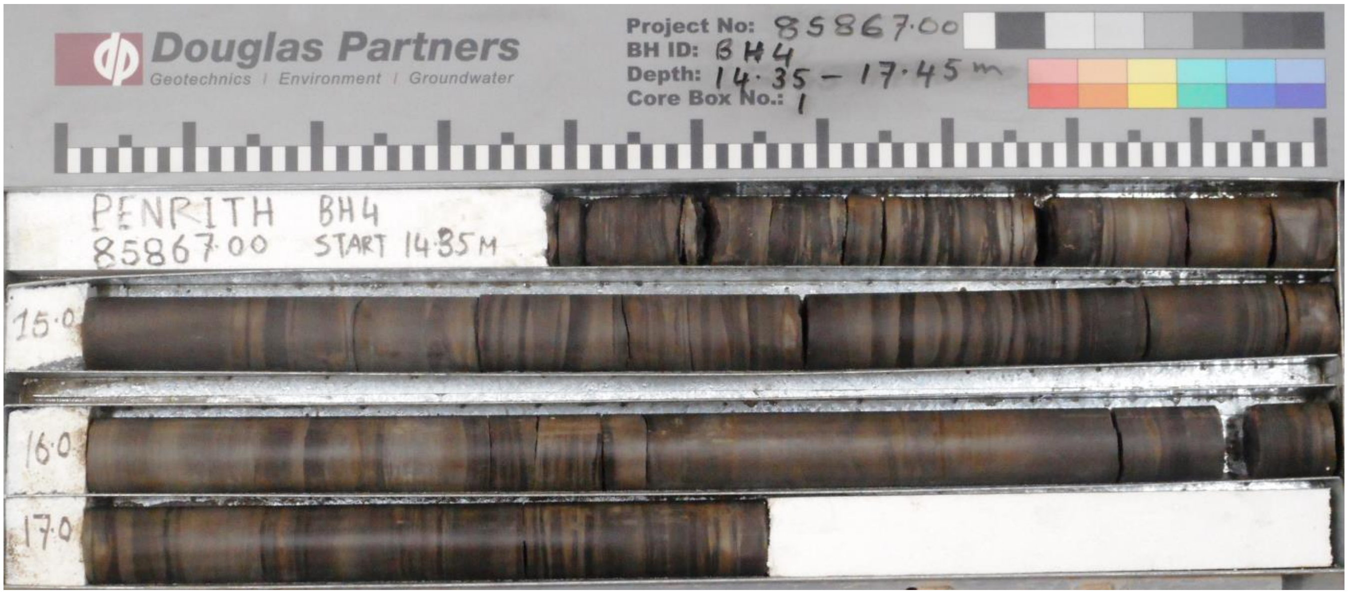


RIG: Sonic TS-03 **DRILLER:** Terratest **LOGGED:** JS/SI **CASING:** 115mm steel casing to 13.5m
TYPE OF BORING: Sonic care advance to 14.35m; HQ-Coring to 17.45m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater



Project No: 85867.00
BH ID: BH4
Depth: 14.35 – 17.45 m
Core Box No.: 1

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285883
NORTHING: 6262993
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 85867.00
DATE: 2-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING - brown and grey, sandy gravel filling, damp							
27				E	0.2		PID<1		
	0.25	FILLING - brown silty clay and gravel filling, damp							
				E	0.5		PID<1		
	0.6	SILTY CLAY - stiff to very stiff, brown silty clay, MC<PL, apparently low plasticity							
	1			E	1.0		PID<1		1
26									
	1.5	Bore discontinued at 1.5m - limit of investigation							

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 1.5m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.6 AHD
EASTING: 285933
NORTHING: 6262969
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 85867.00
DATE: 2-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown sandy gravel filling	▨	E	0.1		PID<1		
27	0.25	SILTY SAND - brown, fine to medium grained silty sand with some silty clay	▨	E	0.5		PID<1		
	1 1.0	Bore discontinued at 1.0m		E	1.0		PID<1		1
26									

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased
TYPE OF BORING: 150mm diameter solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 26.4 AHD
EASTING: 285827
NORTHING: 6262992
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 85867.00
DATE: 2-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.01	ASPHALTIC CONCRETE	■						
		FILLING - grey sandy gravel filling	▨						
	0.1	SILTY SAND - brown, fine to medium grained silty sand with some clay, damp	▒	E	0.1		PID<1		
26			▒						
			▒	E	0.5		PID<1		
	1 1.0	Bore discontinued at 1.0m		E	1.0		PID<1		1
25									

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased
TYPE OF BORING: 150mm diameter solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.1 AHD
EASTING: 285866
NORTHING: 6262957
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 85867.00
DATE: 2-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.03	ASPHALTIC CONCRETE	■						
27		FILLING - brown silty clay filling with a trace of gravel, damp	▨	E	0.1		PID<1		
	0.25	FILLING - brown sandy gravel filling, damp	▨	E	0.3		PID<1		
	0.4	SILTY SAND - brown, fine to medium grained silty sand with some silty clay	⁝	E	0.5		PID<1		
	1 1.0	Bore discontinued at 1.0m - limit of investigation		E	1.0		PID<1		1
26									

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased
TYPE OF BORING: 150mm diameter solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 640-652 & 634-638 High Street &
87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285908
NORTHING: 6262953
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 85867.00
DATE: 2-3-2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING - grey sandy gravel filling, damp - becoming silty sand with gravel filling	▨	E	0.1		PID<1		
27									
	0.4	FILLING - brown silty sand filling, damp (possibly natural)	▨	E	0.5		PID<1		
	0.7	SILTY CLAY - firm, brown silty clay, MC<PL, apparently low plasticity	▧						
	1			E	1.0		PID<1		1
26	1.3	Bore discontinued at 1.3m - limit of investigation							

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 1.3m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT:	Toga Development and Construction Pty Ltd	**SURFACE LEVEL:**	27.3 AHD	**BORE No:**	10
PROJECT:	Proposed Mixed-Use Development	**EASTING:**	285877	**PROJECT No:**	85867.00
LOCATION:	640-652 & 634-638 High Street & 87-91 Union Road, Penrith	**NORTHING:**	6262920	**DATE:**	2-3-2017
		DIP/AZIMUTH:	90°/--	**SHEET**	1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.01	ASPHALTIC CONCRETE	■						
		FILLING - brown silty clay filling with some gravel, damp	▨	E	0.1		PID<1		
27	0.2	FILLING - brown silty clay filling with some sand and gravel, moist	▨	E	0.5		PID<1		
	0.8 1	SILTY CLAY - firm to stiff, brown silty clay, MC<PL, apparently low plasticity, moist	▧	E	1.0		PID<1		1
26	1.3	Bore discontinued at 1.3m - limit of investigation							

RIG: 3.5T Excavator **DRILLER:** BM **LOGGED:** JS **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 1.3m

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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Attachment E

Laboratory Certificates, Sample Receipt Advice

& Chain of Custody Documentation

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 163159

Client:

Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Paul Gorman

Sample log in details:

Your Reference:	**85867.01, Penrith**		
No. of samples:	14 soils		
Date samples received / completed instructions received	08/03/17	/	08/03/17

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: / Issue Date:	15/03/17	/	15/03/17
Date of Preliminary Report:	Not Issued		

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

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	163159-1	163159-2	163159-3	163159-4	163159-5
Your Reference	-------------	BH1	BH2	BH3	BH3	BH4
Depth	------------	0.5	0.2	0.2	0.5	0.5
Date Sampled		6/03/2017	3/03/2017	1/03/2017	1/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	74	91	75	76	86

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	163159-6	163159-7	163159-8	163159-9	163159-10
Your Reference	-------------	BH5	BH6	BH7	BH8	BH9
Depth	------------	0.5	0.1	0.5	0.3	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	79	73	76	72	70

vTRH(C6-C10)/BTEXN in Soil					
Our Reference:	UNITS	163159-11	163159-12	163159-13	163159-14
Your Reference	------------- -	BH10	BD1	TS	TB
Depth	------------	0.5	-	-	-
Date Sampled		2/03/2017	2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	10/03/2017	10/03/2017	10/03/2017
TRH C_6 - C_9	mg/kg	<25	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	130%	<0.2
Toluene	mg/kg	<0.5	<0.5	136%	<0.5
Ethylbenzene	mg/kg	<1	<1	135%	<1
m+p-xylene	mg/kg	<2	<2	133%	<2
o-Xylene	mg/kg	<1	<1	134%	<1
Total +ve Xylenes	mg/kg	<1	<1	[NA]	<1
naphthalene	mg/kg	<1	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	75	84	81	80

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	163159-1	163159-2	163159-3	163159-4	163159-5
Your Reference	-------------	BH1	BH2	BH3	BH3	BH4
Depth	------------	0.5	0.2	0.2	0.5	0.5
Date Sampled		6/03/2017	3/03/2017	1/03/2017	1/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<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	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	77	75	76	75	78

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	163159-6	163159-7	163159-8	163159-9	163159-10
Your Reference	-------------	BH5	BH6	BH7	BH8	BH9
Depth	------------	0.5	0.1	0.5	0.3	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - 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	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	270	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	270	<50
Surrogate o-Terphenyl	%	79	77	76	74	74

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	163159-11	163159-12
Your Reference	------------- -	BH10	BD1
Depth	------------	0.5	-
Date Sampled		2/03/2017	2/03/2017
Type of sample		Soil	Soil
Date extracted	-	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017
TRHC $_{10}$ - C $_{14}$	mg/kg	<50	<50
TRHC $_{15}$ - C $_{28}$	mg/kg	<100	<100
TRHC $_{29}$ - C $_{36}$	mg/kg	100	<100
TRH>C $_{10}$-C $_{16}$	mg/kg	<50	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C $_{16}$-C $_{34}$	mg/kg	110	<100
TRH>C $_{34}$-C $_{40}$	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	110	<50
Surrogate o-Terphenyl	%	76	74

PAHs in Soil						
Our Reference:	UNITS	163159-1	163159-2	163159-3	163159-4	163159-5
Your Reference	-------------	BH1	BH2	BH3	BH3	BH4
Depth	------------	0.5	0.2	0.2	0.5	0.5
Date Sampled		6/03/2017	3/03/2017	1/03/2017	1/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.3	<0.1	0.2	0.3	<0.1
Pyrene	mg/kg	0.3	<0.1	0.2	0.3	<0.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.4	<0.2	<0.2	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	0.08	0.08	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	2.1	<0.05	0.4	0.85	<0.05
Surrogate p-Terphenyl-d14	%	96	87	95	86	100

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	163159-6 BH5 0.5 2/03/2017 Soil	163159-7 BH6 0.1 2/03/2017 Soil	163159-8 BH7 0.5 2/03/2017 Soil	163159-9 BH8 0.3 2/03/2017 Soil	163159-10 BH9 0.5 2/03/2017 Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.3	<0.1	0.1	<0.1	<0.1
Pyrene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	1.7	<0.05	0.1	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	75	98	95	86	106

PAHs in Soil			
Our Reference:	UNITS	163159-11	163159-12
Your Reference	------------- -	BH10	BD1
Depth	------------	0.5	-
Date Sampled		2/03/2017	2/03/2017
Type of sample		Soil	Soil
Date extracted	-	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	0.3	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	1.8	<0.1
Pyrene	mg/kg	2.0	<0.1
Benzo(a)anthracene	mg/kg	1.2	<0.1
Chrysene	mg/kg	0.8	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	2.2	<0.2
Benzo(a)pyrene	mg/kg	1.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	0.9	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.8	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.8	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.8	<0.5
Total +ve PAH's	mg/kg	11	<0.05
Surrogate p-Terphenyl-d14	%	109	96

Organochlorine Pesticides in soil						
Our Reference:	UNITS	163159-1	163159-2	163159-4	163159-6	163159-7
Your Reference	-------------	BH1	BH2	BH3	BH5	BH6
Depth	------------	0.5	0.2	0.5	0.5	0.1
Date Sampled		6/03/2017	3/03/2017	1/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	100	97	94	94

Organochlorine Pesticides in soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ------------- ------------	163159-9 BH8 0.3 2/03/2017 Soil	163159-10 BH9 0.5 2/03/2017 Soil	163159-11 BH10 0.5 2/03/2017 Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	90	93

Organophosphorus Pesticides						
Our Reference:	UNITS	163159-1	163159-2	163159-4	163159-6	163159-7
Your Reference	------------- -	BH1	BH2	BH3	BH5	BH6
Depth	------------	0.5	0.2	0.5	0.5	0.1
Date Sampled		6/03/2017	3/03/2017	1/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	100	97	94	94

Organophosphorus Pesticides				
Our Reference:	UNITS	163159-9	163159-10	163159-11
Your Reference	------------- -	BH8	BH9	BH10
Depth	------------	0.3	0.5	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	90	93

PCBs in Soil						
Our Reference:	UNITS	163159-1	163159-2	163159-4	163159-6	163159-7
Your Reference	-------------	BH1	BH2	BH3	BH5	BH6
Depth	------------	0.5	0.2	0.5	0.5	0.1
Date Sampled		6/03/2017	3/03/2017	1/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	94	100	97	94	94

PCBs in Soil				
Our Reference:	UNITS	163159-9	163159-10	163159-11
Your Reference	-------------	BH8	BH9	BH10
Depth	------------	0.3	0.5	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	86	90	93

Acid Extractable metals in soil						
Our Reference:	UNITS	163159-1	163159-2	163159-3	163159-4	163159-5
Your Reference	------------- -	BH1	BH2	BH3	BH3	BH4
Depth	------------	0.5	0.2	0.2	0.5	0.5
Date Sampled		6/03/2017	3/03/2017	1/03/2017	1/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	7	8	16	9	13
Copper	mg/kg	25	4	49	8	7
Lead	mg/kg	110	90	52	43	15
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	12	3	39	4	5
Zinc	mg/kg	140	30	83	48	42

Acid Extractable metals in soil						
Our Reference:	UNITS	163159-6	163159-7	163159-8	163159-9	163159-10
Your Reference	------------- -	BH5	BH6	BH7	BH8	BH9
Depth	------------	0.5	0.1	0.5	0.3	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Arsenic	mg/kg	5	<4	<4	<4	<4
Cadmium	mg/kg	0.8	0.5	<0.4	<0.4	<0.4
Chromium	mg/kg	46	6	12	34	11
Copper	mg/kg	23	8	22	67	7
Lead	mg/kg	88	54	41	10	47
Mercury	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	44	6	6	51	6
Zinc	mg/kg	310	180	47	38	38

Acid Extractable metals in soil					
Our Reference:	UNITS	163159-11	163159-12	163159-15	163159-16
Your Reference	-------------	BH10	BD1	BH1 - [TRIPLICATE]	BH10 - [TRIPLICATE]
Depth	------------	0.5	-	0.5	0.5
Date Sampled		2/03/2017	2/03/2017	06/03/2017	02/03/2017
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Arsenic	mg/kg	6	<4	<4	4
Cadmium	mg/kg	0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	43	8	11	49
Copper	mg/kg	2,900	69	32	500
Lead	mg/kg	4,400	18	170	3,500
Mercury	mg/kg	0.5	<0.1	0.3	0.3
Nickel	mg/kg	34	58	18	40
Zinc	mg/kg	1,400	38	210	690

Misc Soil - Inorg						
Our Reference:	UNITS	163159-1	163159-2	163159-4	163159-6	163159-7
Your Reference	------------- -	BH1	BH2	BH3	BH5	BH6
Depth	------------	0.5	0.2	0.5	0.5	0.1
Date Sampled		6/03/2017	3/03/2017	1/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg				
Our Reference:	UNITS	163159-9	163159-10	163159-11
Your Reference	------------- -	BH8	BH9	BH10
Depth	------------	0.3	0.5	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	09/03/2017	09/03/2017	09/03/2017
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Moisture						
Our Reference:	UNITS	163159-1	163159-2	163159-3	163159-4	163159-5
Your Reference	-------------	BH1	BH2	BH3	BH3	BH4
Depth	------------	0.5	0.2	0.2	0.5	0.5
Date Sampled		6/03/2017	3/03/2017	1/03/2017	1/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	10/03/2017	10/03/2017	10/03/2017	10/03/2017	10/03/2017
Moisture	%	11	10	9.1	11	6.3

Moisture						
Our Reference:	UNITS	163159-6	163159-7	163159-8	163159-9	163159-10
Your Reference	-------------	BH5	BH6	BH7	BH8	BH9
Depth	------------	0.5	0.1	0.5	0.3	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	09/03/2017	09/03/2017	09/03/2017	09/03/2017	09/03/2017
Date analysed	-	10/03/2017	10/03/2017	10/03/2017	10/03/2017	10/03/2017
Moisture	%	6.6	6.6	11	14	13

Moisture			
Our Reference:	UNITS	163159-11	163159-12
Your Reference	-------------	BH10	BD1
Depth	------------	0.5	-
Date Sampled		2/03/2017	2/03/2017
Type of sample		Soil	Soil
Date prepared	-	09/03/2017	09/03/2017
Date analysed	-	10/03/2017	10/03/2017
Moisture	%	9.3	11

Asbestos ID - soils						
Our Reference:	UNITS	163159-1	163159-2	163159-4	163159-6	163159-7
Your Reference	-------------	BH1	BH2	BH3	BH5	BH6
Depth	------------	0.5	0.2	0.5	0.5	0.1
Date Sampled		6/03/2017	3/03/2017	1/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	14/03/2017	14/03/2017	14/03/2017	14/03/2017	14/03/2017
Sample mass tested	g	Approx. 35g	Approx. 40g	Approx. 40g	Approx. 40g	Approx. 45g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	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

Asbestos ID - soils				
Our Reference:	UNITS	163159-9	163159-10	163159-11
Your Reference	-------------	BH8	BH9	BH10
Depth	------------	0.3	0.5	0.5
Date Sampled		2/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date analysed	-	14/03/2017	14/03/2017	14/03/2017
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	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

Misc Inorg - Soil				
Our Reference:	UNITS	163159-1	163159-5	163159-9
Your Reference	------------- -	BH1	BH4	BH8
Depth	------------	0.5	0.5	0.3
Date Sampled		6/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	10/03/2017	10/03/2017	10/03/2017
Date analysed	-	10/03/2017	10/03/2017	10/03/2017
pH 1:5 soil:water	pH Units	8.6	7.1	9.6

CEC				
Our Reference:	UNITS	163159-1	163159-5	163159-9
Your Reference	------------- -	BH1	BH4	BH8
Depth	------------	0.5	0.5	0.3
Date Sampled		6/03/2017	2/03/2017	2/03/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	13/03/2017	13/03/2017	13/03/2017
Date analysed	-	13/03/2017	13/03/2017	13/03/2017
Exchangeable Ca	meq/100g	12	2.8	19
Exchangeable K	meq/100g	0.1	0.1	0.2
Exchangeable Mg	meq/100g	4.3	0.47	5.2
Exchangeable Na	meq/100g	0.35	0.20	1.1
Cation Exchange Capacity	meq/100g	17	3.6	26

Method ID	Methodology Summary
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.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, 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-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
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.
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.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
TRHC_6 - C_9	mg/kg	25	Org-016	<25	163159-1	<25 || <25	LCS-3	114%
TRHC_6 - C_{10}	mg/kg	25	Org-016	<25	163159-1	<25 || <25	LCS-3	114%
Benzene	mg/kg	0.2	Org-016	<0.2	163159-1	<0.2 || <0.2	LCS-3	94%
Toluene	mg/kg	0.5	Org-016	<0.5	163159-1	<0.5 || <0.5	LCS-3	95%
Ethylbenzene	mg/kg	1	Org-016	<1	163159-1	<1 || <1	LCS-3	127%
m+p-xylene	mg/kg	2	Org-016	<2	163159-1	<2 || <2	LCS-3	127%
o-Xylene	mg/kg	1	Org-016	<1	163159-1	<1 || <1	LCS-3	126%
naphthalene	mg/kg	1	Org-014	<1	163159-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	90	163159-1	74 || 93 || RPD: 23	LCS-3	87%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
TRHC_{10} - C_{14}	mg/kg	50	Org-003	<50	163159-1	<50 || <50	LCS-3	91%
TRHC_{15} - C_{28}	mg/kg	100	Org-003	<100	163159-1	<100 || <100	LCS-3	93%
TRHC_{29} - C_{36}	mg/kg	100	Org-003	<100	163159-1	<100 || <100	LCS-3	106%
TRH>C_{10}-C_{16}	mg/kg	50	Org-003	<50	163159-1	<50 || <50	LCS-3	91%
TRH>C_{16}-C_{34}	mg/kg	100	Org-003	<100	163159-1	<100 || <100	LCS-3	93%
TRH>C_{34}-C_{40}	mg/kg	100	Org-003	<100	163159-1	<100 || <100	LCS-3	106%
Surrogate o-Terphenyl	%		Org-003	90	163159-1	77 || 76 || RPD: 1	LCS-3	81%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	LCS-3	90%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	LCS-3	88%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	163159-1	0.3 || 0.1 || RPD: 100	LCS-3	117%
Anthracene	mg/kg	0.1	Org-012	<0.1	163159-1	0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	163159-1	0.3 || 0.2 || RPD: 40	LCS-3	104%
Pyrene	mg/kg	0.1	Org-012	<0.1	163159-1	0.3 || 0.2 || RPD: 40	LCS-3	128%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	163159-1	0.2 || 0.1 || RPD: 67	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	163159-1	0.2 || 0.1 || RPD: 67	LCS-3	94%
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	163159-1	0.4 || 0.2 || RPD: 67	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	163159-1	0.1 || 0.1 || RPD: 0	LCS-3	78%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	163159-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	163159-1	0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	97	163159-1	96 || 91 || RPD: 5	LCS-3	130%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
HCB	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	95%
gamma-BHC	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	94%
Heptachlor	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	107%
delta-BHC	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	89%
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	87%
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	89%
Dieldrin	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	104%
Endrin	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	84%
pp-DDD	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	105%
Endosulfan II	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	LCS-3	86%
Methoxychlor	mg/kg	0.1	Org-005	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	100	163159-1	94 || 94 || RPD: 0	LCS-3	103%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	74%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	95%
Dimethoate	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	84%
Fenitrothion	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	80%
Malathion	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	87%
Parathion	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	90%
Ronnel	mg/kg	0.1	Org-008	[NT]	163159-1	<0.1 || <0.1	LCS-3	76%
Surrogate TCMX	%		Org-008	100	163159-1	94 || 94 || RPD: 0	LCS-3	100%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	LCS-3	100%
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	163159-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	100	163159-1	94 || 94 || RPD: 0	LCS-3	100%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Arsenic	mg/kg	4	Metals-020	<4	163159-1	<4 || <4	LCS-3	111%
Cadmium	mg/kg	0.4	Metals-020	<0.4	163159-1	<0.4 || <0.4	LCS-3	100%
Chromium	mg/kg	1	Metals-020	<1	163159-1	7 || 11 || RPD: 44	LCS-3	107%
Copper	mg/kg	1	Metals-020	<1	163159-1	25 || 45 || RPD: 57	LCS-3	105%
Lead	mg/kg	1	Metals-020	<1	163159-1	110 || 220 || RPD: 67	LCS-3	105%
Mercury	mg/kg	0.1	Metals-021	<0.1	163159-1	<0.1 || 0.3	LCS-3	94%
Nickel	mg/kg	1	Metals-020	<1	163159-1	12 || 21 || RPD: 55	LCS-3	98%
Zinc	mg/kg	1	Metals-020	<1	163159-1	140 || 260 || RPD: 60	LCS-3	99%

QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Date analysed	-			09/03/2017	163159-1	09/03/2017 || 09/03/2017	LCS-3	09/03/2017
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	163159-1	<5 || <5	LCS-3	98%

QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			10/03/2017	[NT]	[NT]	LCS-3	10/03/2017
Date analysed	-			10/03/2017	[NT]	[NT]	LCS-3	10/03/2017
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	LCS-3	102%

QUALITY CONTROL CEC	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			13/03/2017	[NT]	[NT]	LCS-3	13/03/2017
Date analysed	-			13/03/2017	[NT]	[NT]	LCS-3	13/03/2017
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-3	106%
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-3	97%
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-3	106%
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	LCS-3	106%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	163159-11	09/03/2017 || 09/03/2017
Date analysed	-	163159-11	09/03/2017 || 10/03/2017
TRHC_6 - C_9	mg/kg	163159-11	<25 || <25
TRHC_6 - C_{10}	mg/kg	163159-11	<25 || <25
Benzene	mg/kg	163159-11	<0.2 || <0.2
Toluene	mg/kg	163159-11	<0.5 || <0.5
Ethylbenzene	mg/kg	163159-11	<1 || <1
m+p-xylene	mg/kg	163159-11	<2 || <2
o-Xylene	mg/kg	163159-11	<1 || <1
naphthalene	mg/kg	163159-11	<1 || <1
Surrogate aaa-Trifluorotoluene	%	163159-11	75 || 84 || RPD: 11

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	163159-11	09/03/2017 || 09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017
TRHC_{10} - C_{14}	mg/kg	163159-11	<50 || <50
TRHC_{15} - C_{28}	mg/kg	163159-11	<100 || <100
TRHC_{29} - C_{36}	mg/kg	163159-11	100 || <100
TRH>C_{10}-C_{16}	mg/kg	163159-11	<50 || <50
TRH>C_{16}-C_{34}	mg/kg	163159-11	110 || <100
TRH>C_{34}-C_{40}	mg/kg	163159-11	<100 || <100
Surrogate o-Terphenyl	%	163159-11	76 || 78 || RPD: 3

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	163159-11	09/03/2017 || 09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017
Naphthalene	mg/kg	163159-11	<0.1 || <0.1
Acenaphthylene	mg/kg	163159-11	<0.1 || <0.1
Acenaphthene	mg/kg	163159-11	<0.1 || <0.1
Fluorene	mg/kg	163159-11	<0.1 || <0.1
Phenanthrene	mg/kg	163159-11	0.3 || 0.7 || RPD: 80
Anthracene	mg/kg	163159-11	0.1 || 0.3 || RPD: 100
Fluoranthene	mg/kg	163159-11	1.8 || 3.4 || RPD: 62
Pyrene	mg/kg	163159-11	2.0 || 3.3 || RPD: 49
Benzo(a)anthracene	mg/kg	163159-11	1.2 || 1.7 || RPD: 34
Chrysene	mg/kg	163159-11	0.8 || 1.2 || RPD: 40
Benzo(b,j+k)fluoranthene	mg/kg	163159-11	2.2 || 2 || RPD: 10
Benzo(a)pyrene	mg/kg	163159-11	1.2 || 1.1 || RPD: 9
Indeno(1,2,3-c,d)pyrene	mg/kg	163159-11	0.6 || 0.7 || RPD: 15
Dibenzo(a,h)anthracene	mg/kg	163159-11	0.2 || 0.2 || RPD: 0

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Benzo(g,h,i)perylene	mg/kg	163159-11	0.9 || 0.9 || RPD: 0
Surrogate p-Terphenyl-d14	%	163159-11	109 || 115 || RPD: 5

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
HCB	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	163159-11	<0.1 || <0.1	163159-2	92%
gamma-BHC	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	163159-11	<0.1 || <0.1	163159-2	85%
Heptachlor	mg/kg	163159-11	<0.1 || <0.1	163159-2	105%
delta-BHC	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	163159-11	<0.1 || <0.1	163159-2	90%
Heptachlor Epoxide	mg/kg	163159-11	<0.1 || <0.1	163159-2	80%
gamma-Chlordane	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	163159-11	<0.1 || <0.1	163159-2	90%
Dieldrin	mg/kg	163159-11	<0.1 || <0.1	163159-2	92%
Endrin	mg/kg	163159-11	<0.1 || <0.1	163159-2	75%
pp-DDD	mg/kg	163159-11	<0.1 || <0.1	163159-2	93%
Endosulfan II	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	163159-11	<0.1 || <0.1	163159-2	124%
Methoxychlor	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	163159-11	93 || 93 || RPD: 0	163159-2	98%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Azinphos-methyl (Guthion)	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	163159-11	<0.1 || <0.1	163159-2	94%
Chlorpyriphos-methyl	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	163159-11	<0.1 || <0.1	163159-2	110%
Dimethoate	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	163159-11	<0.1 || <0.1	163159-2	95%
Fenitrothion	mg/kg	163159-11	<0.1 || <0.1	163159-2	117%
Malathion	mg/kg	163159-11	<0.1 || <0.1	163159-2	107%
Parathion	mg/kg	163159-11	<0.1 || <0.1	163159-2	101%
Ronnel	mg/kg	163159-11	<0.1 || <0.1	163159-2	86%
Surrogate TCMX	%	163159-11	93 || 93 || RPD: 0	163159-2	95%

QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Aroclor 1016	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	163159-11	<0.1 || <0.1	163159-2	100%
Aroclor 1260	mg/kg	163159-11	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	163159-11	93 || 93 || RPD: 0	163159-2	95%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Date analysed	-	163159-11	09/03/2017 || 09/03/2017	163159-2	09/03/2017
Arsenic	mg/kg	163159-11	6 || 6 || RPD: 0	163159-2	100%
Cadmium	mg/kg	163159-11	0.4 || <0.4	163159-2	99%
Chromium	mg/kg	163159-11	43 || 39 || RPD: 10	163159-2	103%
Copper	mg/kg	163159-11	2900 || 19000 || RPD: 147	163159-2	109%
Lead	mg/kg	163159-11	4400 || 4700 || RPD: 7	163159-2	122%
Mercury	mg/kg	163159-11	0.5 || 0.8 || RPD: 46	163159-2	105%
Nickel	mg/kg	163159-11	34 || 32 || RPD: 6	163159-2	97%
Zinc	mg/kg	163159-11	1400 || 1400 || RPD: 0	163159-2	#

QUALITY CONTROL Misc Soil - Inorg	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	163159-2	09/03/2017
Date analysed	-	[NT]	[NT]	163159-2	09/03/2017
Total Phenolics (as Phenol)	mg/kg	[NT]	[NT]	163159-2	96%

Report Comments:

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 163159-1 for Cu, Ni, Pb and Zn. Therefore a triplicate result has been issued as laboratory sample number 163159-15.

Acid Extractable Metals in Soil: # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples for asbestos testing were sub-sampled from jars provided by the client.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 163159-11 for Cu. Therefore a triplicate result has been issued as laboratory sample number 163159-16.

Asbestos ID was analysed by Approved Identifier:	Paul Ching
Asbestos ID was authorised by Approved Signatory:	Paul Ching

INS: Insufficient sample for this test
NR: Test not required
<: Less than

PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than

NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

CHAIN OF CUSTODY

Douglas Partners
Geotechnics / Environment / Groundwater

Client: Douglas Partners
Contact Person: Paul Gorman
Project Mgr: Paul Gorman
Sampler: Jarrod Somerville
Address: Penrith

Phone: **Mob:**
Email: paul.gorman @douglaspartners.com.au

Project Number: 85867.01
Project Name: Penrith
PO No.:
lab Quote No. :
Date results required: standard
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required
Report format: esdat / PDF / Excel
Comments

To: Envirolab Services
Contact Person: Aileen Hie
Address: 12 Ashley Street
Chatswood NSW 2068
Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au
Laboratory Report No:
Lab Comments:

Sample information							Tests Required											Comments
Lab Sample ID	**Field Sample ID**	**Depth**	**Date sampled**	**Time Sampled**	**Container Type**	**Type of sample**	Combo 8a	Combo 3	pH	CEC	BTEX							**Sample Condition, filtraion performed**
1	BH1	0.5	6/03/2017		J	soil	x		x	x								
2	BH2	0.2	3/03/2017		J	soil	x											
3	BH3	0.2	1/03/2017		J	soil		x										
4	BH3	0.5	1/03/2017		J	soil	x											
5	BH4	0.5	2/03/2017		J	soil		x	x	x								
6	BH5	0.5	2/03/2017		J	soil	x											
7	BH6	0.1	2/03/2017		J	soil	x											
8	BH7	0.5	2/03/2017		J	soil		x										
9	BH8	0.3	2/03/2017		J	soil	x		x	x								
10	BH9	0.5	2/03/2017		J	soil	x											
11	BH10	0.5	2/03/2017		J	soil	x											
12	BD1				J	soil		x										Intra-laboratory Replicate
13	TS										x							
14	TB										x							
~~15~~	BD2				J	soil		x										Inter-laboratory Replicate - ALS

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 163159

Date Received: 8/3
Time Received: 14:00
Received by: SK
Temp: [✓ Cool]/Ambient
Cooling: [✓ Ice]/Icepack
Security: [✓ Intact]/Broken/None

Relinquished by: Douglas Partners
Departure time from site:
Hand delivered / Courier (by whom)
Condition of Sample at dispatch Cool or Ambient (circle)
Method of Cooling and Temperature (if Applicable):
Print Name:
Date & Time:
Signature:

Sample Receipt
Received by (Company): ELS
Print Name: SK
Date & Time: 14:00 (8/3)
Signature: SKoney

Container Types:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: **(if applicable)**
Transported by: Hand delivered / courier

Page 1 of 1 .

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Douglas Partners Pty Ltd
Attention	Paul Gorman

Sample Login Details	
Your Reference	85867.01, Penrith
Envirolab Reference	**163159**
Date Sample Received	08/03/2017
Date Instructions Received	08/03/2017
Date Results Expected to be Reported	**15/03/2017**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	14 soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	12.5
Cooling Method	Ice
Sampling Date Provided	YES

Comments
Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples

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@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

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

Sample Id	*vTRH(C6-C10)/BTEXN in Soil*	*svTRH (C10-C40) in Soil*	*PAHs in Soil*	*Organochlorine Pesticides in soil*	*Organophosphorus Pesticides*	*PCBs in Soil*	*Acid Extractable metals in soil*	*Total Phenolics (as Phenol)*	*Asbestos ID - soils*	*pH 1:5 soil:water*	*CEC*
BH1-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH2-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH3-0.2	✓	✓	✓				✓				
BH3-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH4-0.5	✓	✓	✓				✓			✓	✓
BH5-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH6-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH7-0.5	✓	✓	✓				✓				
BH8-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH9-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BH10-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓		
BD1	✓	✓	✓				✓				
TS	✓										
TB	✓										

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 163159-A

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Paul Gorman

Sample log in details:

Your Reference:	**85867.01, Penrith**
No. of samples:	Additional Testing on 1 Soil
Date samples received / completed instructions received	08/03/17 / 15/03/17

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: / Issue Date:	21/03/17 / 20/03/17
Date of Preliminary Report:	Not Issued

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

Results Approved By:

David Springer
General Manager

ACCREDITED FOR TECHNICAL COMPETENCE

Metals in TCLP USEPA1311		
Our Reference:	UNITS	163159-A-11
Your Reference	------------- -	BH10
Depth	------------	0.5
Date Sampled		2/03/2017
Type of sample		Soil
Date extracted	-	16/03/2017
Date analysed	-	16/03/2017
pH of soil for fluid# determ.	pH units	8.6
pH of soil TCLP (after HCl)	pH units	1.6
Extraction fluid used	-	1
pH of final Leachate	pH units	5.1
Lead in TCLP	mg/L	44

PAHs in TCLP (USEPA 1311)		
Our Reference:	UNITS	163159-A-11
Your Reference	------------- -	BH10
Depth	------------	0.5
Date Sampled		2/03/2017
Type of sample		Soil
Date extracted	-	17/03/2017
Date analysed	-	17/03/2017
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	82

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
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.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/03/2017	[NT]	[NT]	LCS-W1	16/03/2017
Date analysed	-			16/03/2017	[NT]	[NT]	LCS-W1	16/03/2017
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	70%
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	71%
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	83%
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	81%
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	81%
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	74%
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	72%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	94	[NT]	[NT]	LCS-W1	73%

Report Comments:

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Aileen Hie

From: Nancy Zhang
Sent: Wednesday, 15 March 2017 2:02 PM
To: Paul Gorman
Cc: Customer Service
Subject: RE: Results for Registration 163159 85867.01, Penrith

Envirolab Ref: 163159A
Due: 22/3/17
Std T/A.

Hi Paul,

No problem.

Regards,

Nancy Zhang | Assistant Lab Manager | Envirolab Services Pty Ltd

Great Science,Great Service

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 F 612 9910 6201
mailto:nzhang@envirolab.com.au | http://www.envirolab.com.au

-----Original Message-----
From: Paul Gorman [mailto:Paul.Gorman@douglaspartners.com.au]
Sent: Wednesday, 15 March 2017 1:56 PM
To: Nancy Zhang <NZhang@envirolab.com.au>
Subject: RE: Results for Registration 163159 85867.01, Penrith

Thanks Nancy,

Can I please schedule TCLP testing as follows:

BH10/0.5PAH, lead -11

Standard turnaround.

Thanks

Paul Gorman | Principal / Environmental Manager Douglas Partners Pty Ltd | ABN 75 053 980 117 |
www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0632 | F: 02 9809 4095 | M: 0427 949 878 | E: Paul.Gorman@douglaspartners.com.au

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 163599

Client:

Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: Paul Gorman

Sample log in details:

Your Reference:	**85867.01, Penrith**		
No. of samples:	1 water		
Date samples received / completed instructions received	16/03/17	/	16/03/17

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: / Issue Date:	23/03/17	/	21/03/17
Date of Preliminary Report:	Not Issued		

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Results Approved By:

David Springer
General Manager

ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Water		
Our Reference:	UNITS	163599-1
Your Reference	------------- -	BH2-GW1
Date Sampled	------------	14/03/2017
Type of sample		water
Date extracted	-	16/03/2017
Date analysed	-	17/03/2017
TRHC_6 - C_9	µg/L	15
TRHC_6 - C_{10}	µg/L	17
TRHC_6 - C_{10} less BTEX (F1)	µg/L	17
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	103
Surrogate toluene-d8	%	100
Surrogate 4-BFB	%	91

svTRH (C10-C40) in Water		
Our Reference:	UNITS	163599-1
Your Reference	-------------	BH2-GW1
Date Sampled	------------	14/03/2017
Type of sample		water
Date extracted	-	17/03/2017
Date analysed	-	17/03/2017
TRHC $_{10}$ - C $_{14}$	µg/L	<50
TRHC $_{15}$ - C $_{28}$	µg/L	<100
TRHC $_{29}$ - C $_{36}$	µg/L	<100
TRH>C $_{10}$ - C $_{16}$	µg/L	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	µg/L	<50
TRH>C $_{16}$ - C $_{34}$	µg/L	<100
TRH>C $_{34}$ - C $_{40}$	µg/L	<100
Surrogate o-Terphenyl	%	86

PAHs in Water - Low Level		
Our Reference:	UNITS	163599-1
Your Reference	------------- -	BH2-GW1
Date Sampled	------------	14/03/2017
Type of sample		water
Date extracted	-	17/03/2017
Date analysed	-	17/03/2017
Naphthalene	µg/L	<0.2
Acenaphthylene	µg/L	<0.1
Acenaphthene	µg/L	<0.1
Fluorene	µg/L	<0.1
Phenanthrene	µg/L	<0.1
Anthracene	µg/L	<0.1
Fluoranthene	µg/L	<0.1
Pyrene	µg/L	<0.1
Benzo(a)anthracene	µg/L	<0.1
Chrysene	µg/L	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2
Benzo(a)pyrene	µg/L	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	87

HM in water - dissolved		
Our Reference:	UNITS	163599-1
Your Reference	------------- -	BH2-GW1
Date Sampled	------------	14/03/2017
Type of sample		water
Date prepared	-	17/03/2017
Date analysed	-	17/03/2017
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	2

Method ID	Methodology Summary
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-013	Water samples are analysed directly by purge and trap GC-MS.
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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Metals-022	Determination of various metals by ICP-MS.
Metals-021	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/03/2017	[NT]	[NT]	LCS-W1	16/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
TRHC_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	102%
TRHC_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	102%
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	109%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	101%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	99%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	101%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	102%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	101	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	100	[NT]	[NT]	LCS-W1	100%
Surrogate 4-BFB	%		Org-016	92	[NT]	[NT]	LCS-W1	103%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
TRHC_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	73%
TRHC_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	87%
TRHC_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	104%
TRH>C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	73%
TRH>C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	87%
TRH>C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	104%
Surrogate o-Terphenyl	%		Org-003	75	[NT]	[NT]	LCS-W1	86%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/03/2017	[NT]	[NT]	LCS-W3	17/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-W3	17/03/2017
Naphthalene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	LCS-W3	74%
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	74%
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	77%
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	72%
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	72%

QUALITY CONTROL PAHs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	74%
Benzo(b,j+k) fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	LCS-W3	77%
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	76	[NT]	[NT]	LCS-W3	63%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
Date analysed	-			17/03/2017	[NT]	[NT]	LCS-W1	17/03/2017
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	94%
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	LCS-W1	96%
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	93%
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	93%
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	103%
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	LCS-W1	97%
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	92%
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	LCS-W1	94%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85867.01	**Suburb:**	Penrith	**To:**	Envirolab Services
Project Name:	Contamination Investigation	**Order Number**			12 Ashley Street, Chatswood, NSW 2067
Project Manager:	Paul Gorman	**Sampler:**	Tom Graham	**Attn:**	Aileen Hie
Emails:	Paul.Gorman@douglaspartners.com.au; Tom.Graham@douglaspartners.com.au			**Phone:**	9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☒			**Email:**	ahie@envirolab.com.au

Prior Storage: ☒ Esky ☐ Fridge ☐ Shelved Do samples contain 'potential' HBM? Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes Combo 3L									Notes/preservation
BH2-GW1	①	14/03/17	W	G	X									
PQL (S) mg/kg														

ENVIROLAB GROUP
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 163599
Date Received: 15.3.2017
Time Received: 1840
Received by:
Temp: [✓ Cool]/Ambient
Cooling: [✓ Ice]/Icepack 10.2
Security: [✓ Intact]/Broken/None

ANZECC PQLs req'd for all water analytes ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: 1 **Relinquished by:** TG **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address** 96 Hermitage Road, West Ryde, NSW 2114 **Phone:** 9809 0666 **Fax:** 9809 4095

Signed: **Received by:** P.Ray 15.3.2017 18.40 **Date & Time:**

CERTIFICATE OF ANALYSIS

Work Order : **ES1705712**
Client : **DOUGLAS PARTNERS PTY LTD**
Contact : MR PAUL GORMAN
Address : 439 MONTAGUE ROAD
WEST END QLD, AUSTRALIA 4101
Telephone : +61 02 9809 0666
Project : 85867.01 Penrith
Order number : ----
C-O-C number : ----
Sampler : Jarrod Somerville
Site : ----
Quote number : EN/093/15
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : John Pickering
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 09-Mar-2017 16:40
Date Analysis Commenced : 14-Mar-2017
Issue Date : 16-Mar-2017 13:59

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key :
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**DB1** **DB2**	----	----	----	----
			Client sampling date / time	06-Mar-2017 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1705712-001**	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**20.1**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	**10**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**56**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**8**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.2**	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**0.8**	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**0.7**	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**0.6**	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**2.1**	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**0.8**	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**1.1**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.4**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

			Client sample ID	**DB1** **DB2**	**----**	**----**	**----**	**----**
			Client sampling date / time	06-Mar-2017 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1705712-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**101**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**103**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**106**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**106**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**117**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**106**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**115**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**106**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**DB1 DB2**	**----**	**----**	**----**	**----**
			Client sampling date / time	06-Mar-2017 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1705712-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**105**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)* Low	*Recovery Limits (%)* High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order : **ES1705712**

Client : **DOUGLAS PARTNERS PTY LTD**
Contact : MR PAUL GORMAN
Address : 439 MONTAGUE ROAD
WEST END QLD, AUSTRALIA 4101

Telephone : +61 02 9809 0666
Project : 85867.01 Penrith
Order number : ----
C-O-C number : ----
Sampler : Jarrod Somerville
Site : ----
Quote number : EN/093/15
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 7

Laboratory : Environmental Division Sydney
Contact : John Pickering
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555
Date Samples Received : 09-Mar-2017
Date Analysis Commenced : 14-Mar-2017
Issue Date : 16-Mar-2017

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
\# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 790791)									
EP1702317-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	42.3	47.7	11.9	0% - 20%
ES1705710-005	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	11.3	10.2	9.96	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 790680)									
ES1705495-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	8	24.4	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	3	114	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	5	27.2	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	8	46.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	15	44.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	46	26	56.1	No Limit
ES1705824-007	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	32	32	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	16	16	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	123	117	4.83	0% - 20%
		EG005T: Copper	7440-50-8	5	mg/kg	43	44	3.10	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	27	44.4	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	32	42	25.6	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 790681)									
ES1705495-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1705824-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.4	75.6	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 789106)									
ES1705786-023	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	0.6	0.7	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 789106) - continued									
ES1705786-023	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.5	1.6	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	4.4	4.4	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	4.6	4.6	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	2.3	2.2	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	2.2	2.1	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	2.7	2.8	5.79	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.1	1.1	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	2.5	2.4	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.2	1.3	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	1.6	1.6	6.34	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	24.7	25.3	2.40	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	3.3	3.2	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 789107)									
ES1705815-005	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1705786-023	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 790169)									
ES1705824-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1705824-009	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 789107)									
ES1705815-005	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1705786-023	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	130	150	14.7	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 790169)									
ES1705824-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1705824-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 790169)									
ES1705824-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 790169) - continued									
ES1705824-001	Anonymous	EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1705824-009	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 790680)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.0	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.3	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	90.4	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	103	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	97.1	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	100	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	104	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 790681)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	83.3	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 789106)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	97.0	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	95.0	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	97.2	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	99.0	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	96.2	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	98.1	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	96.0	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	97.2	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	95.6	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	100	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.4	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	98.6	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	91.2	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	86.6	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	88.2	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	86.6	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 789107)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	99.2	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	100	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	103	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 790169)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	98.2	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 789107)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 789107) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	101	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	103	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	99.4	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 790169)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	98.4	68	128
EP080: BTEXN (QCLot: 790169)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	99.7	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	103	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	93.1	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	96.0	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	99.8	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	98.7	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG005T: Total Metals by ICP-AES (QCLot: 790680)							
ES1705495-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	95.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.0	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	97.7	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	100	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	100	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	86.2	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.3	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 790681)							
ES1705495-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	106	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 789106)							
ES1705786-023	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	84.2	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	86.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 789107)							
ES1705786-023	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	105	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	122	53	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 789107) - continued							
ES1705786-023	Anonymous	EP071: C29 - C36 Fraction	----	1714 mg/kg	125	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 790169)							
ES1705824-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	111	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 789107)							
ES1705786-023	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	107	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	125	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	107	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 790169)							
ES1705824-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	108	70	130
EP080: BTEXN (QCLot: 790169)							
ES1705824-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	86.4	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	92.1	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	93.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	91.7	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	98.1	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	104	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1705712**	Page	: 1 of 4
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Telephone	: +61-2-8784 8555
Project	: 85867.01 Penrith	Date Samples Received	: 09-Mar-2017
Site	: ----	Issue Date	: 16-Mar-2017
Sampler	: Jarrod Somerville	No. of samples received	: 1
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method ***Container*** */ Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103) DB1 - DB2	**06-Mar-2017**	**----**	----	----	**14-Mar-2017**	20-Mar-2017	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	02-Sep-2017	✓	**14-Mar-2017**	02-Sep-2017	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	03-Apr-2017	✓	**15-Mar-2017**	03-Apr-2017	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**14-Mar-2017**	23-Apr-2017	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**14-Mar-2017**	20-Mar-2017	✓
Soil Glass Jar - Unpreserved (EP071) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**15-Mar-2017**	23-Apr-2017	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**14-Mar-2017**	20-Mar-2017	✓
Soil Glass Jar - Unpreserved (EP071) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**15-Mar-2017**	23-Apr-2017	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) DB1 - DB2	**06-Mar-2017**	**14-Mar-2017**	20-Mar-2017	✓	**14-Mar-2017**	20-Mar-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

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91005

16/3/17

CHAIN OF CUSTODY

Douglas Partners
Geotechnics / Environment / Groundwater

Client: Douglas Partners
Contact Person: Paul Gorman
Project Mgr: Paul Gorman
Sampler: Jarrod Somerville
Address: Penrith
Phone: **Mob:**
Email: paul.gorman @douglaspartners.com.au

Project Number: 85867.01
Project Name: Penrith
PO No.:
lab Quote No. :
Date results required: standard
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required
Report format: esdat / PDF / Excel
Comments

To: Envirolab Services
Contact Person: Aileen Hie
Address: 12 Ashley Street
Chatswood NSW 2068
Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au
Laboratory Report No:
Lab Comments:

Sample information							Tests Required											Comments
Lab Sample ID	Field Sample ID	Depth	Date sampled	Time Sampled	Container Type	Type of sample	Combo 8a	Combo 3	pH	CEC	BTEX							Sample Condition, filtraion performed
1	BH1	0.5	6/03/2017		J	soil	x		x	x								
2	BH2	0.2	3/03/2017		J	soil	x											
3	BH3	0.2	1/03/2017		J	soil		x										
4	BH3	0.5	1/03/2017		J	soil	x											
5	BH4	0.5	2/03/2017		J	soil		x	x	x								
6	BH5	0.5	2/03/2017		J	soil	x											
7	BH6	0.1	2/03/2017		J	soil	x											
8	BH7	0.5	2/03/2017		J	soil		x										
9	BH8	0.3	2/03/2017		J	soil	x		x	x								
10	BH9	0.5	2/03/2017		J	soil	x											
11	BH10	0.5	2/03/2017		J	soil	x											
12	BD1				J	soil		x										Intra-laboratory Replicate
13	TS										x							
14	TB										x							
① ~~15~~	BD2				J	soil		x										Inter-laboratory Replicate - ALS

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 163159
Date Received: 8/3
Time Received: 14:00
Received by: SK
Temp: [✓ Cool]/Ambient
Cooling: [✓ Ice]/Icepack
Security: [✓ Intact]/Broken/None

Relinquished by: Douglas Partners
Departure time from site:
Hand delivered / Courier (by whom)
Condition of Sample at dispatch Cool or Ambient (circle)
Method of Cooling and Temperature (if Applicable):
Print Name:
Date & Time:
Signature:

Sample Receipt
Received by (Company): ELS
Print Name: SK
Date & Time: 14:00 (8/3)
Signature: SKong
Container Types:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: **(if applicable)**
Transported by: Hand delivered / courier

Relin: James - ELS
9/3 12:00

MGould 9.3.17 16:40 16.7°

Environmental Division
Sydney
Work Order Reference
ES1705712

Telephone : + 61-2-8784 8555

Attachment F

Tables A1 and A2 - Laboratory Test Results

Table A1 - Soil Results

						PAHs in Soil					Inorganics	Metals									TPH												BTEX		
					Scheduled chemicals (NSW Waste 2009)	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs	Moisture	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	TCLP Pb	Mercury	Nickel	Zinc	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.5	0.5	0.5	0.2	0.05	0.1	4	0.4	1	1	1		0.1	1	1	50	100	100	50	25	50	100	100		50	25	25	0.2	1	0.5
NSW EPA (2014) General Solid Waste (CT1)												100	20			100		4	40														10	600	288
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)					<50							500	100			1500	5	50	1050						650				10000				18	1080	518
NSW EPA (2014) Restricted Solid Waste (CT2)												400	80			400		16	160														40	2400	1152
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)					<50							2000	400			6000	20	200	4200						2600				40000				72	4320	2073
ANZECC Background Ranges																																			
Olszowy et al (1995) - Urban Soils (0-150mm) ^{4}												<5-40	<0.5-14	5-131	<5-466	3-1465		<0.1-3.4	<5-160	5-3820					NA	NA	NA	NA					NA	NA	NA
Berkman 4th Edition (2001) - Field Geologists Manual ^{5}												1-50	1	5-1000	2-100	2-200		0.03	5-500	10-300					NA	NA	NA	NA					NA	NA	NA
NEPM 2013 Table 1A(1) HILs Res B Soil												500	150		30000	1200		120	1200	60000															
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																								110							45		0.5	55	160
NEPM 2013 EILs Res/Open Space Aged												100			230	1100			230	690															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																						300	2800	120							180		50	70	85
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																					1000	2500	10000									700			
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																															
BD1	BD1		2/03/2017	Fill	-	<0.5	<0.5	<0.5	<0.2	<0.05	11	<4	<0.4	8	69	18		<0.1	58	38	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH1	BH1	0.5	6/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	0.4	2.1	11	<4	<0.4	7	25	110		<0.1	12	140	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	<4	<0.4	11	32	170		0.3	18	210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<1.3	1.8	1.8	1.8	2.2	11	9.3	6	0.4	43	2900	4400	44	0.5	34	1400	<50	110	<100	<50	<25	<50	<100	100	175	110	<25	<25	<0.2	<1	<0.5
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	4	<0.4	49	500	3500		0.3	40	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	10	<4	<0.4	8	4	90		<0.1	3	30	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH3	BH3	0.2	1/03/2017	Fill	-	<0.5	<0.5	<0.5	<0.2	0.4	9.1	<4	<0.4	16	49	52		<0.1	39	83	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH3	BH3	0.5	1/03/2017	Natural	<1.3	<0.5	<0.5	<0.5	0.2	0.85	11	<4	<0.4	9	8	43		<0.1	4	48	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH4	BH4	0.5	2/03/2017	Natural	-	<0.5	<0.5	<0.5	<0.2	<0.05	6.3	<4	<0.4	13	7	15		<0.1	5	42	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH5	BH5	0.5	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	0.3	1.7	6.6	5	0.8	46	23	88		0.1	44	310	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH6	BH6	0.1	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	6.6	<4	0.5	6	8	54		<0.1	6	180	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH7	BH7	0.5	2/03/2017	Natural	-	<0.5	<0.5	<0.5	<0.2	0.1	11	<4	<0.4	12	22	41		0.1	6	47	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH8	BH8	0.3	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	14	<4	<0.4	34	67	10		<0.1	51	38	<50	<100	270	<50	<25	<50	<100	160	235	270	<25	<25	<0.2	<1	<0.5
BH9	BH9	0.5	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	13	<4	<0.4	11	7	47		<0.1	6	38	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
TB			2/03/2017		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	<25	-	-	-	-	-	<25	<25	<0.2	<1	<0.5

Table A1 - Soil Results

								Halogenated Benzenes	PAH/Phenols																		Polychlorinated Biphenyls									
					Xylene (m & p)	Xylene (o)	Xylene Total	Hexachlorobenzene	PAH (total, NSW Waste 2009)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	TCLP B(a)P	Benzo(g,h,i)perylene	Carcinogenic PAHs (as BaP TEQ)	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Phenolics Total	Pyrene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	a-BHC
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					2	1	1	0.1		0.1	0.1	0.1	0.1	0.05		0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA (2014) General Solid Waste (CT1)							1000							0.8																						
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)							1800		200					10	0.04																			<50		
NSW EPA (2014) Restricted Solid Waste (CT2)							4000							3.2																						
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)							7200		800					23	0.16																			<50		
ANZECC Background Ranges																																				
Olszowy et al (1995) - Urban Soils (0-150mm) [4]					NA	NA	NA		NA																									NA		
Berkman 4th Edition (2001) - Field Geologists Manual [5]					NA	NA	NA		NA																									NA		
NEPM 2013 Table 1A(1) HILs Res B Soil								15	400								4																	1		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m							40																3													
NEPM 2013 EILs Res/Open Space Aged																							170													
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m							105							0.7																						
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																				
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																
BD1	BD1		2/03/2017	Fill	<2	<1	<1	-	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.5	6/03/2017	Fill	<2	<1	<1	<0.1	1.9	<0.1	<0.1	0.1	0.2	0.1		0.1	0.178	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.3	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	9.3	<0.1	<0.1	0.1	1.2	1.2	<0.001	0.9	1.597	0.8	0.2	1.8	<0.1	0.6	<0.1	0.3	<5	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH3	BH3	0.2	1/03/2017	Fill	<2	<1	<1	-	1.03	<0.1	<0.1	<0.1	<0.1	0.08		<0.1	0.141	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	-	0.2	-	-	-	-	-	-	-	-	-	-
BH3	BH3	0.5	1/03/2017	Natural	<2	<1	<1	<0.1	1.23	<0.1	<0.1	<0.1	<0.1	0.08		<0.1	0.141	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH4	BH4	0.5	2/03/2017	Natural	<2	<1	<1	-	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH5	BH5	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	1.65	<0.1	<0.1	<0.1	0.1	0.1		0.1	0.168	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.2	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH6	BH6	0.1	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH7	BH7	0.5	2/03/2017	Natural	<2	<1	<1	-	0.725	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH8	BH8	0.3	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH9	BH9	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TB			2/03/2017		<2	<1	<1	-	-	-	-	-	-	-		-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A1 - Soil Results

					Organochlorine Pesticides																			Organophosphorous Pesticides											Pesticides		Asbestos
					Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Pesticides (total, NSW Waste 2009)	Parathion	Asbestos fibres
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
EQL					0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	
NSW EPA (2014) General Solid Waste (CT1)																										4											
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)																										7.5									250		
NSW EPA (2014) Restricted Solid Waste (CT2)																										16											
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)																										30									1000		
ANZECC Background Ranges																																					
Olszowy et al (1995) - Urban Soils (0-150mm) [4]																																			NA		
Berkman 4th Edition (2001) - Field Geologists Manual [5]																																			NA		
NEPM 2013 Table 1A(1) HILs Res B Soil						10							600					20			10		500			340											
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																																					
NEPM 2013 EILs Res/Open Space Aged												180																									
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																																					
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																					
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																	
BD1	BD1		2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.5	6/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH3	BH3	0.2	1/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH3	BH3	0.5	1/03/2017	Natural	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH4	BH4	0.5	2/03/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	BH5	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH6	BH6	0.1	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH7	BH7	0.5	2/03/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	BH8	0.3	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH9	BH9	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
TB			2/03/2017		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Groundwater Results

				PAHs in Water - Low Level	Metals								TPH										BTEX					PAH/Phenols													
				Benzo(a)pyrene TEQ	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
				µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.5	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.05	0.1	0.1	0.05	0.01	0.05	0.1	0.1	0.01	0.01	0.001	0.001	0.001	0.002	0.001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand																																									
2-4m																1					1		0.8	NL	NL														NL		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																																									
2-4m																NL					6		5	NL	NL														NL		
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion																																									
2-4m																NL|1					NL|1|6		0.8|4|5	NL	NL														NL		
NEPM 2013 Table 1C GILs, Fresh Waters						0.0002		0.0014	0.0034	0.00006	0.011	0.008											0.95				0.35												0.016		
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																																						
BH2-GW1	BH2-GW1		14/03/2017	<0.5	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	<0.001	0.002	<0.05	<0.1	<0.1	<0.05	0.015	<0.05	<0.1	<0.1	0.017	0.017	<0.001	<0.001	<0.001	<0.002	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001

Attachment G

Quality Assurance and Quality Control Procedures

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The preliminary site investigation was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S10 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S2 Scope of Works S3 Site Description and Walkover S4 Findings of the Previous PSI S5 Conceptual Site Model S6 Fieldwork S9 Results summary
Define the Boundary of the Assessment	S3 Site Description and Walkover Drawing 1 (attached)
Develop a Decision Rule	S7 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S7 Site Assessment Criteria Data Quality Assessment – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S6 Fieldwork Data Quality Assessment – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the data quality indicators in Table Q6 and the laboratory results certificates attached for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	>5% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]
Inter-laboratory replicates	>5% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]
Trip Spikes	1 per field batch	60-140% recovery	yes
Trip Blanks	1 per field batch	<PQL/LOR	yes

Note: 1 qualitative assessment of RPD results overall; refer Section Q2.1 and Q2.2

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards Some additional analysis performed on samples were on or slightly exceed the specified holding times (14 days), however the analysis was for semi-volatiles and results are consistent with results for analysis undertaken within specified holding times.	ok
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	Yes
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes[2]
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes[2]
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	Yes

Notes: 1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD
ALS: <10xLOR – no limit; 10-20x LOR – 0-50%; >20x LOR – 0-20%RPD

2 See Table Q6 for comments on triplicate samples and spike recovery.

A 5% intra-laboratory analysis frequency was achieved for soils and a 5% inter-laboratory sampling analysis frequency was achieved for both soil and water.

In summary, the QC data is considered to be of sufficient quality to be acceptable for the assessment.

Q2.1 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services Pty Ltd (ELS) and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Tables Q4 and Q5.

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics with the exception of the results shown in bold. However, this is not considered to be significant because:

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred. High RPD values reflect the small differences between two small numbers;
- The number of replicate pairs being collected from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised duplicates, were used to minimise the risk of volatile loss, hence greater variability can be expected;
- Most of the recorded concentrations being relatively close to the LOR/PQL. High RPD values reflect the low concentrations;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals							
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
ELS	BH1/0.5	6/03/2017	Filling	mg/kg	<4	<0.4	7	25	110	<0.1	12	140
ELS	BH1 - [TRIPLICATE]	6/03/2017	Filling	mg/kg	<4	<0.4	11	32	170	0.3	18	210
Difference				mg/kg	0	0	0	8	34	0	1	84
RPD				%	**0**	**0**	**0**	**30**	**59**	**0**	**15**	**61**
ELS	BH10/0.5	2/01/2017	Filling	mg/kg	6	0.4	43	2900	4400	0.5	34	1400
ELS	BH10 - [TRIPLICATE]	2/01/2017	Filling	%	4	<0.4	49	500	3500	0.3	40	690
Difference				mg/kg	2	0	6	2400	900	0.2	6	710
RPD				%	**40**	**0**	**13**	**141**	**23**	**50**	**16**	**68**

Q2.2 Inter-Laboratory Analysis

Inter-laboratory replicates were conducted as a check of the reproducibility of results between the primary laboratory ELS and the secondary laboratory ALS Limited (ALS) and as a measure of consistency of sampling techniques.

The comparative results of analysis between original and inter-laboratory replicate samples are summarised in Table Q5.

Table Q5: Relative Percentage Difference Results – Inter-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals							
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
ELS (Sydney)	BH1/0.5	6/3/17	Filling	mg/kg	<4	<0.4	7	25	110	<0.1	12	140
ALS	DB1 DB2	6/3/17	Filling	mg/kg	<5	<1	<2	10	56	0.2	<2	8
Difference				mg/kg	0	0	5	15	54	0.1	10	132
RPD				%	0	0	111	**86**	**65**	**67**	**143**	**178**

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

For water, the calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics. For soils, the calculated RPD values marginally exceeded the acceptable range of ± 30 but it is considered that this is likely to be a result of the heterogeneous soil matrix which comprised a yellow and light grey silty clay, moist.

Overall, the inter-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q2.3 Field Instrument Calibration

The photoionisation detector (PID) fitted with a [11.7 volt lamp] was calibrated and serviced prior to use on the field.

The water quality meter was calibrated by Airmet prior to use. Prior to commencement of groundwater sampling the water quality meter was calibrated in the field prior to use.

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- Completeness – a measure of the amount of usable data from a data collection activity;
- Comparability – the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness – the confidence (qualitative) of data representativeness of media present on-site;
- Precision – a measure of variability or reproducibility of data; and
- Accuracy – a measure of closeness of the data to the ‘true’ value.

The DQIs were assessed as outlined in the following Table Q6.

Table Q6: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Samples were extracted and analysed within holding times. Samples were analysed in accordance with the analysis request. It is noted that a report comment is made by ELS with respect to sub-sampled asbestos from soil jars. This is expected and acceptable for analytical requirements.

Data Quality Indicator	**Method(s) of Achievement**
Precision	Acceptable RPD between original samples and replicates. It is noted that laboratory triplicates were conducted for samples BH1/0.2-0.3 which initially exceeded the RPD acceptance criteria for some metals but the total concentrations were very low. The laboratory has noted Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference. The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s. Overall, satisfactory results were achieved for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

Attachment H

Groundwater Sampling Form

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_2 d_2^2/4 + n(\pi h_3 d_3^2/4 - \pi h_3 d_2^2/4)$

Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_2 = height of water column
d_3 = diameter of annulus
h_3 = length of filter pack
d_2 = diameter of casing

Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BA2-MW1
Project Name:	Penrith Contamination Investigation
Project Number:	85867.01
Site Location:	Cnr High St & Mulgoa Rd, Penrith
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	
Micropurge and Sampling Details	
Date/Time:	14/3/17 12:30 — 8.72
Sampled By:	TG — 63.146
Weather Conditions:	Wet — 190 ~
GW Level (pre-purge):	7.11 m bgl
GW Level (post sample):	m bgl
PSH observed:	Yes / [✓ No] ([✓ interface] / [✓ visual]). Thickness if observed:
Observed Well Depth:	15.88 m bgl
Estimated Bore Volume:	63.146 L
Total Volume Purged:	L
Equipment:	

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
~~1520 / 2~~	~~23.2~~	~~1.07~~	~~911~~	~~11.26~~		~~-257~~
1525 / 1	22.8	1.15	874	10.82		-266
1527 / 5	22.8	1.24	882	10.76		-264
1529 / 9	22.8	1.31	880	10.66		-259
1531 / 13	22.8	1.39	891	10.58		-254
1533 / 17	22.8	1.48	886	10.57		-251
1535 / 21	22.8	1.57	887	10.57		-252
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	

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Integrated Practical Solutions

Report on
Detailed Site Investigation

Proposed Mixed Use Development
634-638 High Street and 87-89 Union Road, Penrith

Prepared for
Toga Penrith Developments Pty Ltd

Project 85867.02
September 2021

Douglas Partners
Geotechnics / Environment / Groundwater

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author	p.p.	29 September 2021
Reviewer		29 September 2021

bsi. ISO 9001 Quality Management

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Report on Detailed Site Investigation
Proposed Mixed Use Development
634-638 High Street and 87-89 Union Road, Penrith

1. Introduction

This report presents the results of a Detailed Site Investigation (DSI) for Contamination undertaken for a proposed mixed use development at 634-638 High Street and 87-89 Union Road, Penrith. The investigation was commissioned in an email dated 7 March 2018 by Jia Fernandez of Toga Penrith Developments Pty Ltd (Toga) and was undertaken in accordance with Douglas Partners' proposal SYD180245 dated 6 March 2018.

The subject site comprises Stage 1 of a mixed-use development proposed by Toga. The proposed development of Stage 1 comprises of residential buildings, commercial and associated parking. Buildings 1 and 2 are joined together by a common ground floor podium, underground three level basement and podium car parking areas.

The DSI has been undertaken to support a development application for the site, and supplement a due diligence investigation undertaken for the site in 2017 (refer to Section 4). The DSI has been prepared to address the requirements of *State Environmental Planning Policy No 55 - Remediation of Land*. The objective of the DSI is to assess the risk of contamination being present at the site, the need (or otherwise) for further investigation and or remediation, and to comment on the suitability of the site for the proposed development from a contamination perspective.

2. Scope of Work

The scope of the DSI was designed to supplement the due diligence contamination investigation completed at the site by DP in April 2017. An interim report dated 14 March 2018 presented a summary of the due diligence contamination investigation, and the field observations made during the sampling phase of this DSI. Both previous reports are summarised in Section 4 of this report.

The scope of work for the DSI included:

- Review of site and proposed development information, as provided by the client;
- Review of the previous contamination investigation reports;
- Site walkover to identify current features and site uses;
- Setting out and levelling of nine bore locations to supplement the previous five locations within Stage 1 of the development site;
- Drilling two bores (BH101 and BH102) with a truck mounted drilling rig to depths of about 10 metres (m) below ground level (bgl), then converting into groundwater monitoring wells. The bores were positioned close to the underground storage tank (UST) and close to the hydraulic down gradient boundary to Stage 1;

- Drilling seven bores (BH103 to BH107) in an approximate grid pattern across the site for general site coverage and completion of the sampling numbers to the NSW EPA *Sampling Design Guidelines* (1995);
- Soil samples were recovered at regular intervals for testing for potential contaminants;
- Laboratory analysis of selected soil samples for the following potential contaminants:
    - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
    - Total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons - TPH);
    - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene - BTEX);
    - Polycyclic aromatic hydrocarbons (PAH);
    - Phenols (total);
    - Organochlorine pesticides (OCP);
    - Organophosphate pesticides (OPP);
    - Polychlorinated biphenyls (PCB);
    - Asbestos (40 g samples for screening purposes); and
    - pH and cation exchange capacity (CEC).
- Development, purge and sample groundwater from one previously installed well (Bore 2A) and the two wells at BH101 and BH102;
- Laboratory analysis of the groundwater samples for heavy metals, TRH, BTEX, PAH, phenols, OPP, OCP, PCB and hardness; and
- QA / QC analysis including replicates, trip spike and trip blank samples.

The bore locations (previous and current) are shown on Drawing 1, Appendix B.

3. Site Description

Stage 1 of the proposed mixed us development (from herein referred to as “the site”) is bounded by High Street to the north, John Tipping Grove to the west, Union Road to the south and vacant land and high density residential development to the east.

At the time of conducting the drilling works for the DSI (10 and 11 March 2018) the site was generally flat with a very slight slope to the west and is situated at an elevation of about 28 m AHD. The site contained a single building in the north-west corner (recently leased for the sale of Christmas decorations), a concreted area in front of the building, including old fuel bowsers and an underground storage tank (UST), then vacant and generally gravel covered space across the remainder of the site. There were no observed signs of potential contamination on the ground surface.

No significant changes to the site layout have been observed since 11 March 2018, and the site has remained fenced off from the public over that period.

It is anticipated that the direction of groundwater flow would be to the west and towards the Nepean River located approximately 800 m wast of the site. It is likely that stormwater at the site and region discharges to the Nepean River.

The Geology of Penrith 1:100,000 Geology Sheet indicates the site is underlain by Cranebrook Formation from the Quaternary Period comprising gravel, sand, silt and clay. The site is underlain by the Wianamatta Group of rocks consisting of shale, carbonaceous claystone, laminate and sandstone. The bedrock is reported to be overlain by fluvial deposits consisting of gravel sand and clay of variable thickness. A discussion on the subsurface conditions encountered at the site is presented in Section 8.1.

A search of NSW Department of Land and Water Acid Sulphate Soil Risk Map indicates that the site is in a region of no known occurrence of acid sulfate soils.

4. Review of Previous Reports

DP prepared a report for Toga in 2017 titled *Due Diligence Contamination Investigation, 634 - 652A High Street, 87 - 8991 Union* Road, Penrith (Reference 85867.01.R.001.Rev2) dated 14 March 2018 (DP, 2018a), which was updated in 2021 (85867.01.R.001.Rev3) and dated 29 September 2021 (DP (2021). As part of DP (2021) DP was provided with copies of contamination investigations undertaken by others in 2015 and 2007. Both reports covered a larger land mass than the current investigation area, extending further to the east. BG (2015) also refers to the Geotechnique report of 2007 titled *Environmental Site Assessment for the site at 616 High Street Penrith*, however it appears that the assessment was conducted on the property to the east of the current site.

During the fieldwork for Geotechnique (2007) five bores were drilled to between 12 and 16.8 metres depth using a truck mounted drill rig and various drilling techniques. Bore descriptions provided in Geotechnique (2007) included:

- FILL (0-0.5 m) comprising fine to coarse grained brown gravelly sand, gravelly silty sand with some crushed concrete and bricks;
- ALLUVIUM (sand / silt) (between 1.8 to 3.4 m depth);
- ALLUVIUM (gravel) (between 1.8 and 13 m depth);
- CLAY (between 13 and 13.8 m); and
- SHALE bedrock (below 13 metres).

Groundwater level was assessed to be in excess of 6 m. Various geotechnical recommendations were provided in the report.

The following summarises the pertinent information and findings presented in BG (2015):

- A WorkCover search identified that several tanks were formally located on the site at 616 High Street (outside of the current site) and that these had been removed as part of the previous remediation works;
- A review of the EPA website by Benviron revealed the site was not listed on the database;

- A review of land titles indicates that the site has been owned and used for residential purposes between the early 1930s and 1960s when the sites were generally redeveloped for commercial uses as a car yard; and
- A review of aerial photographs revealed that the site has been vacant and residential up until 1961 when the site was redeveloped for commercial uses (mostly car yard uses) and it remained this way up until 2002.

BG (2007) provided the following conclusions and recommendations:

'Based on the results of this investigation it is considered that the risks to human health and the environment associated with soil contamination at the site are medium to high in the context of the proposed use of the site. The site can be made suitable for the proposed development, subject to the following recommendations:

- *A Detailed Environmental Site Investigation should be undertaken across the entire site in order to clarify the data gaps identified with this report.*
- *A hazardous materials assessment of the buildings should be undertaken prior to demolition being carried out on site.*

If during any potential site works any significant unexpected occurrence us identified site works should cease in that area, at least temporarily, and the environmental consultant should be notified immediately to set up a response to this unexpected occurrence.'

DP notes that BG (2007) does not mention the bowser or potential USTs evidenced from the operational bowser on High Street, and detected using ground penetrating radar.

DP (2021) was a due diligence investigation that included five bores within the subject site (BH2A, BH4, BH6, BH9 and BH10, as shown on Drawing 1, Appendix B), with BH2A positioned adjacent to and hydraulically down-gradient of the UST. The sub-surface profile encountered is discussed in Section 8.1 of this report.

Selected fill, soil and groundwater samples from the bores were analysed at a NATA accredited laboratory for contaminants of concern including metals, TRH, BTEX, PAH, OCP, PCB, Phenols and asbestos.

Reported concentrations of analytes in the soil samples were below the laboratory limits of reporting (LOR) and/or below the adopted health based assessment criteria, adapted primarily from the *National Environment Protection Measure 1999, as amended 2013* (NEPC, 2013). A few exceedances of the ecological based investigation levels were reported in some fill samples in BH10.

Reported concentrations of analytes in the groundwater sample from BH2A were below the LOR and / or the adopted site assessment criteria (SAC).

Summary tables showing the analytical results and the adopted SAC for both soil and groundwater are presented in Appendix D of this report.

Based on the DP (2021) investigation, it was considered that there are not likely to be any significant contamination risks to human health or the ecology associated with the site, and that the site can be made suitable for the proposed development, subject to the following:

- The intrusive investigations undertaken were limited and additional investigations will be required to comply with SEPP55 as part of any future development application. The additional investigations will need to provide additional site coverage for both soils and groundwater, with respect to a proposed development layout, and it would be beneficial to more thoroughly identify the soil waste classifications in areas of proposed bulk excavation;
- A remediation action plan (RAP) will be required to document the remediation and validation process associated with the two USTs and associated infrastructure, and any other contaminants identified through the additional investigations recommended above. The RAP will also document the management process associated with any retained fill materials, given the reported ecological investigation and screening level exceedances;
- A pre-demolition hazardous building materials survey must be undertaken prior to demolition of the existing structures and hardstands. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the then current legislation;
- Incorporation of an unexpected finds protocol in the site construction environmental management plan and the RAP; and
- Validation of any remediation undertaken, culminating in a validation report declaring that the site is suitable for the proposed development.

DP also prepared the report for Toga titled *Detailed Contamination Investigation–Interim Report, 634-652 High Street, 87-91 Union Road, Penrith* (Reference 85867.02.R.001.Rev0) dated 14 March 2018 (DP, 2018b). The interim report presented a summary of DP (2018a) and the field observations made during the sampling phase of this DSI. The report is essentially superseded by this DSI report.

5. Conceptual Site Model

A Conceptual Site Model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became (or may become) contaminated and how potential receptors may be exposed to contamination either in the present or the future, i.e., it enables an assessment of the potential source (S) - pathway (P) - receptor (R) linkages (complete pathways).

5.1 Potential Sources

Based on the previous reports and the site walkover by DP, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified.

S1 - Filling and demolition rubble: Associated with levelling, and site formation, demolition of previous buildings at the site (applies to entire site):

COPC include metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), phenols, volatile organic compounds (VOC), asbestos and synthetic mineral fibres (SMF).

S2 - Historic land use (car yard, service centre, vehicle repair workshops, bowsers and USTs):

COPC (soil, groundwater and surface water) metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols and VOC.

S3 - Off-Site sources - commercial / industrial land to the north:

COPC (particularly in groundwater and surface water) metals, TPH, BTEX, PAH and VOC.

S4 - Existing buildings (it is possible some of the original foundations, slab and frame that were retained during the site redevelopment contain hazardous building materials):

COPC include lead, PCB, asbestos.

5.2 Potential Receptors

Based on the proposed redevelopment the following potential human health and ecological receptors have been identified.

Human Health Receptors:

R1 - Construction and maintenance workers;

R2 - Current and future users (commercial / industrial / residential); and

R3 - Adjacent users (commercial / industrial / high rise residential / public).

Environmental (Ecological) Receptors:

R4 - Groundwater (groundwater);

R5 - Surface water (Nepean River); and

R6 - Terrestrial ecology

5.3 Potential Pathways

The potential pathways for the identified receptors are as follows:

P1 - Ingestion and dermal contact;

P2 - Inhalation of dust and/or vapours;

P3 - Leaching of contaminants and vertical mitigation into groundwater;

P4 - Lateral migration of groundwater providing base flow to watercourses (Nepean River); and

P5 - Contact with terrestrial ecology.

5.4 Summary of Potential Complete Pathways

A 'source-pathway-receptor' approach has been used to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (complete pathways). The possible pathways between the above sources (S1 to S4) and receptors (R1 to R6) are provided in Table 1 below.

Table 1: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor
Diffuse Sources **S1: Filling and demolition rubble** Metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols, VOCs, asbestos and SMF **S2 – Historic Land use (caryard , service, USTs)** COPC include metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols and VOC **S3 – Off-Site Sources Site/s** metals, TPH, BTEX, PAH and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)
	P2: Inhalation of dust and/or vapours	R3: Adjacent users (commercial)
	P3 - Leaching of contaminants and vertical mitigation into groundwater	R4 - Groundwater
	P4 - Lateral migration of groundwater providing baseflow to watercourses (Nepean River) P5 - Lateral migration of groundwater providing base flow to water bodies	R5 - Surface water (Nepean River)
	P6 - Contact with terrestrial ecology	R6 - Terrestrial ecology
S4: Existing buildings lead, PCB, asbestos and SMF	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)

Based on the conceptual site model, DP has conducted a detailed soil and groundwater investigation to assess the potential for broad scale and gross contamination at the site in relation to the historical and current land use and the presence of USTs.

DP notes that as the client intends to demolish the buildings and to excavate the site for construction of the proposed basement carpark, the removal of the USTs and the bulk of the fill on the site will be required as part of the proposed works and will result in the removal of all or most of these possible sources of contamination from the site.

6. Field Work Methods

6.1 Data Quality Objectives and Project Quality Procedures

This DSI has been devised in general accordance with the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the problem;
- Identify the decision;
- Identify inputs into the decision;
- Define the boundary of the assessment;
- Develop a decision rule;
- Specify acceptable limits on decision errors; and
- Optimise the design for obtaining data.

Referenced sections for the respective DQOs listed above are provided in Appendix F.

6.2 Data Quality Indicators

The performance of the assessment in achieving the DQO was assessed through the application of data quality indicators (DQI) as defined by:

Precision:	A quantitative measure of the variability (reproducibility) of data;
Accuracy:	A quantitative measure of the closeness of reported data to the “true” value;
Representativeness:	The confidence (expressed qualitatively) that data are representative of each media present on the site;
Completeness:	A measure of the useable data from a data collection activity; and
Comparability:	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

Further comments on the DQIs are presented in Appendix F.

6.3 Soil Sampling and Monitoring Well Locations and Rationale

Environmental field work, including drilling, well installation and soil sampling, was undertaken between 10 and 11 March 2018. Groundwater development was undertaken on 14 March 2018 and groundwater sampling on 19 March 2018.

The bore locations are shown on Drawing 1, Appendix B. BH101 and BH102 were drilled to a depth of 10 metres bgl and then converted into groundwater monitoring wells. Theses bores were positioned close to the UST and close to the hydraulic down gradient boundary to Stage 1.

A further seven bores (BH103 to BH109) were drilled in an approximate grid pattern across the site for general site coverage and completion of the sampling numbers to the NSW EPA Sampling Design Guidelines (1995). These bores were drilled to a depth of between 1 m and 2 m bgl.

Soil samples were collected from all nine bores. Selected soil samples were analysed for the chemicals of concern listed in Section 5. Samples were selected based on site observations (odour, composition etc.), and their location within the subsoil strata (*i.e.,* fill or natural).

Groundwater samples were collected from the monitoring wells located at BH101 and BH102, as well as Bore 2a installed previously by DP in March 2017 (refer DP, 2021). These samples were analysed for the chemicals of potential concern listed in Section 5.

6.4 Soil Sampling Procedures

Environmental sampling was performed with reference to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on bore logs (Appendix C) and samples selected for laboratory analysis were recorded on DP chain-of-custody (COC) sheets (Appendix E). The general soil sampling procedure comprised:

- Soil samples were recovered directly from augers. The lead augers were replaced between samples;
- Use of disposable sampling equipment including disposal nitrile gloves;
- Transfer of samples into laboratory-prepared glass jars and capping immediately with Teflon lined lids;
- Labelling of sampling containers with individual and unique identification, including project number, sample location and sample depth;
- Field screening of replicate soil samples collected in sealed plastic bags for Total Photo-ionisable Compounds (TOPIC) using a calibrated photo-ionisation detector (PID); and
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory.

Envirolab Services Pty Ltd (Envirolab), accredited by NATA for the analysis undertaken, was employed to conduct the sample analysis. The laboratory is required to carry out in-house QC procedures.

6.5 Groundwater Wells

The two groundwater monitoring wells were constructed of 50 mm diameter acid washed Class 18 PVC casing and machine slotted well screen. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate samples.

The wells were completed with a gravel pack extending to a minimum 0.5 m above the well screen, and then a minimum 0.5 m thick bentonite plug, and backfilled to the surface. All bores were finished with a Gatic cover. Well construction details of the individual monitoring wells are included in the corresponding bore logs (attached) which should be read in conjunction with the attached explanatory notes that define classification methods and terms used to describe the soils and rocks.

Based on the groundwater levels recorded in the wells installed by DP in 2017, the two new wells at BH101 and BH102 were screened from 4 m bgl to the base of the borehole (approximately 10 m bgl).

6.6 Groundwater Sampling

Subsequent to installation, the groundwater monitoring wells at BH101 and BH102, as well as the previously installed Bore 2a were developed by continuous pumping until dry, or until three well volumes were removed, or until the water was free of sediment/mud as determined by the environmental scientist on site. The purpose of well development was to remove as far as practicable sediment introduced via drilling and to facilitate the connection of the well to the local groundwater regime.

All re-used equipment was decontaminated between samples using a 3% solution of Decon 90 and rinsing with deionised water. Physical parameters were taken at all monitoring bores using a TPS water quality meter. The recorded readings for temperature, pH, dissolved oxygen, redox, conductivity and turbidity are recorded in the field sheets attached in Appendix D. The wells were micro-purged using a low flow pump (Geopump) until field parameters (pH, temperature, dissolved oxygen (DO), conductivity, total dissolved solids (TDS) and redox) had stabilised. Once field parameters had stabilised groundwater samples were collected using a low flow pump with adjustable flow rate, with disposable polyethylene tubing using the low flow pump. Samples were placed with a minimum of aeration into appropriately preserved bottles. Groundwater samples obtained for metal analysis were filtered in the field using an in-line disposable 0.45 µm filter that was changed between samples.

Sample handling and transport to Envirolab for analysis was conducted as described for soil sampling.

6.7 Analytical Rationale

The analytical scheme for soil and groundwater samples was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of potential concern identified by the CSM, being metals, TRH, BTEX, PAH, OCP, OPP, PCB, phenols, VOC and asbestos. The results of the analytical testing were compared with the adopted site assessment criteria (SAC) discussed in Section 7.

In terms of soil samples, the surface, near surface and fill samples were selected for analysis, being the most likely samples to contain contaminants at the sampled locations.

7. Site Assessment Criteria

A new mixed use residential, commercial floor space with a three level basement carpark is proposed for the site. A high density residential land use setting has therefore been adopted as the land use in determining the SAC, being the most sensitive (in terms of human and ecological exposure) of the proposed land uses.

Soil and groundwater analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). NEPC (2013) is endorsed by the NSW EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The investigation and screening levels are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g., Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

7.1 Soils

7.1.1 Health Investigation and Screening Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first Stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HILs are applicable to assessing health risk arising via all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HILs apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSLs have been developed for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HIL and HSL are:

- **HIL-B** - Residential with minimal opportunities for soil access;
- **HSL-A & B** - Low -high density residential (for vapour intrusion); and
- **HSL-B** - Residential (high-density) (for direct contact).

It is noted that health screening levels for intrusive maintenance workers are listed in CRC CARE (2011), however, these have not been used as SAC for the current investigation as the screening levels are higher than HSL-B and therefore are considered unlikely to be risk drivers for further assessment.

The HSL adopted are predicated on the inputs summarised in Table 2.

Table 2: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Soil vapour intrusion (inhalation) / Direct contact *	Both potential exposure pathways identified in the CSM. It is noted that direct contact HSLs are generally not the risk drivers for further site assessment for the same contamination source as the HSLs for vapour intrusion (NEPC, 2013).
Soil Type	Sand	Sand filling or sandy filling types were recorded at the site and is the most conservative medium for soil HSLs.
Depth to contamination	0 m to <1 m	Filling comprising sand was present within the top 1 m at the site.

* Developed by CRC CARE (2011)

The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 3.

Table 3: Health Investigation and Screening Levels (HIL and HSL) in mg/kg Unless Otherwise Indicated

Contaminants		HIL- B and HSL- B Direct Contact	HSL- B^3 Vapour Intrusion
Metals	Arsenic	500	-
	Cadmium	150	-
	Chromium (VI)	500	-
	Copper	30,000	-
	Lead	1,200	-
	Manganese	14,000	-
	Mercury (inorganic)	120	-
	Nickel	1,200	-
	Zinc	60,000	-
PAH	Benzo(a)pyrene TEQ[1]	4	-
	Naphthalene	2,200	3
	Total PAH	400	-
TRH	C6 – C10 (less BTEX) [F1]	5,600	45
	>C10-C16 (less Naphthalene) [F2]	4,200	110
	>C16-C34 [F3]	5,800	-
	>C34-C40 [F4]	8,100	-
BTEX	Benzene	140	0.5

Contaminants		HIL- B and HSL- B Direct Contact	HSL- B[3] Vapour Intrusion
	Toluene	21,000	160
	Ethylbenzene	5,900	55
	Xylenes	17,000	40
Phenol	Pentachlorophenol (used as an initial screen)	130	-
OCP	Aldrin + Dieldrin	10	-
	Chlordane	90	-
	DDT+DDE+DDD	600	-
	Endosulfan	400	-
	Endrin	20	-
	Heptachlor	10	-
	HCB	15	-
	Methoxychlor	500	-
OPP	Chlorphyrifos	340	-
PCB [2]		1	-
Cyanide		300	-

Notes:

1 sum of carcinogenic PAH

2 non dioxin-like PCBs only

3 HSL-D vapour intrusion criteria may apply if basement car-park is constructed across the whole site footprint

7.1.2 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL). The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g., motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required.

The EIL is calculated using the following formula:

EIL = ABC + ACL,

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (Standing Council on Environment and Water) website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from the *Interactive (Excel) Calculation Spreadsheet* are shown in the following Table 4.

The following assumptions have been used to determine the EILs:

- A protection level of 80% for urban residential areas and public open space has been adopted;
- The EILs will apply to the top 2 m of the soil profile which corresponds to the root zone and habitation zone of many species;
- Given the likely predominant source of soil contaminants (i.e., historical site uses / fill) the contamination is considered as “aged” (>2 years);
- ABCs have been derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters of NSW for the State in which the site is located, and low for traffic volumes; and
- Location specific pH and CEC values have been used as input parameters from three locations (BH1, BH4 and BH8) from DP (2018a). The average values obtained from these locations were pH 8.4 and CEC 15.5 cmol$_c$/kg, respectively.

Table 4: Ecological Investigation Levels (EIL) in mg/kg

Analyte		**EIL**	**Comments**
Metals	Arsenic	100	*Adopted pH of 8.4 and CEC of 15.5 cmol$_c$/kg; **A conservative assumed clay content of 10% was adopted.
	Copper*	230	
	Nickel*	230	
	Chromium III**	200	
	Lead	1100	
	Zinc*	690	
PAH	Naphthalene	170	
OCP	DDT	180	

7.1.3 Ecological Screening Levels - Petroleum Hydrocarbons

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and benzo(a)pyrene. Site specific data and assumptions as summarised in Table 5 have been used to determine the ESL. The adopted ESL, from Table 1B (6), Schedule B1 of NEPC (2013) are shown in Table 6.

Table 5: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Residential	Proposed land use is mixed use residential, commercial and retail floor space with basement levels.
Soil Texture	Coarse	Site soils include sand in filling, and coarse is the most conservative medium for soil ESLs.

Table 6: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL	Comments
TRH	C6 - C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	45^	
PAH	Benzo(a)pyrene	0.7	

^ ESL for fine soils adopted as a more conservative criterion.

7.1.4 Management Limits - Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSL (F1 to F4). The adopted Management Limits, from Table 1B (7), Schedule B1 of NEPC (2013) are shown in the following Table 7. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;
- The Management Limits for residential land uses apply; and
- Site soils include sand both in natural soils and filling. A “coarse” soil texture has been adopted and is the most conservative texture for soil Management Limits.

Table 7: Management Limits in mg/kg

Analyte		Management Limit
TRH	C_6 - C_{10} (F1) #	700
	>C_{10}-C_{16} (F2) #	1000
	>C_{16}-C_{34} (F3)	2500
	>C_{34}-C_{40} (F4)	10,000

\# Separate management limits for BTEX and naphthalene are not available hence these have not been subtracted from the relevant fractions to obtain F1 and F2

7.1.5 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and / or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of this investigation, rather, the presence or absence of asbestos, at a limit of reporting of 0.1 g/kg, has been adopted for this assessment as an initial screen.

7.2 Groundwater

The potential receptors of impacted groundwater from the site include:

- Localised groundwater (freshwater); and
- Open water bodies (Nepean River).

Given no registered domestic groundwater bores on site, ingestion via drinking water is excluded as a pathway to human receptors.

7.2.1 Groundwater Investigation Levels

The Groundwater Investigation Levels (GIL) adopted in NEPC (2013) are based on:

- *Australian Drinking Water Guidelines* 2011 (ADWG);
- *Guidelines for Managing Risk in Recreational Waters* 2008 (GMRRW); and
- *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality* 2000 (ANZECC & ARMCANZ).

The adopted GIL for the analytes included in the assessment, and the corresponding source documents, are shown in Table 8.

Table 8: Groundwater Investigation Levels (in µg/L except metals)

Analyte		NEPC (2013) Fresh Waters [a]	Comments
Metals (mg/L)	Arsenic (V) Cadmium Chromium (VI) Copper Lead Manganese Mercury (total) Nickel Zinc	0.013 0.0.0002 0.001 0.0014 0.0034 1.9 0.00006 0.011 0.008	
PAH	Naphthalene Benzo(a)pyrene	16 -	
BTEX	Benzene Toluene Ethylbenzene Xylene (o) Xylene (p) Xylenes (Total)	950 - - 350 200 -	

Analyte		NEPC (2013) Fresh Waters[a]	Comments
OCP	Chlordane	0.03	
	DDT	0.006	
	Endosulfan	0.03	
	Endrin	0.01	
	Heptachlor	0.01	
	Aldrin + Dieldrin	-	
	Lindane	0.2	
	Heptachlor Expoxide	-	
PCB	Aroclor 1242	0.3	
	Aroclor 1254	0.01	
Phenols	Pentachorophenol (used as an initial screen)	3.6	
VOC	Chloroform	370[b]	Given the exhaustive list of VOC contaminants, only those VOC concentrations detected above the laboratory reporting limits and with GILs have been included in this table

Notes:

a Investigation levels apply to typically slightly-moderately disturbed systems

b In cases where no high reliability trigger values are provided, the low reliability trigger values provided in ANZECC &ARMCANZ (2000) were used as screening levels

Hardness of 3100 mgCaCo3/L registered for groundwater samples from this site.

7.2.2 Health Screening Levels - Petroleum Hydrocarbons

The generic HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HSL are:

- **HSL- AB** - Low - high density residential.

In addition, the HSL adopted is predicated on the following inputs prescribed in Table 9.

Table 9: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Groundwater vapour intrusion (inhalation)	Exposure pathway via groundwater vapour intrusion affects the adopted HSL.
Soil Type	Sand	Site soils include sand in filling and is the most conservative medium for soil HSLs.
Depth to contamination	2 - <4 m	Whilst recorded depths to groundwater (prior to sampling) of 7 m (Section 8), given the depth of the excavation for the development is currently unknown depth to groundwater after basement construction has been assumed to be 2-4 m.

The adopted groundwater HSL for vapour intrusion, from Table 1A (4), Schedule B1 of NEPC (2013) are shown in the following Table 10.

Table 10: Groundwater Health Screening Levels (HSL) for Vapour Intrusion (µg/L)

Analyte		HSL- AB
TRH	C_6 - C_{10} (less BTEX) [F1]	1000
	>C_{10}-C_{16} (less Naphthalene) [F2]	1000
BTEX	Benzene	800
	Toluene	NL
	Ethylbenzene	NL
	Xylene	NL
PAH	Naphthalene	NL

Note: NL -The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour which is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for a given scenario. For these scenarios no HSL is presented for these chemicals. These are denoted as not limiting 'NL'.

7.3 Preliminary Waste Classification and VENM Assessment

The preliminary waste classification was generally conducted with reference to the six step process as set out in NSW EPA *Waste Classification Guidelines* 2014 (EPA, 2014) which is summarised in Table 11 below.

Table 11: Six Step Classification

Step	Classification	Rationale
1. Is it special waste?	No	Waste not considered to be clinical, asbestos or tyre waste.
2. Is it liquid waste?	No	Waste composed of soil matrix (*i.e.,* no liquids)
3. Is the waste "pre-classified"?	No	Waste not observed to contain coal tar, batteries, lead paint or dangerous goods containers.
4. Does the waste have hazardous waste characteristics?	No	Waste not observed to / or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances.
5. Chemical Assessment	Undertaken	Refer to Section 9.1
6. Is the waste putrescible?	No	All observed components of material were composed of materials pre-classified as non-putrescible (*i.e.,* soils). Organic content is assessed to be minor.

Contaminant threshold (CT1, CT2, SCC1 and SCC2) values for the waste classification are presented in Table D2, Appendix D.

With respect to natural materials underlying the filling, NSW EPA (2014) defines Virgin Excavated Natural Material (VENM) as:

"*natural material (such as clay, gravel, sand, soil or rock fines):*

- *That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or process residues, as a result of industrial, commercial, mining or agricultural activities;*
- *That does not contain any sulfidic ores or soils or any 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."

No other criteria for VENM has been approved. Information provided on the NSW EPA website further specifies that:

- Generators of VENM must assess the past and present activities on the site. The possibility that a previous land use has caused contamination of a site must be considered when assessing whether an excavated material is VENM;
- By definition, VENM cannot contain any other waste, or be 'made' from processed soils. Excavated material that has been processed in any way cannot be classified as VENM; and
- Classification of excavated material as VENM requires certainty that all aspects of the definition are met. Chemical testing may be required to ascertain whether an excavated material is contaminated with manufactured chemicals or process residues, or whether it contains sulfidic ores or soils.

No further NSW EPA guidelines or Gazettal notices have been published/issued that provide additional criteria for assessing VENM.

8. Field Work Results

8.1 Field Observations

As noted in Section 2, the fieldwork for the DSI comprised the drilling of an additional nine bore locations (BH101 to BH109) and the installation of two groundwater monitoring wells at BH101 and BH102. The general sequence of subsurface materials encountered in the bores (including the previous bores) is described below in increasing depth order:

PAVEMENT:	Typically 20-150 mm of asphaltic concrete or concrete (with or without roadbase). BH6 and BH9 encountered no pavement.
FILLING:	Brown and grey silty sand filling, clayey sand and silty clay to depths of 0.1 m to 0.9 m bgl.
Silty CLAY:	Generally stiff, brown silty clay, to borehole termination depths (shallow bores), or to depths of up to 2.5 m bgl in deeper bores.
Silty SAND:	Generally loose to medium dense, brown, silty sand between depths of 0.3 to 3.5 m.
Sandy GRAVEL:	Dense to very dense, brown and grey gravel within a matrix of silty sand below depths of 1.7 m to 3.5 m.
LAMINITE:	Extremely low to low strength laminite (interbedded sandstone and siltstone) below depths of 12.1 m to 13.8 m. Medium and high strength, slightly weathered to fresh laminite below depths of 12.8 m to 14.3 m.

Free groundwater was observed at approximately 7 m bgl in BH2A, BH101 and BH102 during auger drilling. Recorded water levels in the three monitoring wells, on 19 March 2018 were approximately 7.3 m bgl.

There were not visual or olfactory indications of the presence of contaminants in the soils at the bore locations. There were no odours noted in the groundwater monitoring bores during installation of the monitoring wells, or at the time of sampling. Groundwater sampling field sheets are included in Appendix C.

9. Laboratory Results

The results of the laboratory analysis undertaken are presented in the following tables in Appendix D.

Table D1: Soil Results; and

Table D2: Waste Classification; and

Table D3: Groundwater Results.

Additionally results from DP (2021) laboratory analysis are included in Appendix D.

The full NATA laboratory certificates of analysis together with the chain of custody and sample receipt information are attached in Appendix E.

The following sub-sections present a summary of the analytical results for soil and groundwater samples recovered as part of DP (2018a) and as part of the current DSI.

9.1 Soil Testing Results

Reported concentrations of phenols, OCP, OPP, and asbestos in the soil samples were below the laboratory limits of reporting (LOR) and therefore the SAC (Table D1, Appendix D).

Reported concentrations of metals were below SAC with the exception of:

- Lead in sample BH103 0-0.2 (2100 mg/kg) and BD1/20180311 (2040 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg);
- Copper in sample BH103 0-0.2 (250 mg/kg) and BD1/20180311 (255 mg/kg) - exceeding the EIL (230 mg/kg);
- Zinc in sample BH103 0-0.2 (690 mg/kg) and BD1/20180311 (1000 mg/kg) - exceeding the EIL (690 mg/kg);
- Copper in sample BH10/0.5 (2900 mg/kg) and replicate BH10/0.5 (500 mg/kg) - exceeding the EIL (230 mg/kg);
- Lead in sample BH10/0.5 (4400 mg/kg) and replicate BH10/0.5 (3500 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg); and
- Zinc in sample BH10/0.5 (1400 mg/kg) - exceeding the EIL of 690 mg/kg.

Reported concentrations of PAH were below the SAC with the exception of:

- B(a)P in sample BH102 0.2-0.3 (25 mg/kg) - exceeding the ESL (0.7 mg/kg);
- B(a)P in sample BH107 0-0.2 (1.1 mg/kg) - exceeding the ESL (0.7 mg/kg);
- Naphthalene in sample BH102 0.2-0.3 (6.4 mg/kg) - exceeding the HSL (3 mg/kg);
- Carcinogenic PAHs in sample BH102 0.2-0.3 (32.6 mg/kg) - exceeding the HIL B (4 mg/kg); and
- B(a)P in sample BH10/0.5 - concentration 1.2 mg/kg exceeded the ESL of 0.7 mg/kg.

Reported concentrations of PCBs were below SAC with the exception of:

- PCBs (total) in BH103 0-0.2 (5.2 mg/kg) - exceeding the HIL B (1 mg/kg). This sample was retested, and the repeat sample concentration was 8.0 mg/kg.

Reported concentrations of TRHs were below SAC with the exception of:

- C10-C16 (less Naphthalene) in BH102 0.2-0.3 (210 mg/kg) - exceeding the ESL (120 mg/kg); and
- C16-C34 in BH102 0.2-0.3 (2600 mg/kg), BH103 0-0.2 (2800 mg/kg) and BD1/20180311 (4110 mg/kg) - exceeding the ESL (300 mg/kg) and the Management Limit (2500 mg/kg).

Reported concentrations of BTEX were below SAC with the exception of:

- Naphthalene in sample BH102 0.2-0.3 (8 mg/kg) - exceeding the HSL (3 mg/kg).

All of the above exceedances occurred at or close to the surface, in the filling layers. The elevated concentrations are considered to be related to either the presence of contaminated filling, or the historical use of the site as a car yard (i.e., lead, TRH and PAH related to spilt oils and fuels). PCBs are commonly associated with oils in motors and hydraulic systems, transformers and capacitors. BH103 (which recorded the elevated PCB concentration) is located close to the rear of the building on site, which may have been an area for car maintenance and the use of hydraulic lifting machines.

9.1.1 Preliminary Waste Classification

Selected samples based on highest concentrations were analysed using TCLP to determine leachable concentrations. All results for soil samples analysed were below the General Solid Waste (GSW) criteria without leaching (CT1) or with leaching (SCC1, TCLP1) with the exception of the following: Lead in sample BH103 0-0.2 (2100 mg/kg) - exceeding the GSW (SCC1, TCLP) (1500 mg/kg), but complying with the Restricted Solid Waste (RSW) thresholds SCC2 and TCLP2;

- PAH (total) in sample BH102 0.2-0.3 (339 mg/kg) - exceeding the GSW (CT1) (200 mg/kg), but complying with the RSW threshold CT2;
- B(a)P in sample BH102 0.2-0.3 - (25 mg/kg) exceeded the RSW criteria (SCC2) of 23 mg/kg. This sample on current results falls into the hazardous waste category; and
- Lead TCLP in sample BH10/0.5 (44 mg/L) exceeding the RSW criteria (TCLP2) of 20 mg/L. This sample on current results falls into the hazardous waste category.

Based on the results, the filling material encountered at the site is preliminarily classified for off-site disposal purposes as General Solid Waste (non-putrescible), with the exception of the following:

- Fill soils in the vicinity of BH102 which currently classifies as hazardous waste;
- Fill soils in the vicinity of BH10 which currently classifies as hazardous waste;
- Fill soils in the vicinity of BH103 which currently classifies as restricted solid waste.

Further investigations are required to delineate and confirm the waste classifications around these locations.

Soils beneath the current building footprint require investigation to confirm the waste classification.

9.2 Groundwater Testing Results

Reported concentrations of BTEX, TRH, OCP, OPP, PCB, PAH, As, Cd, Cr, Cu, Pb, and Hg in the groundwater samples were below the LOR and therefore the SAC (Table D3, Appendix D). Reported concentrations of nickel and zinc were below the SAC, with the exception of the sample from BH102 which had a nickel concentration of 0.016 mg/L. This exceeded the GIL of 0.011 mg/L. The minor exceedance is not considered to be significant and further investigation of groundwater is not considered to be necessary at this stage.

10. Conclusions and Recommendations

Based on the scope of works undertaken and the results presented in this DSI report, and in DP (2021) it is considered that there are not likely to be any significant contamination risks to human health or the ecology associated with the site. Surficial soil contamination has been identified and there is potentially localised soil contamination around the USTs and beneath the existing building footprint, which need to be managed.

The site can be made suitable for the proposed development, subject to the following:

- A remediation action plan (RAP) will be required to document the remediation and validation process associated with the two USTs and associated infrastructure, the lead, TRH, PCB and PAH contaminated soil identified in this current and the previous investigations, and any other contaminants identified through investigation of the building footprint, once demolished. The RAP will also document the management process associated with any retained fill materials, given the reported SAC exceedances; and
- A pre-demolition hazardous building materials survey must be undertaken prior to demolition of the existing building. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the then current legislation.

Should the site be excavated, and the soil disposed of, the results suggest that there are some areas of fill on the site that contain high levels of heavy metals and PAHs, in particular around BH103 and BH10. The fill in the areas surrounding BH103 and BH10 have been classified as Restricted Solid Waste and Hazardous Waste, respectively. A more detailed investigation for waste classification, including delineation of these areas, is recommended as part of the RAP to inform the soil excavation and off-site disposal process.

11. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at 640 - 652 High Street, 634 - 638 High Street and 87 - 91 Union Road, Penrith in accordance with DP's proposal dated 6 March 2018 and acceptance received from Toga dated 7 March 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Toga Development and Construction Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

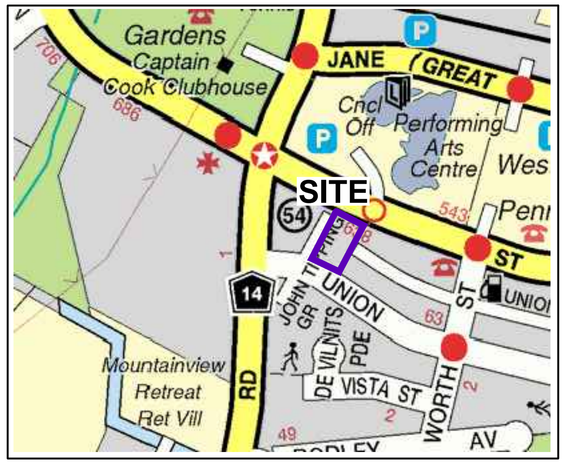
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Drawings



Locality Plan

LEGEND

- ✦ Borehole location (DP, 2017)
- W Groundwater monitoring well (DP, 2017)
- ✦ Groundwater monitoring well (DP, March 2018)
- ✦ Borehole location (DP, March 2018)

NOTE:

1: Base image from Nearmap.com
(Dated Feb. 2017)

2: Test locations are approximate only and were
located using hand-held GPS.

0 10 20 30 40 50 75 100m

1:1000 @ A3

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Toga Development and Construction Pty Ltd

OFFICE: Sydney DRAWN BY: PSCH

SCALE: 1:1000 @ A3 DATE: 13.3.2018

TITLE: **Locations of Boreholes and Wells (Stage 01)**
Proposed Mixed Use Development, 634-652 High Street,
87-91 Union Road, PENRITH

N

PROJECT No: 85867.02

DRAWING No: 1

REVISION: 0

Appendix C

Descriptive Notes

Borehole Logs and Groundwater Field Sheets

Sampling Methods

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approximate Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General

■	Asphalt
▨	Road base
▨	Concrete
▨	Filling

Soils

▨	Topsoil
▨	Peat
▨	Clay
▨	Silty clay
▨	Sandy clay
▨	Gravelly clay
▨	Shaly clay
▨	Silt
▨	Clayey silt
▨	Sandy silt
▨	Sand
▨	Clayey sand
▨	Silty sand
▨	Gravel
▨	Sandy gravel
▨	Cobbles, boulders
▨	Talus

Sedimentary Rocks

▨	Boulder conglomerate
▨	Conglomerate
▨	Conglomeratic sandstone
▨	Sandstone
▨	Siltstone
▨	Laminite
▨	Mudstone, claystone, shale
■	Coal
▨	Limestone

Metamorphic Rocks

▨	Slate, phyllite, schist
▨	Gneiss
▨	Quartzite

Igneous Rocks

▨	Granite
▨	Dolerite, basalt, andesite
▨	Dacite, epidote
▨	Tuff, breccia
▨	Porphyry

BOREHOLE LOG

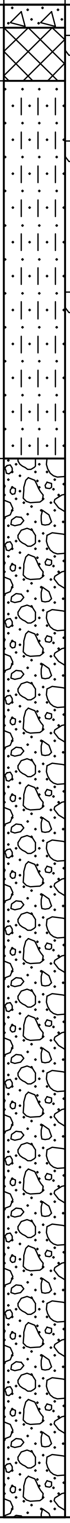
CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.5 mAHD
EASTING: 285932
NORTHING: 6263005
DIP/AZIMUTH: 90°/--

BORE No: BH101
PROJECT No: 85867.02
DATE: 10/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata
27.5	0.15	CONCRETE
	0.5	FILLING - brown silty sand filling, trace of fine gravels (possibly natural)
	3.0	SILTY SAND - brown fine to medium silty sand - becoming red brown at 1.3m
	10.0	SANDY GRAVEL - brown fine to medium sandy gravel and cobbles

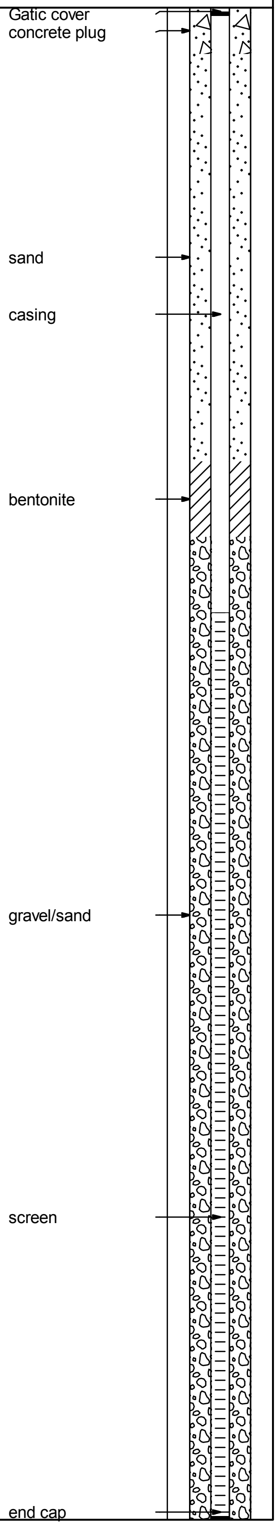
Bore discontinued at 10.0m
target depth reached



Sampling & In Situ Testing			
Type	Depth	Sample	Results & Comments
A	0.2 0.3		
A*	0.9 1.0		
A	1.9 2.0		

Water: 10-03-18 (at 7.0m)

Well Construction Details



RIG: Scout 2 **DRILLER:** LC **LOGGED:** CL **CASING:** HW to 10m
TYPE OF BORING: Solid flight auger to 3.0m, then ODEX to 10.0m
WATER OBSERVATIONS: Groundwater observed at 7.0m
REMARKS: Location coordinates are in MGA94 Zone 56. * Duplicate sample BD1/20180310 taken at 0.9 - 1.0m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

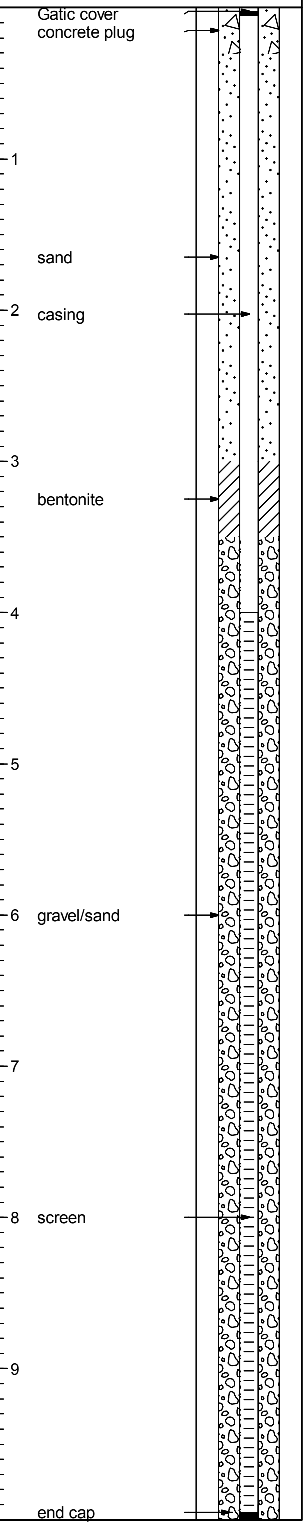
CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.3 mAHD
EASTING: 285891
NORTHING: 6262956
DIP/AZIMUTH: 90°/--

BORE No: BH102
PROJECT No: 85867.02
DATE: 10/3/2018
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Water
0.05	ASPHALTIC CONCRETE			
0.1	ROADBASE - sand and gravel roadbase	A	0.2 0.3	
0.3	FILLING - brown silty sand filling with fine to medium gravel, trace of brick fragments	A	0.4 0.5	
	SILTY SAND - brown fine to medium silty sand, trace of clay	A	0.9 1.0	
	- becoming red-brown at 1.2m	A	1.4 1.5	
3.2	SANDY GRAVEL - brown fine to medium sandy gravel and cobbles			10-03-18 (7.0)
10.0	Bore discontinued at 10.0m - target depth reached			

Well Construction Details



RIG: Scout 2
DRILLER: LC
LOGGED: CL
CASING: HW to 10m

TYPE OF BORING: Solid flight auger to 3.0m, then ODEX to 10.0m
WATER OBSERVATIONS: Groundwater observed at 7.0m
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.4 mAHD
EASTING: 285915
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING - brown and grey silty clay filling with some gravel and sand		A	0.0 0.2				
	0.5	SILTY CLAY - red-brown silty clay, low plasticity, moist		A	0.9 1.0				
	1.5	Bore discontinued at 1.5m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased

TYPE OF BORING: Solid flight auger to 1.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. * Duplicate sample BD1/20180311 taken at 0.0 - 0.2m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.5 mAHD
EASTING: 285931
NORTHING: 6262949
DIP/AZIMUTH: 90°/--

BORE No: BH104
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
		FILLING - light yellow brown clayey sand filling with some gravel		A	0.0 0.2				
27	0.4	SILTY CLAY - red-brown silty clay, low plasticity, dry		A	0.9 1.0				
	1.0	Bore discontinued at 1.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased

TYPE OF BORING: Solid flight auger to 1.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.6 mAHD
EASTING: 285939
NORTHING: 6262980
DIP/AZIMUTH: 90°/--

BORE No: BH105
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Sampling & In Situ Testing Sample	Sampling & In Situ Testing Results & Comments	Water	Well Construction Details
		FILLING - brown silty clay filling with gravel	☒	A	0.0 0.2				
	0.3	SILTY CLAY - red brown silty clay, low plasticity, dry	▨	A	0.9 1.0				
	1.0	Bore discontinued at 1.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased
TYPE OF BORING: Solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.3 mAHD
EASTING: 285922
NORTHING: 6262917
DIP/AZIMUTH: 90°/--

BORE No: BH106
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING - brown silty clay filling with some sand and gravel		A	0.0 0.2				
	0.3	SILTY CLAY - red brown silty clay, low plasticity, dry		A	0.9 1.0				
	1.0	Bore discontinued at 1.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased

TYPE OF BORING: Solid flight auger to 1.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.3 mAHD
EASTING: 285903
NORTHING: 6262934
DIP/AZIMUTH: 90°/--

BORE No: BH107
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown silty clay filling with some gravel	▨	A	0.0 0.2				
	0.9	SILTY CLAY - red brown silty clay, moist	▨	A	0.9 1.0				
	2.0	Bore discontinued at 2.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased
TYPE OF BORING: Solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.2 mAHD
EASTING: 285899
NORTHING: 6262906
DIP/AZIMUTH: 90°/--

BORE No: BH108
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
27		FILLING - brown silty clay filling with some gravel	⊠	A	0.0 0.2				
	0.3	SILTY CLAY - red brown silty clay, damp	▨	A	0.9 1.0				
	1.0	Bore discontinued at 1.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased
TYPE OF BORING: Solid flight auger to 1.0m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 634 - 652 High Street and
87 - 91 Union Road, Penrith

SURFACE LEVEL: 27.2 mAHD
EASTING: 285882
NORTHING: 6262937
DIP/AZIMUTH: 90°/--

BORE No: BH109
PROJECT No: 85867.02
DATE: 11/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
27		FILLING - light yellow brown sandy clay filling with some gravel		A	0.0 0.2				
	0.6	SILTY CLAY - red brown silty clay, low plasticity, moist		A	0.9 1.0				
26	1.0	Bore discontinued at 1.0m - target depth reached							

RIG: Bobcat DT25 **DRILLER:** SS **LOGGED:** LT **CASING:** Uncased

TYPE OF BORING: Solid flight auger to 1.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$

Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing

Bore Vol Normally: 7.2*h

Project and Bore Installation Details

Bore / Standpipe ID:	BH102
Project Name:	Contamination Investigation
Project Number:	[illegible] 85867-02
Site Location:	
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details

Date/Time:	14/3/18, 10am
Purged By:	NW
GW Level (pre-purge):	7.30 m bgl
GW Level (post-purge):	7.36 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	8.77 m bgl
Estimated Bore Volume:	10.58 L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) ≈ 35L.
Equipment:	Twister

Micropurge and Sampling Details

Date/Time:	19/3/18, 10:45am
Sampled By:	NW
Weather Conditions:	Sunny
GW Level (pre-purge):	7.30 m bgl
GW Level (post sample):	7.30 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	8.72 m bgl
Estimated Bore Volume:	10.2 L
Total Volume Purged:	L
Equipment:	geo pump

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (μS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	***0.1° C***	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
10:55	26.9	3.01	8.698	6.05	1.6	67
10:56	25.5	1.58	1252	6.24	1.5	54
10:57	24.8	1.37	1262	6.51	1.6	44
10:58	24.3	1.31	1268	6.38	2.4	39
10:59	24.2	1.38	1275	6.29	13.5	36
11:00	24.4	1.71	1275	6.27	1230	30
11:01	24.7	1.81	1269	6.25	1409	30
11:02	24.2	1.77	1261	6.25	1660	30
11:03	24.1	1.65	1254	6.25	1678	30
11:04	24.0	1.74	1239	6.23	1588	30
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	8.00 m bgl, mid depth
Sample Appearance (e.g. colour, siltiness, odour):	Silty brown
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$

Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_0 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing

Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH101
Project Name:	Proposed Mixed Use Development
Project Number:	85867.02
Site Location:	
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	14/3/18, 11:30am
Purged By:	NW
GW Level (pre-purge):	7.37 m bgl
GW Level (post-purge):	7.33 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	10.22 m bgl
Estimated Bore Volume:	20.52 L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) ≈ 80L
Equipment:	Twister
Micropurge and Sampling Details	
Date/Time:	19/3/18, 9am
Sampled By:	NW
Weather Conditions:	Sunny
GW Level (pre-purge):	7.36 ✓ m bgl
GW Level (post sample):	7.35 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	10.22 m bgl
Estimated Bore Volume:	20.6 L
Total Volume Purged:	L
Equipment:	geopump

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L) ppm	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
9:25	25.1	3.18	1184.	5.50	1.4	10
9:26	24.6	2.34	1174	5.50	1.3	3
9:27	24.1	2.01	1167	5.57	1.5	-1
9:28	23.9	1.93	1162	5.64	7.9	-4
9:29	23.7	1.77	1159	5.68	70.9	-2
9:30	23.7	1.72	1155	5.7	74.0	-3
9:31	23.0	1.70	1153	5.7	75.9	-3
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	8.5 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	Slightly brown, no odour.
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	BD1/20180319 taken from BH101

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
= $\pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH2A
Project Name:	Proposed mixed use development
Project Number:	85867.02
Site Location:	
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	14/3/18 - 12:30pm
Purged By:	NW
GW Level (pre-purge):	7.32 m bgl
GW Level (post-purge):	7.32 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	15.8 m bgl
Estimated Bore Volume:	~~[illegible]~~ 61.1 L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) ∝ 185L
Equipment:	Twister
Micropurge and Sampling Details	
Date/Time:	19/3/18, 10am
Sampled By:	NW
Weather Conditions:	sunny
GW Level (pre-purge):	7.32 m bgl
GW Level (post sample):	7.30 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	15.84 m bgl
Estimated Bore Volume:	61.3 L
Total Volume Purged:	L
Equipment:	geopump

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	***0.1° C***	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
10.13	26.3	2.0	765	5.93	1.6	48
10:14	25.1	1.12	1311	5.99	1.6	34
10:15	24.6	0.84	1309	6.00	1.9	28
10:16	24.2	0.63	1309	6.01	30.8	24
10:17	24.0	0.47	1306	6.02	301	19
10:18	23.9	0.41	1304	6.01	299	18
10:19	23.9	6.34	1302	6.01	304	15
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	12.00 m bgl, mid depth
Sample Appearance (e.g. colour, siltiness, odour):	clear, slightly brown, no odour
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	

Appendix D

Results Tables

Table D1: Summary of Laboratory Results - Soil

						8 metals in soil								Asbestos ID	Cyanide TPhenol 2.5g	ESDAT Combined Compounds															Moisture Content
						Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Asbestos fibres	Phenolics Total	Aldrin + Dieldrin	Benzo(a)pyrene TEQ	Endosulfan	Moderately Harmful Pesticides (NSW Waste 2014)	PAH (total, NSW Waste 2008)	PAH (total, NSW Waste 2009)	PAH (total, NSW Waste 2014)	PCB Total	Pesticides (total, NSW Waste 2008)	Pesticides (total, NSW Waste 2009)	Scheduled chemicals (NSW Waste 2008)	Scheduled chemicals (NSW Waste 2009)	Scheduled chemicals (NSW Waste 2014)	TPH+C10 - C36 (Sum of total)	Carcinogenic PAHs (as BaP TEQ)	Moisture Content
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
EQL						4	0.4	1	1	1	0.1	1	1		5																1
NEPM 2013 Table 1A(1) HILs Res B Soil						500	150		30000	1200	120	1200	60000			10		400												4	
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																															
NEPM 2013 EILs Res/Open Space Aged						100			230	1100		230	690																		
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																															
Field_ID	**LocCode**	**Sample Depth**	**Sample Date**	**Lab_Report_Number**	**Matrix_Description**																										
BD1/20180310	BH101	0.9-1	10/03/2018	187018	Natural	<4	<0.4	9	3	7	<0.1	4	9	-	-	-	<0.172	-	-	<1.35	<1.35	<1.35	-	-	-	-	-	-	<250	<0.172	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	6	16	23	255	2040		24	1000	-	-	-	<1.21	-	-	<7.5	<7.5	<7.5	-	-	-	-	-	-	-	<1.21	8.8
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	10	5	19	<0.1	5	15	0	<5	<0.2	<0.172	<0.2	<0.6	<1.35	<1.35	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172	-
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<4	<0.4	11	4	10	<0.1	4	10	-	-	-	<0.172	-	-	<1.35	<1.35	<1.35	-	-	-	-	-	-	<250	<0.172	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	21	14	38	<0.1	23	43	0	<5	<2	32.57	<2	<6	338.8	338.8	338.8	<7	<6	<6	<13	<13	<13	2949	33	-
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<4	<0.4	10	7	14	<0.1	6	21	-	-	-	<0.172	-	-	<1.35	<1.35	<1.35	-	-	-	-	-	-	<250	<0.172	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	4	12	23	250	2100	0.2	24	690	0	<5	<0.2	0.1275	<0.2	<0.6	1.21	1.21	1.21	6.45	<0.6	<0.6	<1.3	<1.3	<1.3	3025	0.1275	-
BH104	BH104	0-0.2	11/03/2018	187018	Filling	6	<0.4	11	9	29	<0.1	13	44	0	<5	<0.2	<0.172	<0.2	<0.6	<1.35	<1.35	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172	-
BH105	BH105	0-0.2	11/03/2018	187018	Filling	35	0.5	19	31	130	0.3	15	130	0	<5	<0.2	0.629	<0.2	<0.6	5.3	5.3	5.3	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.629	-
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<4	<0.4	11	18	120	0.1	11	120	0	<5	<0.2	0.121	<0.2	<0.6	1.01	1.01	1.01	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.121	-
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<4	<0.4	5	2	4	<0.1	2	7	-	-	-	<0.172	-	-	<1.35	<1.35	<1.35	-	-	-	-	-	-	<250	<0.172	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	4	<0.4	16	24	99	0.4	13	100	0	<5	<0.2	1.382	<0.2	<0.6	11.25	11.25	11.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	1.382	-
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<4	0.6	17	39	450	0.2	10	320	0	<5	<0.2	0.691	<0.2	<0.6	6.25	6.25	6.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.691	-
BH109	BH109	0-0.2	11/03/2018	187018	Filling	5	<0.4	6	8	16	<0.1	9	53	0	<5	<0.2	<0.172	<0.2	<0.6	<1.35	<1.35	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172	-

* different PQLs used by ALS labtoratory compared to Envirolab

** BH103 retested for PCBs (total). The result was 8.0mg/kg.

Table D1: Summary of Laboratory Results - Soil

						OCs in Soil																					OPs in Soil											
						4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NEPM 2013 Table 1A(1) HILs Res B Soil															600					20			10		15	500			340									
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																																						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																																						
NEPM 2013 EILs Res/Open Space Aged														180																								
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																						
Field_ID	**LocCode**	**Sample Depth**	**Sample Date**	**Lab_Report_Number**	**Matrix_Description**																																	
BD1/20180310	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

* different PQLs used by ALS labtoratory compared to Envirolab

** BH103 retested for PCBs (total). The result was 8.0mg/kg.

Table D1: Summary of Laboratory Results - Soil

						PAH/Phenols (SIM)																				
						Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene	Benzo(b,j+k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.05	0.5	0.5	0.5	0.1	0.5	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05
NEPM 2013 Table 1A(1) HILs Res B Soil																										400
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																							3			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m										0.7																
NEPM 2013 EILs Res/Open Space Aged																							170			
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																										
Field_ID	LocCode	Sample Depth	Sample Date	Lab_Report_Number	Matrix_Description																					
BD1/20180310	BH101	0.9-1	10/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	13	<1	17	26	25	36	36	36	14	-	-	38	33	3	66	7.3	15	6.4	54	57	370
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	0.06	<0.5	<0.5	<0.5	0.2	-	-	<0.2	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.2	0.77
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	0.3	0.5	0.6	0.7	0.7	0.4	-	-	0.7	0.5	<0.1	1.2	<0.1	0.4	<0.1	0.5	1.2	5.7
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	0.06	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.4
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	0.2	0.2	0.6	1.1	1.6	1.6	1.6	1.2	-	-	2	1	0.1	2.4	<0.1	1	<0.1	0.9	2.4	13
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	0.4	0.55	0.7	0.8	0.8	0.5	-	-	0.9	0.6	<0.1	1.5	<0.1	0.4	<0.1	0.6	1.4	6.8
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	<0.1	-	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05

						PCBs in Soil								Total Mercury by FIMS	TRH - Semivolatile Fraction								
						Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (total)	Mercury	TPH C10-C40	TPH+C10 - C36 (Sum of total)	TRH >C10 - C16 less Naphthalene (F2)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	50	50	50	50	100	100	50	100	100
NEPM 2013 Table 1A(1) HILs Res B Soil													1	120									
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																	110						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																	120		300	2800			
NEPM 2013 EILs Res/Open Space Aged																							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																		1000	2500	10000			
Field_ID	LocCode	Sample Depth	Sample Date	Lab_Report_Number	Matrix_Description																		
BD1/20180310	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	0.2	5650	4980	<50	<50	4110	1540	<50	2210	2770
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	-	3200	-	210	210	2600	420	79	1900	970
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<2	5.2	5.2**	-	3700	-	69	69	2800	830	<50	1200	1800
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100

* different PQLs used by ALS labtoratory compared to Envirolab

** BH103 retested for PCBs (total). The result was 8.0mg/kg.

Table D1: Summary of Laboratory Results - Soil

						TRH Volatiles/BTEX										
						Benzene	Ethylbenzene	Naphthalene	Toluene	TRH C6 - C10	TRH C6 - C9	vTPH C6 - C10 less BTEX (F1)	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.2	0.5	1	0.5	10	10	10	0.5	0.5	0.5	0.2
NEPM 2013 Table 1A(1) HILs Res B Soil																
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m						0.5	55	3	160			45			40	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m						50	70		85			180			105	
NEPM 2013 EILs Res/Open Space Aged								170								
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil										700						
Field_ID	**LocCode**	**Sample Depth**	**Sample Date**	**Lab_Report_Number**	**Matrix_Description**											
BD1/20180310	BH101	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	<0.2	<0.5	<1	<0.5	<10	<10	<10	<0.5	<0.5	<0.5	<0.2
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	8	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-

* different PQLs used by ALS labtoratory compared to Envirolab

** BH103 retested for PCBs (total). The result was 8.0mg/kg.

Table D2: Summary of Results - Waste Classification

						8 metals in soil									Asbestos ID - soils	Phenols
						Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Lead in TCLP	Mercury	Nickel	Zinc	Asbestos fibres	Phenolics Total
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	-	mg/kg
EQL						4	0.4	1	1	1	0.1	0.1	1	1		5
NSW EPA 2014 General Solid Waste (CT1)						100	20	100		100		4	40			288
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						500	100	1900		1500	5	50	1050			518
NSW EPA 2014 Restricted Solid Waste (CT2)						400	80	400		400		16	160			1152
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						2000	400	7600		6000	20	200	4200			2073
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**											
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	<4	<0.4	9	3	7	-	<0.1	4	9	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	6	16	23	255	2040	-	-	24	1000	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	10	5	19	-	<0.1	5	15	0	<5
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<4	<0.4	11	4	10	-	<0.1	4	10	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	21	14	38	-	<0.1	23	43	0	<5
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<4	<0.4	10	7	14	-	<0.1	6	21	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	4	12	23	250	2100	5.9	0.2	24	690	0	<5
BH104	BH104	0-0.2	11/03/2018	187018	Filling	6	<0.4	11	9	29	-	<0.1	13	44	0	<5
BH105	BH105	0-0.2	11/03/2018	187018	Filling	35	0.5	19	31	130	<0.03	0.3	15	130	0	<5
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<4	<0.4	11	18	120	-	0.1	11	120	0	<5
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<4	<0.4	5	2	4	-	<0.1	2	7	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	4	<0.4	16	24	99	-	0.4	13	100	0	<5
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<4	0.6	17	39	450	0.04	0.2	10	320	0	<5
BH109	BH109	0-0.2	11/03/2018	187018	Filling	5	<0.4	6	8	16	-	<0.1	9	53	0	<5

						ESDAT Combined Compounds												
						Aldrin + Dieldrin	Benzo(a)pyrene	Endosulfan	Moderately Harmful Pesticides (NSW Waste 2014)	PAH (total, NSW Waste 2014)	PCB Total	Pesticides (total, NSW Waste 2008)	Pesticides (total, NSW Waste 2009)	Scheduled chemicals (NSW Waste 2008)	Scheduled chemicals (NSW Waste 2009)	Scheduled chemicals (NSW Waste 2014)	TPH+C10 - C36 (Sum of total)	Carcinogenic PAHs (as BaP TEQ)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																		
NSW EPA 2014 General Solid Waste (CT1)								60	250	200	50					50	10000	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)								108	250	200	50					50	10000	
NSW EPA 2014 Restricted Solid Waste (CT2)								240	1000	800	50					50	40000	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)								432	1000	800	50					50	40000	
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**													
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	<1.21	-	-	<7.5	-	-	-	-	-	-	-	<1.21
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<2	32.57	<2	<6	339	<7	<6	<6	<13	<13	<13	2949	32.57
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.2	0.1275	<0.2	<0.6	1.21	6.45	<0.6	<0.6	<1.3	<1.3	<1.3	3025	0.1275
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.2	0.629	<0.2	<0.6	5.3	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.629
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.2	0.121	<0.2	<0.6	1.01	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.121
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.2	1.382	<0.2	<0.6	11.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	1.382
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.2	0.691	<0.2	<0.6	6.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.691
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172

						OCs in Soil																				
						4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)																										
NSW EPA 2014 General Solid Waste (SCC1, TCLP)																										
NSW EPA 2014 Restricted Solid Waste (CT2)																										
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)																										
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**																					
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

* different PQLs used by ALS labtoratory compared to Envirolab

Table D2: Summary of Results - Waste Classification

Field_ID	LocCode	Sample Depth	Sampled Date	Lab_Report_Nun	Matrix_Description	OPs in Soil											
						Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)								4									
NSW EPA 2014 General Solid Waste (SCC1, TCLP)								7.5									
NSW EPA 2014 Restricted Solid Waste (CT2)								16									
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)								30									
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	-	-	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Field_ID	Sample Depth	PAHs in Soil																					
		Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a) pyrene in TCLP	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total +ve PAH's	Benzo(b,j+k)fluoranthene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		0.1	0.1	0.1	0.1	0.05	0.005	0.5	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.2	0.5	0.5
NSW EPA 2014 General Solid Waste (CT1)						0.8																	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						10																	
NSW EPA 2014 Restricted Solid Waste (CT2)						3.2																	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						23																	
BD1/20180310	0.9-1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BD1/20180311	0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
BH101	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH101	0.9-1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH102	0.2-0.3	13	<1	17	26	25	<0.001	36	36	36	14	33	3	66	7.3	15	6.4	54	57	370	38	-	-
BH102	0.9-1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH103	0-0.2	<0.1	<0.1	<0.1	<0.1	0.06		<0.5	<0.5	<0.5	0.2	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.2	0.77	<0.2	-	-
BH104	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH105	0-0.2	<0.1	<0.1	<0.1	0.3	0.5		0.6	0.7	0.7	0.4	0.5	<0.1	1.2	<0.1	0.4	<0.1	0.5	1.2	5.7	0.7	-	-
BH106	0-0.2	<0.1	<0.1	<0.1	<0.1	0.06		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.4	<0.2	-	-
BH106	0.9-1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH107	0-0.2	<0.1	0.2	0.2	0.6	1.1	<0.001	1.6	1.6	1.6	1.2	1	0.1	2.4	<0.1	1	<0.1	0.9	2.4	13	2	-	-
BH108	0-0.2	<0.1	<0.1	<0.1	0.4	0.55		0.7	0.8	0.8	0.5	0.6	<0.1	1.5	<0.1	0.4	<0.1	0.6	1.4	6.8	0.9	-	-
BH109	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-

Field_ID	Sample Depth	PCBs in Soil								Total Mercury by FIMS	TRH Soil C10-C40 NEPM								
		Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (total)	Mercury	TPH C10-C40	TPH+C10 - C36 (Sum of total)	TRH >C10 - C16 less Naphthalene (F2)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	50	50	50	50	100	100	50	100	100
NSW EPA 2014 General Solid Waste (CT1)										4		10000							
NSW EPA 2014 General Solid Waste (SCC1, TCLP)									50	50		10000							
NSW EPA 2014 Restricted Solid Waste (CT2)										16		40000							
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)									50	200		40000							
BD1/20180310	0.9-1	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BD1/20180311	0-0.2	-	-	-	-	-	-	-	-	0.2	5650	4980	<50	<50	4110	1540	<50	2210	2770
BH101	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH101	0.9-1	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH102	0.2-0.3	<1	<1	<1	<1	<1	<1	<1	<1	-	3200	-	210	210	2600	420	79	1900	970
BH102	0.9-1	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH103	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<2	5.2	5.2	-	3700	-	69	69	2800	830	<50	1200	1800
BH104	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH105	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	0.9-1	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH107	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH108	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH109	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100

* different PQLs used by ALS labtoratory compared to Envirolab

Table D2: Summary of Results - Waste Classification

						vTRH & BTEXN in Soil NEPM										
						Benzene	Ethylbenzene	Naphthalene	Toluene	TRH C6 - C10	TRH C6 - C9	vTPH C6 - C10 less BTEX (F1)	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.2	1	1	0.5	25	25	25	2	1	1	0.2
NSW EPA 2014 General Solid Waste (CT1)						10	600		288		650				1000	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						18	1080		518		650				1800	
NSW EPA 2014 Restricted Solid Waste (CT2)						40	2400		1152		2600				4000	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						72	4320		2073		2600				7200	
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**											
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	<0.2	<0.5	<1	<0.5	<10	<10	<10	<0.5	<0.5	<0.5	<0.2
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	8	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-

* different PQLs used by ALS labtoratory compared to Envirolab

Table D3: Summary of Laboratory Results - Groundwater

				8 HM in water - dissolved							
				Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand 2-4m											
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand 2-4m											
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m											
NEPM 2013 Table 1C GILs, Fresh Waters					0.0002		0.0014	0.0034	0.00006	0.011	0.008
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**								
BH101	BH101	BH101	19/03/2018	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	0.002	0.003
BH102	BH102	BH102	19/03/2018	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	0.016	0.006
BH2A	BH2A	BH2A	19/03/2018	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	0.002	0.006
BD1/20180319	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-

				OCP in water - low level																			
				4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000006	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand 2-4m																							
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand 2-4m																							
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m																							
NEPM 2013 Table 1C GILs, Fresh Waters												0.000006					0.00001		0.0002	0.00001			
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																				
BH101	BH101	BH101	19/03/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
BH102	BH102	BH102	19/03/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
BH2A	BH2A	BH2A	19/03/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.000006	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
BD1/20180319	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A1 - Soil Results

						PAHs in Soil					Inorganics	Metals									TPH												BTEX		
					Scheduled chemicals (NSW Waste 2009)	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs	Moisture	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	TCLP Pb	Mercury	Nickel	Zinc	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.5	0.5	0.5	0.2	0.05	0.1	4	0.4	1	1	1		0.1	1	1	50	100	100	50	25	50	100	100		50	25	25	0.2	1	0.5
NSW EPA (2014) General Solid Waste (CT1)												100	20			100		4	40														10	600	288
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)					<50							500	100			1500	5	50	1050						650				10000				18	1080	518
NSW EPA (2014) Restricted Solid Waste (CT2)												400	80			400		16	160														40	2400	1152
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)					<50							2000	400			6000	20	200	4200						2600				40000				72	4320	2073
ANZECC Background Ranges																																			
Olszowy et al (1995) - Urban Soils (0-150mm) [4]												<5-40	<0.5-14	5-131	<5-466	3-1465		<0.1-3.4	<5-160	5-3820					NA	NA	NA	NA					NA	NA	NA
Berkman 4th Edition (2001) - Field Geologists Manual [5]												1-50	1	5-1000	2-100	2-200		0.03	5-500	10-300					NA	NA	NA	NA					NA	NA	NA
NEPM 2013 Table 1A(1) HILs Res B Soil												500	150		30000	1200		120	1200	60000															
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																								110							45		0.5	55	160
NEPM 2013 EILs Res/Open Space Aged												100			230	1100			230	690															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																						300	2800	120							180		50	70	85
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																					1000	2500	10000									700			
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																															
BD1	BD1		2/03/2017	Fill	-	<0.5	<0.5	<0.5	<0.2	<0.05	11	<4	<0.4	8	69	18		<0.1	58	38	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH1	BH1	0.5	6/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	0.4	2.1	11	<4	<0.4	7	25	110		<0.1	12	140	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	<4	<0.4	11	32	170		0.3	18	210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<1.3	1.8	1.8	1.8	2.2	11	9.3	6	0.4	43	2900	4400	44	0.5	34	1400	<50	110	<100	<50	<25	<50	<100	100	175	110	<25	<25	<0.2	<1	<0.5
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	4	<0.4	49	500	3500		0.3	40	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	10	<4	<0.4	8	4	90		<0.1	3	30	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH3	BH3	0.2	1/03/2017	Fill	-	<0.5	<0.5	<0.5	<0.2	0.4	9.1	<4	<0.4	16	49	52		<0.1	39	83	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH3	BH3	0.5	1/03/2017	Natural	<1.3	<0.5	<0.5	<0.5	0.2	0.85	11	<4	<0.4	9	8	43		<0.1	4	48	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH4	BH4	0.5	2/03/2017	Natural	-	<0.5	<0.5	<0.5	<0.2	<0.05	6.3	<4	<0.4	13	7	15		<0.1	5	42	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH5	BH5	0.5	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	0.3	1.7	6.6	5	0.8	46	23	88		0.1	44	310	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH6	BH6	0.1	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	6.6	<4	0.5	6	8	54		<0.1	6	180	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH7	BH7	0.5	2/03/2017	Natural	-	<0.5	<0.5	<0.5	<0.2	0.1	11	<4	<0.4	12	22	41		0.1	6	47	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
BH8	BH8	0.3	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	14	<4	<0.4	34	67	10		<0.1	51	38	<50	<100	270	<50	<25	<50	<100	160	235	270	<25	<25	<0.2	<1	<0.5
BH9	BH9	0.5	2/03/2017	Fill	<1.3	<0.5	<0.5	<0.5	<0.2	<0.05	13	<4	<0.4	11	7	47		<0.1	6	38	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5
TB			2/03/2017		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	<25	-	-	-	-	-	<25	<25	<0.2	<1	<0.5

								Halogenated Benzenes	PAH/Phenols																		Polychlorinated Biphenyls									
					Xylene (m & p)	Xylene (o)	Xylene Total	Hexachlorobenzene	PAH (total, NSW Waste 2009)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	TCLP B(a)P	Benzo(g,h,i)perylene	Carcinogenic PAHs (as BaP TEQ)	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Phenolics Total	Pyrene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	a-BHC
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					2	1	1	0.1		0.1	0.1	0.1	0.1	0.05		0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA (2014) General Solid Waste (CT1)							1000							0.8																						
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)							1800		200					10	0.04																			<50		
NSW EPA (2014) Restricted Solid Waste (CT2)							4000							3.2																						
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)							7200		800					23	0.16																			<50		
ANZECC Background Ranges																																				
Olszowy et al (1995) - Urban Soils (0-150mm) [4]					NA	NA	NA		NA																									NA		
Berkman 4th Edition (2001) - Field Geologists Manual [5]					NA	NA	NA		NA																									NA		
NEPM 2013 Table 1A(1) HILs Res B Soil								15	400								4																	1		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m							40																3													
NEPM 2013 EILs Res/Open Space Aged																							170													
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m							105							0.7																						
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																				
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																
BD1	BD1		2/03/2017	Fill	<2	<1	<1	-	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.5	6/03/2017	Fill	<2	<1	<1	<0.1	1.9	<0.1	<0.1	0.1	0.2	0.1		0.1	0.178	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.3	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	9.3	<0.1	<0.1	0.1	1.2	1.2	<0.001	0.9	1.597	0.8	0.2	1.8	<0.1	0.6	<0.1	0.3	<5	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH3	BH3	0.2	1/03/2017	Fill	<2	<1	<1	-	1.03	<0.1	<0.1	<0.1	<0.1	0.08		<0.1	0.141	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	-	0.2	-	-	-	-	-	-	-	-	-	-
BH3	BH3	0.5	1/03/2017	Natural	<2	<1	<1	<0.1	1.23	<0.1	<0.1	<0.1	<0.1	0.08		<0.1	0.141	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH4	BH4	0.5	2/03/2017	Natural	<2	<1	<1	-	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH5	BH5	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	1.65	<0.1	<0.1	<0.1	0.1	0.1		0.1	0.168	0.2	<0.1	0.3	<0.1	<0.1	<0.1	0.2	<5	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH6	BH6	0.1	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH7	BH7	0.5	2/03/2017	Natural	<2	<1	<1	-	0.725	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH8	BH8	0.3	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH9	BH9	0.5	2/03/2017	Fill	<2	<1	<1	<0.1	<1.35	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.172	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TB			2/03/2017		<2	<1	<1	-	-	-	-	-	-	-		-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A1 - Soil Results

					Organochlorine Pesticides																			Organophosphorous Pesticides											Pesticides		Asbestos
					Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Pesticides (total, NSW Waste 2009)	Parathion	Asbestos fibres
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
EQL					0.1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	
NSW EPA (2014) General Solid Waste (CT1)																										4											
NSW EPA (2014) General Solid Waste (SCC1, TCLP1)																										7.5									250		
NSW EPA (2014) Restricted Solid Waste (CT2)																										16											
NSW EPA (2014) Restricted Solid Waste (SCC2, TCLP2)																										30									1000		
ANZECC Background Ranges																																					
Olszowy et al (1995) - Urban Soils (0-150mm) ^{4}																																			NA		
Berkman 4th Edition (2001) - Field Geologists Manual ^{5}																																			NA		
NEPM 2013 Table 1A(1) HILs Res B Soil						10							600					20			10		500			340											
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																																					
NEPM 2013 EILs Res/Open Space Aged												180																									
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																																					
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																					
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																	
BD1	BD1		2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.5	6/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH1 - [TRIPLICATE]	BH1	0.5	6/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10	BH10	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH10 - [TRIPLICATE]	BH10	0.5	2/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.2	3/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH3	BH3	0.2	1/03/2017	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH3	BH3	0.5	1/03/2017	Natural	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH4	BH4	0.5	2/03/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	BH5	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH6	BH6	0.1	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH7	BH7	0.5	2/03/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH8	BH8	0.3	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
BH9	BH9	0.5	2/03/2017	Fill	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	0
TB			2/03/2017		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Groundwater Results

				PAHs in Water - Low Level	Metals								TPH										BTEX					PAH/Phenols													
				Benzo(a)pyrene TEQ	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
				µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.5	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.05	0.1	0.1	0.05	0.01	0.05	0.1	0.1	0.01	0.01	0.001	0.001	0.001	0.002	0.001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand																																									
2-4m																1					1		0.8	NL	NL														NL		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																																									
2-4m																NL					6		5	NL	NL														NL		
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion																																									
2-4m																NL|1					NL|1|6		0.8|4|5	NL	NL														NL		
NEPM 2013 Table 1C GILs, Fresh Waters						0.0002		0.0014	0.0034	0.00006	0.011	0.008											0.95				0.35												0.016		
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																																						
BH2-GW1	BH2-GW1		14/03/2017	<0.5	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	<0.001	0.002	<0.05	<0.1	<0.1	<0.05	0.015	<0.05	<0.1	<0.1	0.017	0.017	<0.001	<0.001	<0.001	<0.002	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001

Table D3: Summary of Laboratory Results - Groundwater

				OP in water LL ANZECCF/ADWG										
				Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00005	0.00001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand														
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand														
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m														
NEPM 2013 Table 1C GILs, Fresh Waters						0.00001		0.00001		0.00015		0.0002	0.00005	
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**											
BH101	BH101	BH101	19/03/2018	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001
BH102	BH102	BH102	19/03/2018	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001
BH2A	BH2A	BH2A	19/03/2018	<0.00002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00005	<0.00001
BD1/20180319	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-	-	-	-
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-	-	-	-

				PAHs in Water - Low Level																
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total +ve PAH's
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.0001	0.0001	0.0001	0.0001	0.0001	0.0005	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand																NL			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																NL			
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m																NL			
NEPM 2013 Table 1C GILs, Fresh Waters																0.016			
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																
BH101	BH101	BH101	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	0
BH102	BH102	BH102	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	0
BH2A	BH2A	BH2A	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	0
BD1/20180319	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

				PAHs in Water																
				Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total +ve PAH's
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand																NL			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																NL			
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m																NL			
NEPM 2013 Table 1C GILs, Fresh Waters																0.016			
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																
BH101	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	BH102	19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2A	BH2A	BH2A	19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180319	BH101	BH101	19/03/2018	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D3: Summary of Laboratory Results - Groundwater

				PCBs in Water - Low Level							Phenols in Water	TRH Water(C10-C40) NEPM							vTRH & BTEXN in Water NEPM								
				Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Phenolics Total	TRH >C10 - C16 less Naphthalene (F2)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Ethylbenzene	Naphthalene	Toluene	TRH C6 - C10	TRH C6 - C9	vTPH C6 - C10 less BTEX (F1)	Xylene (m & p)	Xylene (o)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.05	0.05	0.05	0.1	0.1	0.05	0.1	0.1	0.001	0.001	0.001	0.001	0.01	0.01	0.01	0.002	0.001
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand												1							0.8	NL	NL	NL			1		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sanc												NL							5	NL	NL	NL			6		
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion 2-4m												NL|1							0.8|4|5	NL	NL	NL			NL|1|6		
NEPM 2013 Table 1C GILs, Fresh Waters							0.0003		0.00001										0.95		0.016						0.35
Field_ID	**LocCode**	**WellCode**	**Sampled_Date-Time**																								
BH101	BH101	BH101	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.002	<0.001
BH102	BH102	BH102	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.002	<0.001
BH2A	BH2A	BH2A	19/03/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.002	<0.001
BD1/20180319	BH101	BH101	19/03/2018	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.1	<0.1	<0.05	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.002	<0.001
Trip Blank	Trip Blank		19/03/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.002	<0.001

Appendix E

Laboratory Reports and Chain of Custody

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 187018

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Celine Li
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.02, Penrith**
Number of Samples	13 Soil
Date samples received	12/03/2018
Date completed instructions received	12/03/2018

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	19/03/2018
Date of Issue	19/03/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Lucy Zhu, Asbsestos Analyst
Nick Sarlamis, Inorganics Supervisor

Authorised By

David Springer

David Springer, General Manager

ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187018-1	187018-2	187018-3	187018-4	187018-5
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.2-0.3	0.9-1.0	0.2-0.3	0.9-1.0	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	10/03/2018	10/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
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	8	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	89	94	92	89	88

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187018-6	187018-7	187018-8	187018-9	187018-10
Your Reference	UNITS	BH104	BH105	BH106	BH106	BH107
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.9-1.0	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	92	94	92	89

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		187018-11	187018-12	187018-13
Your Reference	UNITS	BH108	BH109	BD1/20180310
Depth		0.0-0.2	0.0-0.2	-
Date Sampled		11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	89	92	92

svTRH (C10-C40) in Soil						
Our Reference		187018-1	187018-2	187018-3	187018-4	187018-5
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.2-0.3	0.9-1.0	0.2-0.3	0.9-1.0	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	10/03/2018	10/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	79	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	1,900	<100	1,200
TRH C_{29} - C_{36}	mg/kg	<100	<100	970	<100	1,800
TRH >C_{10} -C_{16}	mg/kg	<50	<50	210	<50	69
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	210	<50	69
TRH >C_{16} -C_{34}	mg/kg	<100	<100	2,600	<100	2,800
TRH >C_{34} -C_{40}	mg/kg	<100	<100	420	<100	830
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	3,200	<50	3,700
Surrogate o-Terphenyl	%	70	81	#	81	125

svTRH (C10-C40) in Soil						
Our Reference		187018-6	187018-7	187018-8	187018-9	187018-10
Your Reference	UNITS	BH104	BH105	BH106	BH106	BH107
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.9-1.0	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	85	84	82	84	80

svTRH (C10-C40) in Soil				
Our Reference		187018-11	187018-12	187018-13
Your Reference	UNITS	BH108	BH109	BD1/20180310
Depth		0.0-0.2	0.0-0.2	-
Date Sampled		11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	81	81	81

PAHs in Soil						
Our Reference	UNITS	187018-1	187018-2	187018-3	187018-4	187018-5
Your Reference		BH101	BH101	BH102	BH102	BH103
Depth		0.2-0.3	0.9-1.0	0.2-0.3	0.9-1.0	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	10/03/2018	10/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Naphthalene	mg/kg	<0.1	<0.1	6.4	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	13	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	7.3	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	54	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	17	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	66	<0.1	0.2
Pyrene	mg/kg	<0.1	<0.1	57	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1	26	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	33	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	38	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	25	<0.05	0.06
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	15	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	3.0	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	14	<0.1	0.2
Total +ve PAH's	mg/kg	<0.05	<0.05	370	<0.05	0.77
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	36	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	36	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	36	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	108	103	100	103	103

PAHs in Soil						
Our Reference		187018-6	187018-7	187018-8	187018-9	187018-10
Your Reference	UNITS	BH104	BH105	BH106	BH106	BH107
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.9-1.0	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
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	<0.1	0.9
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	1.2	0.2	<0.1	2.4
Pyrene	mg/kg	<0.1	1.2	0.2	<0.1	2.4
Benzo(a)anthracene	mg/kg	<0.1	0.3	<0.1	<0.1	0.6
Chrysene	mg/kg	<0.1	0.5	<0.1	<0.1	1.0
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.7	<0.2	<0.2	2
Benzo(a)pyrene	mg/kg	<0.05	0.5	0.06	<0.05	1.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.4	<0.1	<0.1	1.0
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.4	<0.1	<0.1	1.2
Total +ve PAH's	mg/kg	<0.05	5.7	0.4	<0.05	13
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	0.6	<0.5	<0.5	1.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.7	<0.5	<0.5	1.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.7	<0.5	<0.5	1.6
Surrogate p-Terphenyl-d14	%	109	106	106	107	103

PAHs in Soil				
Our Reference		187018-11	187018-12	187018-13
Your Reference	UNITS	BH108	BH109	BD1/20180310
Depth		0.0-0.2	0.0-0.2	-
Date Sampled		11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.6	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.5	<0.1	<0.1
Pyrene	mg/kg	1.4	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.4	<0.1	<0.1
Chrysene	mg/kg	0.6	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.9	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.55	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.5	<0.1	<0.1
Total +ve PAH's	mg/kg	6.8	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	106	104	105

Organochlorine Pesticides in soil						
Our Reference		187018-1	187018-3	187018-5	187018-6	187018-7
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
HCB	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Surrogate TCMX	%	112	90	97	106	104

Organochlorine Pesticides in soil					
Our Reference		187018-8	187018-10	187018-11	187018-12
Your Reference	UNITS	BH106	BH107	BH108	BH109
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	102	103	105

Organophosphorus Pesticides						
Our Reference		187018-1	187018-3	187018-5	187018-6	187018-7
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Surrogate TCMX	%	112	90	97	106	104

Organophosphorus Pesticides					
Our Reference		187018-8	187018-10	187018-11	187018-12
Your Reference	UNITS	BH106	BH107	BH108	BH109
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	102	103	105

PCBs in Soil						
Our Reference		187018-1	187018-3	187018-5	187018-6	187018-7
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Aroclor 1016	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<1	<2	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<1	5.2	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<1	5.2	<0.1	<0.1
Surrogate TCLMX	%	112	90	97	106	104

PCBs in Soil					
Our Reference		187018-8	187018-10	187018-11	187018-12
Your Reference	UNITS	BH106	BH107	BH108	BH109
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	106	102	103	105

Acid Extractable metals in soil						
Our Reference		187018-1	187018-2	187018-3	187018-4	187018-5
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.2-0.3	0.9-1.0	0.2-0.3	0.9-1.0	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	10/03/2018	10/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	12
Chromium	mg/kg	10	11	21	10	23
Copper	mg/kg	5	4	14	7	250
Lead	mg/kg	19	10	38	14	2,100
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	5	4	23	6	24
Zinc	mg/kg	15	10	43	21	690

Acid Extractable metals in soil						
Our Reference		187018-6	187018-7	187018-8	187018-9	187018-10
Your Reference	UNITS	BH104	BH105	BH106	BH106	BH107
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.9-1.0	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Arsenic	mg/kg	6	35	<4	<4	4
Cadmium	mg/kg	<0.4	0.5	<0.4	<0.4	<0.4
Chromium	mg/kg	11	19	11	5	16
Copper	mg/kg	9	31	18	2	24
Lead	mg/kg	29	130	120	4	99
Mercury	mg/kg	<0.1	0.3	0.1	<0.1	0.4
Nickel	mg/kg	13	15	11	2	13
Zinc	mg/kg	44	130	120	7	100

Acid Extractable metals in soil				
Our Reference		187018-11	187018-12	187018-13
Your Reference	UNITS	BH108	BH109	BD1/20180310
Depth		0.0-0.2	0.0-0.2	-
Date Sampled		11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018
Arsenic	mg/kg	<4	5	<4
Cadmium	mg/kg	0.6	<0.4	<0.4
Chromium	mg/kg	17	6	9
Copper	mg/kg	39	8	3
Lead	mg/kg	450	16	7
Mercury	mg/kg	0.2	<0.1	<0.1
Nickel	mg/kg	10	9	4
Zinc	mg/kg	320	53	9

Misc Soil - Inorg						
Our Reference		187018-1	187018-3	187018-5	187018-6	187018-7
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg					
Our Reference		187018-8	187018-10	187018-11	187018-12
Your Reference	UNITS	BH106	BH107	BH108	BH109
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5

Moisture						
Our Reference		187018-1	187018-2	187018-3	187018-4	187018-5
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.2-0.3	0.9-1.0	0.2-0.3	0.9-1.0	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	10/03/2018	10/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Moisture	%	7.7	7.6	4.5	6.2	11

Moisture						
Our Reference		187018-6	187018-7	187018-8	187018-9	187018-10
Your Reference	UNITS	BH104	BH105	BH106	BH106	BH107
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.9-1.0	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Moisture	%	3.4	8.0	7.0	2.8	9.5

Moisture				
Our Reference		187018-11	187018-12	187018-13
Your Reference	UNITS	BH108	BH109	BD1/20180310
Depth		0.0-0.2	0.0-0.2	-
Date Sampled		11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	13/03/2018	13/03/2018	13/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018
Moisture	%	9.1	6.8	7.3

Asbestos ID - soils						
Our Reference		187018-1	187018-3	187018-5	187018-6	187018-7
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	16/03/2018	16/03/2018	16/03/2018	16/03/2018	16/03/2018
Sample mass tested	g	Approx. 40g	Approx. 45g	Approx. 40g	Approx. 40g	Approx. 40g
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	-	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

Asbestos ID - soils					
Our Reference		187018-8	187018-10	187018-11	187018-12
Your Reference	UNITS	BH106	BH107	BH108	BH109
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	16/03/2018	16/03/2018	16/03/2018	16/03/2018
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 45g	Approx. 45g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	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

Misc Inorg - Soil						
Our Reference		187018-1	187018-3	187018-8	187018-10	187018-11
Your Reference	UNITS	BH101	BH102	BH106	BH107	BH108
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Date analysed	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
pH 1:5 soil:water	pH Units	8.9	9.5	8.4	8.7	7.8

Misc Inorg - Soil		
Our Reference		187018-12
Your Reference	UNITS	BH109
Depth		0.0-0.2
Date Sampled		11/03/2018
Type of sample		Soil
Date prepared	-	14/03/2018
Date analysed	-	14/03/2018
pH 1:5 soil:water	pH Units	6.7

CEC						
Our Reference		187018-1	187018-3	187018-8	187018-10	187018-11
Your Reference	UNITS	BH101	BH102	BH106	BH107	BH108
Depth		0.2-0.3	0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	10/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	14/03/2018	14/03/2018	14/03/2018	14/03/2018	14/03/2018
Date analysed	-	15/03/2018	15/03/2018	15/03/2018	15/03/2018	15/03/2018
Exchangeable Ca	meq/100g	7.2	15	9.3	9.3	10
Exchangeable K	meq/100g	0.2	0.1	0.2	0.2	0.4
Exchangeable Mg	meq/100g	0.28	2.1	0.70	2.8	2.1
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	7.7	18	10	12	13

CEC		
Our Reference		187018-12
Your Reference	UNITS	BH109
Depth		0.0-0.2
Date Sampled		11/03/2018
Type of sample		Soil
Date prepared	-	14/03/2018
Date analysed	-	15/03/2018
Exchangeable Ca	meq/100g	1.8
Exchangeable K	meq/100g	0.2
Exchangeable Mg	meq/100g	1.4
Exchangeable Na	meq/100g	<0.1
Cation Exchange Capacity	meq/100g	3.4

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.
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-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
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).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. ‘EQ PQL’values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. ‘EQ zero’values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. ‘EQ half PQL’values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			14/03/2018	1	14/03/2018	14/03/2018		14/03/2018	14/03/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	113	106
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	113	106
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	92	84
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	115	103
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	114	107
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	122	117
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	109	104
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	97	1	89	89	0	92	89

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]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	14/03/2018	14/03/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	89	90	1	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			14/03/2018	1	14/03/2018	14/03/2018		14/03/2018	14/03/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	121	78
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	106	111
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	121	78
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	106	111
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	#
Surrogate o-Terphenyl	%		Org-003	80	1	70	70	0	125	#

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	14/03/2018	14/03/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	81	83	2	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	96	#
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	#
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	96	#
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	94	#
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	82	#
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	126	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	97	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	110	1	108	102	6	122	105

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	0.6	0.4	40	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	1.5	1.2	22	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	1.4	1.2	15	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	0.4	0.3	29	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	0.6	0.6	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	0.9	0.7	25	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	0.55	0.5	10	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	0.4	0.4	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	0.5	0.4	22	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	106	109	3	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	81
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	106
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	82	109
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	99	110
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	116
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	104	121
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	92	110
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	119
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	75	124
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	98	128
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	112	1	112	106	6	89	106

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	11	103	104	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	111	104
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	112	114
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	113	108
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	113	108
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	118	103
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	114	71
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	125	97
Surrogate TCMX	%		Org-008	112	1	112	106	6	89	106

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	11	103	104	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date extracted	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	96	84
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	112	1	112	106	6	89	106

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	11	103	104	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	5	13/03/2018	13/03/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	5	<2	<2	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	5	5.2	12	79	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	5	97	93	4	[NT]	[NT]

Client Reference: 85867.02, Penrith

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date prepared	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			14/03/2018	1	14/03/2018	14/03/2018		14/03/2018	14/03/2018
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	110	92
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	105	89
Chromium	mg/kg	1	Metals-020	<1	1	10	10	0	110	83
Copper	mg/kg	1	Metals-020	<1	1	5	5	0	115	111
Lead	mg/kg	1	Metals-020	<1	1	19	23	19	105	115
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	99	101
Nickel	mg/kg	1	Metals-020	<1	1	5	4	22	106	76
Zinc	mg/kg	1	Metals-020	<1	1	15	13	14	105	91

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	14/03/2018	14/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	0.6	0.6	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	17	22	26	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	39	37	5	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	450	370	20	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	0.2	0.2	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	10	15	40	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	320	290	10	[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]	5	13/03/2018	13/03/2018		[NT]	[NT]
Date analysed	-			[NT]	5	14/03/2018	14/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	5	4	5	22	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	5	12	13	8	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	5	23	22	4	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	5	250	250	0	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	5	2100	2500	17	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	5	0.2	0.2	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	5	24	29	19	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	5	690	710	3	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	187018-3
Date prepared	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Date analysed	-			13/03/2018	1	13/03/2018	13/03/2018		13/03/2018	13/03/2018
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	95	104

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			14/03/2018	12	14/03/2018	14/03/2018		14/03/2018	[NT]
Date analysed	-			14/03/2018	12	14/03/2018	14/03/2018		14/03/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	12	6.7	6.5	3	101	[NT]

Client Reference: 85867.02, Penrith

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			14/03/2018	1	14/03/2018	14/03/2018		14/03/2018	[NT]
Date analysed	-			15/03/2018	1	15/03/2018	15/03/2018		15/03/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	1	7.2	8.9	21	101	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	1	0.2	0.2	0	114	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	1	0.28	0.27	4	102	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	1	<0.1	<0.1	0	107	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Report Comments

PAHs in Soil (sample 3) - PQL has been raised due to the high concentration of analytes in the sample/s, resulting in the sample/s requiring dilution.
Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Organochlorine Pesticides,OP and PCBs in soil (sample 3) - PQL has been raised due to interference from analytes(other than those being tested) in the sample/s.
PCBs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s.

svTRH (C10-C40) in Soil - (3MS and Surrogate, 3 Surrogate)# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 187018-1, 3, 5 to 8, 10 to 12 were sub-sampled from jars provided by the client.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.02
Suburb: Penrith
To: Envirolab
Project Name: Penrith Proposed Mixed use Developme
Order Number
Project Manager: Paul Gorman
Sampler: CL/LT
Attn: Aileen Hie
Emails: aul.gorman@douglaspartners.com.a celine.li@douglaspartners.com.au; lisa.t
Phone:
Date Required: Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑
Email:
Prior Storage: ☐ Esky ☐ Fridge
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	Heavy Metals	OCP/OPP PCB	TRH and BTEX	PAH	Total Phenols	Asbestos 500 ml	pH	CEC		
BH101/0.2-0.3	1	10.3.18	S	G							X	X		combo 8a
BH101/0.9-1.0	2	10.3.18	S	G										combo 3
BH102/0.2-0.3	3	10.3.18	S	G							X	X		combo 8a
BH102/0.9-1.0	4	10.3.18	S	G										combo 3
BH103/0.0-0.2	5	11.3.18	S	G										combo 8a
BH104/0.0-0.2	6	11.3.18	S	G										combo 8a
BH105/0.0-0.2	7	11.3.18	S	G										combo 8a
BH106/0.0-0.2	8	11.3.18	S	G							X	X		combo 8a
BH106/0.9-1.0	9	11.3.18	S	G										combo 3
BH107/0.0-0.2	10	11.3.18	S	G										combo 8a
BH108/0.0-0.2	11	11.3.18	S	G										combo 8a
BH109/0.0-0.2	12	11.3.18	S	G										combo 8a
BD1/20180311	—	11.3.18	S	G	X		X	X						Inter-lab
BD1/20180310	13	11.3.18	S	G	X		X	X						Intra-lab
PQL (S) mg/kg												ANZECC PQLs req'd for all water analytes ☐		

Envirolab Services
hley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 187018
Date Received: 12/3/18
Time Received: 16:30
Received by: MT 9.6
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Metals to Analyse: 8HM unless specified here:
Lab Report/Reference No: 187018
Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NM
Received by: MT ELS
Date & Time: 12/3/18 16:30

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 187018-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.02, Penrith**
Number of Samples	Additional Testing on 5 Soils
Date samples received	12/03/2018
Date completed instructions received	23/03/2018

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	03/04/2018
Date of Issue	29/03/2018

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu
Results Approved By
Jeremy Faircloth, Organics Supervisor
Leon Ow, Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

Metals in TCLP USEPA1311						
Our Reference		187018-A-3	187018-A-5	187018-A-7	187018-A-10	187018-A-11
Your Reference	UNITS	BH102	BH103	BH105	BH107	BH108
Depth		0.2-0.3	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		10/03/2018	11/03/2018	11/03/2018	11/03/2018	11/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	27/03/2018	27/03/2018	27/03/2018	27/03/2018	27/03/2018
Date analysed	-	[NA]	27/03/2018	27/03/2018	[NA]	27/03/2018
pH of soil for fluid# determ.	pH units	8.9	8.0	7.1	6.9	6.1
pH of soil TCLP (after HCl)	pH units	1.6	1.5	1.5	1.5	1.5
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.1	5.1	5.0	5.0	5.1
Lead in TCLP	mg/L	[NA]	5.9	<0.03	[NA]	0.04

PAHs in TCLP (USEPA 1311)			
Our Reference		187018-A-3	187018-A-10
Your Reference	UNITS	BH102	BH107
Depth		0.2-0.3	0.0-0.2
Date Sampled		10/03/2018	11/03/2018
Type of sample		Soil	Soil
Date extracted	-	28/03/2018	28/03/2018
Date analysed	-	28/03/2018	28/03/2018
Naphthalene in TCLP	mg/L	0.019	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001
Acenaphthene in TCLP	mg/L	0.028	<0.001
Fluorene in TCLP	mg/L	0.011	<0.001
Phenanthrene in TCLP	mg/L	0.026	<0.001
Anthracene in TCLP	mg/L	0.007	<0.001
Fluoranthene in TCLP	mg/L	0.007	<0.001
Pyrene in TCLP	mg/L	0.005	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001
Total +ve PAH's	mg/L	0.10	NIL (+)VE
Surrogate p-Terphenyl-d14	%	108	112

Total PCBs in Soil		
Our Reference		187018-A-5
Your Reference	UNITS	BH103
Depth		0.0-0.2
Date Sampled		11/03/2018
Type of sample		Soil
Date extracted	-	26/03/2018
Date analysed	-	27/03/2018
Total PCB (Aroclor 1016-1260)	mg/kg	8.0
Surrogate TCLMX	%	89

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.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			27/03/2018	[NT]	[NT]	[NT]	[NT]	27/03/2018	[NT]
Date analysed	-			27/03/2018	[NT]	[NT]	[NT]	[NT]	27/03/2018	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	98	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
Date analysed	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	78	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	91	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	91	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	107	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	100	[NT]	[NT]	[NT]	[NT]	128	[NT]

Client Reference: 85867.02, Penrith

QUALITY CONTROL: Total PCBs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	
Date extracted	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
Date analysed	-			27/03/2018	[NT]	[NT]	[NT]	[NT]	27/03/2018	[NT]
Total PCB (Aroclor 1016-1260)	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate TCLMX	%		Org-006	103	[NT]	[NT]	[NT]	[NT]	83	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Aileen Hie

From: Ken Nguyen
Sent: Friday, 23 March 2018 4:25 PM
To: Aileen Hie
Subject: FW: Results for Registration 187018 85867.02, Penrith

Envirolab Ref: 187018A
Due: 3/4/18
Std T/A.

Regards,

Ken Nguyen | Chemist | Envirolab Services Pty Ltd
(Monday to Friday 1pm to 9pm)

Great Science. Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 | F 612 9910 6201
E knguyen@envirolab.com.au | W www.envirolab.com.au

Please note that all samples submitted to the Envirolab Group laboratories will be analysed under the Envirolab Group Terms and Conditions. The Terms and Conditions are accessible by clicking this link

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From: Paul Gorman [mailto:Paul.Gorman@douglaspartners.com.au]
Sent: Friday, 23 March 2018 3:54 PM
To: Ken Nguyen <KNguyen@envirolab.com.au>; Celine Li <Celine.Li@douglaspartners.com.au>
Subject: RE: Results for Registration 187018 85867.02, Penrith

Hi Ken,

Can you please run the following tests for me:

3 BH102/0.2-0.3	TCLP – PAH
5 BH103/0-0.2	TCLP – lead; plus please re-run PCB
7 BH105/0-0.2	TCLP – lead
10 BH107/0-0.2	TCLP – PAH
11 BH108/0-0.2	TCLP – lead

All on standard turnaround please.

Regards

Paul Gorman | Principal / Environmental Manager
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0612 | F: 02 9809 4095 | M: 0427 949 878 | E: Paul.Gorman@douglaspartners.com.au

FINANCIAL REVIEW
CLIENT CHOICE AW
WINNER

From: Ken Nguyen [mailto:KNguyen@envirolab.com.au]
Sent: Monday, 19 March 2018 4:22 PM
To: Paul Gorman; Celine Li
Subject: Results for Registration 187018 85867.02, Penrith

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC/paperwork received from you
ESDAT Extracts
an Excel or .csv file containing the results
Please note that a hard copy will not be posted.

We have a new reporting format and would welcome your feedback. Sydney@envirolab.com.au

Enquiries should be made directly to:
customerservice@envirolab.com.au

Regards,

Ken Nguyen | Chemist | **Envirolab Services Pty Ltd**
(Monday to Friday 1pm to 9pm)

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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 187649

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.02, Penrith**
Number of Samples	6 water
Date samples received	20/03/2018
Date completed instructions received	20/03/2018

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	27/03/2018
Date of Issue	27/03/2018

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Results Approved By
Dragana Tomas, Senior Chemist
Jaimie Loa-Kum-Cheung, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Nancy Zhang, Assistant Lab Manager
Nick Sarlamis, Inorganics Supervisor

Authorised By
David Springer
David Springer, General Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		187649-1	187649-2	187649-3	187649-4	187649-5
Your Reference	UNITS	BH101	BH102	BH2A	BD1/20180319	Trip Spike
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water	water	water
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	μg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10}	μg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	μg/L	<10	<10	<10	<10	[NA]
Benzene	μg/L	<1	<1	<1	<1	75%
Toluene	μg/L	<1	<1	<1	<1	85%
Ethylbenzene	μg/L	<1	<1	<1	<1	85%
m+p-xylene	μg/L	<2	<2	<2	<2	78%
o-xylene	μg/L	<1	<1	<1	<1	80%
Naphthalene	μg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	118	118	118	118	118
Surrogate toluene-d8	%	116	114	114	114	120
Surrogate 4-BFB	%	112	111	113	111	120

vTRH(C6-C10)/BTEXN in Water		
Our Reference		187649-6
Your Reference	UNITS	Trip Blank
Date Sampled		19/03/2018
Type of sample		water
Date extracted	-	23/03/2018
Date analysed	-	23/03/2018
TRH C_6 - C_9	μg/L	<10
TRH C_6 - C_{10}	μg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	μg/L	<10
Benzene	μg/L	<1
Toluene	μg/L	<1
Ethylbenzene	μg/L	<1
m+p-xylene	μg/L	<2
o-xylene	μg/L	<1
Naphthalene	μg/L	<1
Surrogate Dibromofluoromethane	%	119
Surrogate toluene-d8	%	114
Surrogate 4-BFB	%	114

svTRH (C10-C40) in Water					
Our Reference		187649-1	187649-2	187649-3	187649-4
Your Reference	UNITS	BH101	BH102	BH2A	BD1/20180319
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Surrogate o-Terphenyl	%	96	132	131	96

PAHs in Water - Low Level				
Our Reference	UNITS	187649-1	187649-2	187649-3
Your Reference		BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018
Naphthalene	µg/L	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	115	96	115

PAHs in Water		
Our Reference		187649-4
Your Reference	UNITS	BD1/20180319
Date Sampled		19/03/2018
Type of sample		water
Date extracted	-	21/03/2018
Date analysed	-	21/03/2018
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	108

Total Phenolics in Water				
Our Reference	UNITS	187649-1	187649-2	187649-3
Your Reference		BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05

OCP in water - low level				
Our Reference	UNITS	187649-1	187649-2	187649-3
Your Reference		BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
HCB	µg/L	<0.01	<0.01	<0.01
alpha-BHC	µg/L	<0.01	<0.01	<0.01
gamma-BHC	µg/L	<0.01	<0.01	<0.01
beta-BHC	µg/L	<0.01	<0.01	<0.01
Heptachlor	µg/L	<0.01	<0.01	<0.01
delta-BHC	µg/L	<0.01	<0.01	<0.01
Aldrin	µg/L	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01	<0.01
Endosulfan I	µg/L	<0.01	<0.01	<0.01
pp-DDE	µg/L	<0.01	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01	<0.01
pp-DDD	µg/L	<0.01	<0.01	<0.01
Endosulfan II	µg/L	<0.01	<0.01	<0.01
DDT	µg/L	<0.006	<0.006	<0.006
Endrin Aldehyde	µg/L	<0.01	<0.01	<0.01
Endosulfan Sulphate	µg/L	<0.01	<0.01	<0.01
Methoxychlor	µg/L	<0.01	<0.01	<0.01
Surrogate TCMX	%	77	95	107

OP in water LL ANZECCF/ADWG				
Our Reference	UNITS	187649-1	187649-2	187649-3
Your Reference		BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02	<0.02
Bromophos ethyl	µg/L	<0.01	<0.01	<0.01
Chlorpyriphos	µg/L	<0.01	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.01	<0.01	<0.01
Diazinon	µg/L	<0.01	<0.01	<0.01
Dichlorovos	µg/L	<0.01	<0.01	<0.01
Dimethoate	µg/L	<0.01	<0.01	<0.01
Ethion	µg/L	<0.01	<0.01	<0.01
Fenitrothion	µg/L	<0.01	<0.01	<0.01
Malathion	µg/L	<0.05	<0.05	<0.05
Ronnel	µg/L	<0.01	<0.01	<0.01
Surrogate TCMX	%	77	95	107

PCBs in Water - Low Level				
Our Reference		187649-1	187649-2	187649-3
Your Reference	UNITS	BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date extracted	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
Aroclor 1016	µg/L	<0.1	<0.1	<0.1
Aroclor 1221	µg/L	<0.1	<0.1	<0.1
Aroclor 1232	µg/L	<0.1	<0.1	<0.1
Aroclor 1242	µg/L	<0.1	<0.1	<0.1
Aroclor 1248	µg/L	<0.1	<0.1	<0.1
Aroclor 1254	µg/L	<0.1	<0.1	<0.1
Aroclor 1260	µg/L	<0.1	<0.1	<0.1
Surrogate TCLMX	%	77	95	107

HM in water - dissolved				
Our Reference	UNITS	187649-1	187649-2	187649-3
Your Reference		BH101	BH102	BH2A
Date Sampled		19/03/2018	19/03/2018	19/03/2018
Type of sample		water	water	water
Date prepared	-	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018
Arsenic-Dissolved	µg/L	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	2	16	2
Zinc-Dissolved	µg/L	3	6	6

Method ID	Methodology Summary
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
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-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly 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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			23/03/2018	1	23/03/2018	23/03/2018		23/03/2018	[NT]
Date analysed	-			23/03/2018	1	23/03/2018	23/03/2018		23/03/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	1	<10	<10	0	109	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	1	<10	<10	0	109	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	116	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	115	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	112	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	100	[NT]
o-xylene	µg/L	1	Org-016	<1	1	<1	<1	0	98	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	118	1	118	118	0	116	[NT]
Surrogate toluene-d8	%		Org-016	115	1	116	114	2	116	[NT]
Surrogate 4-BFB	%		Org-016	112	1	112	115	3	115	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH $>C_{10}$ - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH $>C_{16}$ - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH $>C_{34}$ - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-003	99	[NT]	[NT]	[NT]	[NT]	80	[NT]

Client Reference: 85867.02, Penrith

QUALITY CONTROL: PAHs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Naphthalene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	80	[NT]
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	112	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	76	[NT]
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	112	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	[NT]
Date analysed	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	99	[NT]

Client Reference: 85867.02, Penrith

QUALITY CONTROL: OCP in water - low level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/0208	[NT]	[NT]	[NT]	[NT]	21/03/0208	[NT]
Date analysed	-			23/03/2018	[NT]	[NT]	[NT]	[NT]	23/03/2018	[NT]
HCB	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	98	[NT]
gamma-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	105	[NT]
Heptachlor	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
delta-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	84	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	108	[NT]
gamma-Chlordane	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	112	[NT]
Dieldrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Endrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	110	[NT]
pp-DDD	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	103	[NT]
Endosulfan II	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
DDT	µg/L	0.006	Org-005	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
Methoxychlor	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	98	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			23/03/2018	[NT]	[NT]	[NT]	[NT]	23/03/2018	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-008	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chlorpyriphos-methyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorovos	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	99	[NT]
Dimethoate	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
Fenitrothion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	93	[NT]
Malathion	µg/L	0.05	Org-008	<0.05	[NT]	[NT]	[NT]	[NT]	96	[NT]
Ronnel	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate TCMX	%		Org-008	98	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: PCBs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			23/03/2018	[NT]	[NT]	[NT]	[NT]	23/03/2018	[NT]
Aroclor 1016	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Aroclor 1260	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	98	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	88	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

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	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton

Sample Login Details

Your reference	85867.02, Penrith
Envirolab Reference	187649
Date Sample Received	20/03/2018
Date Instructions Received	20/03/2018
Date Results Expected to be Reported	27/03/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	6 water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	25.8
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:

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	PAHsin Water	Total Phenolicsin Water	OCP in water - low level	OP in water LL ANZECCF/ADWG	PCBs in Water - Low Level	HM in water - dissolved
BH101	✓	✓	✓		✓	✓	✓	✓	✓
BH102	✓	✓	✓		✓	✓	✓	✓	✓
BH2A	✓	✓	✓		✓	✓	✓	✓	✓
BD1/20180319	✓	✓		✓					
Trip Spike	✓								
Trip Blank	✓								

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.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.02
Suburb: Penrith
To: EnviroLab
Project Name: Proposed Mixed Use Development
Order Number
Project Manager: Paul Gorman
Sampler: NW
Attn: Aileen Hie
Emails: Paul.Gorman@douglaspartners.com.au nicola.warton@douglaspartners.com.au
Phone:
Date Required: Standard ☑
Email:
Prior Storage: ☑ Esky
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	Combo 8*	TRH	BTEX	PAH						
BH101	1	19/03/18	W	G/.P	X									
BH102	2	19/03/18	W	G/.P	X									*Test for PAH (low level and OCP/OPP (low level)
BH2A	3	19/03/18	W	G/.P	X									
BD1/20180319	4	19/03/18	W	G/.P		X	X	X						
Trip Spike	5						X							
Trip Blank	6						X							
PQL (S) mg/kg														

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
ENVIROLAB
Job No: 187649
Date Received: 20.3.18
Time Received: 13:45
Received by: JE
25.8°C
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

ANZECC PQLs req'd for all water analytes ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Lab Report/Reference No:
Metals to Analyse: 8HM unless specified here:
Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NW
Received by: ELS JE
Date & Time: 20.3.18 13:45

CERTIFICATE OF ANALYSIS

Work Order : **ES1807628**
Client : **DOUGLAS PARTNERS PTY LTD**
Contact : MR PAUL GORMAN
Address : PO BOX 472 96 HERMITAGE ROAD
WEST RYDE NSW, AUSTRALIA 1685
Telephone : +61 07 32378900
Project : 85867.02 Penrith Proposed Mixed Use Development
Order number :
C-O-C number : ----
Sampler : CL/LT
Site : Penrith
Quote number : EN/222/17
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-3-8549 9630
Date Samples Received : 13-Mar-2018 17:30
Date Analysis Commenced : 15-Mar-2018
Issue Date : 21-Mar-2018 09:27

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL)**

			Client sample ID	**BD1/20180311**	**----**	**----**	**----**	**----**
			Client sampling date / time	11-Mar-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1807628-001**	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**8.8**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	**6**	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	**16**	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**23**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**255**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**2040**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**24**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**1000**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.2**	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Client sample ID*	**BD1/20180311**	**----**	**----**	**----**	**----**
			Client sampling date / time	11-Mar-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1807628-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	**2210**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**2770**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**4980**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**4110**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**1540**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**5650**	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**79.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**82.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**72.6**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**91.7**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**90.1**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**81.2**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**81.7**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**104**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			Client sample ID	**BD1/20180311**	**----**	**----**	**----**	**----**
			Client sampling date / time	11-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1807628-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**106**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)*	
		Low	***High***
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

QUALITY CONTROL REPORT

Work Order	: **ES1807628**	Page	: 1 of 7
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 32378900	Telephone	: +61-3-8549 9630
Project	: 85867.02 Penrith Proposed Mixed Use Development	Date Samples Received	: 13-Mar-2018
Order number	:	Date Analysis Commenced	: 15-Mar-2018
C-O-C number	: ----	Issue Date	: 21-Mar-2018
Sampler	: CL/LT		
Site	: Penrith		
Quote number	: EN/222/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1498955)									
ES1807630-001	Anonymous	EA055: Moisture Content	----	1	%	19.9	20.4	2.48	0% - 20%
EW1801114-004	Anonymous	EA055: Moisture Content	----	1	%	12.4	12.7	2.78	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 1504872)									
ES1807505-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	7	28.4	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	5	0.00	No Limit
ES1807700-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	52	49	6.54	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	7	7	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	6	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	12	11	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	22	21	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	14	33.2	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1504873)									
ES1807505-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1807700-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.1	0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1496808)									
ES1807719-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1496808) - continued									
ES1807719-002	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1807645-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1496809)									
ES1807719-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1496809) - continued									
ES1807719-002	Anonymous	EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1807645-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1497237)									
ES1807656-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1807702-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	49	47	3.87	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1496809)									
ES1807719-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1807645-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1497237)									
ES1807656-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1807702-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	77	75	3.23	No Limit
EP080: BTEXN (QC Lot: 1497237)									
ES1807656-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1807702-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	6.2	6.0	2.30	0% - 50%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	18.3	17.5	4.92	0% - 20%
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	8.8	8.7	1.66	0% - 50%
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EG005T: Total Metals by ICP-AES (QCLot: 1504872)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	96.5	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	105	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	100	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	107	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	107	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1504873)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	86.0	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1496808)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	113	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	110	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	114	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	114	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	117	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	119	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	119	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	121	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	104	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	111	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	103	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	108	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	103	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	94.0	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	95.0	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	89.3	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1496809)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	100	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	115	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	108	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1497237)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	80.5	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1496809)								

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1496809) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	101	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	108	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	110	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1497237)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	77.1	68	128
EP080: BTEXN (QCLot: 1497237)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	102	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.3	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	95.2	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.3	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	96.1	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	114	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005T: Total Metals by ICP-AES (QCLot: 1504872)							
ES1807505-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	105	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	106	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	105	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	106	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	109	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1504873)							
ES1807505-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	80.3	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1496808)							
ES1807645-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	130	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	112	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1496809)							
ES1807645-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	82.6	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	113	53	131

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1496809) - continued							
ES1807645-001	Anonymous	EP071: C29 - C36 Fraction	----	1714 mg/kg	120	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1497237)							
ES1807656-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	76.0	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1496809)							
ES1807645-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	92.8	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	125	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	116	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1497237)							
ES1807656-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	76.9	70	130
EP080: BTEXN (QCLot: 1497237)							
ES1807656-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	94.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	89.0	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	91.0	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	90.2	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	92.5	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	99.8	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1807628**	Page	: 1 of 4
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Telephone	: +61-3-8549 9630
Project	: 85867.02 Penrith Proposed Mixed Use Development	Date Samples Received	: 13-Mar-2018
Site	: Penrith	Issue Date	: 21-Mar-2018
Sampler	: CL/LT	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
***Container** / Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BD1/20180311	**11-Mar-2018**	**----**	----	----	**15-Mar-2018**	25-Mar-2018	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BD1/20180311	**11-Mar-2018**	**19-Mar-2018**	07-Sep-2018	✓	**19-Mar-2018**	07-Sep-2018	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BD1/20180311	**11-Mar-2018**	**19-Mar-2018**	08-Apr-2018	✓	**19-Mar-2018**	08-Apr-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BD1/20180311	**11-Mar-2018**	**15-Mar-2018**	25-Mar-2018	✓	**16-Mar-2018**	24-Apr-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BD1/20180311	**11-Mar-2018**	**15-Mar-2018**	25-Mar-2018	✓	**16-Mar-2018**	25-Mar-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BD1/20180311	**11-Mar-2018**	**15-Mar-2018**	25-Mar-2018	✓	**16-Mar-2018**	25-Mar-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BD1/20180311	**11-Mar-2018**	**15-Mar-2018**	25-Mar-2018	✓	**16-Mar-2018**	25-Mar-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1807628**

Client : **DOUGLAS PARTNERS PTY LTD**
Contact : MR PAUL GORMAN
Address : PO BOX 472 96 HERMITAGE ROAD
WEST RYDE NSW, AUSTRALIA 1685

E-mail : paul.gorman@douglaspartners.com.au
Telephone : +61 07 32378900
Facsimile : +61 07 32378999

Project : 85867.02 Penrith Proposed Mixed Use Development
Order number :
C-O-C number : ----
Site : Penrith
Sampler : CL/LT

Laboratory : Environmental Division Sydney
Contact : Shirley LeCornu
Address : 277-289 Woodpark Road Smithfield
NSW Australia 2164

E-mail : shirley.lecornu@Alsglobal.com
Telephone : +61-3-8549 9630
Facsimile : +61-2-8784 8500

Page : 1 of 2

Quote number : EM2017DOUPAR0002 (EN/222/17)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 13-Mar-2018 17:30
Client Requested Due Date : 21-Mar-2018
Issue Date : 14-Mar-2018
Scheduled Reporting Date : **21-Mar-2018**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 1
Receipt Detail :
Security Seal : Not Available
Temperature : 12.0 - Ice Bricks present
No. of samples received / analysed : 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1807628-001	11-Mar-2018 00:00	BD1/20180311	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE		
- A4 - AU Tax Invoice (INV)	Email	accounts@douglaspartners.com.au
CELINE LI		
- *AU Certificate of Analysis - NATA (COA)	Email	celine.li@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	celine.li@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	celine.li@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	celine.li@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	celine.li@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	celine.li@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	celine.li@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	celine.li@douglaspartners.com.au
PAUL GORMAN		
- *AU Certificate of Analysis - NATA (COA)	Email	paul.gorman@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	paul.gorman@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	paul.gorman@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	paul.gorman@douglaspartners.com.au
- A4 - AU Tax Invoice (INV)	Email	paul.gorman@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	paul.gorman@douglaspartners.com.au

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85867.02	**Suburb:**	Penrith	**To:**	Envirolab
Project Name:	Penrith Proposed Mixed use Developme	**Order Number**			
Project Manager:	Paul Gorman	**Sampler:**	CL/LT	**Attn:**	Aileen Hie
Emails:	aul.gorman@douglaspartners.com.a	celine.li@douglaspartners.com.au;	lisa.t	**Phone:**	
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑			**Email:**	

Prior Storage: ☐ Esky ☐ Fridge Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes Heavy Metals	OCP/OPP PCB	TRH and BTEX	PAH	Total Phenols	Asbestos 500 ml	pH	CEC		
BH101/0.2-0.3	1	10.3.18	S	G							X	X		
BH101/0.9-1.0	2	10.3.18	S	G										
BH102/0.2-0.3	3	10.3.18	S	G							X	X		
BH102/0.9-1.0	4	10.3.18	S	G										
BH103/0.0-0.2	5	11.3.18	S	G										combo
BH104/0.0-0.2	6	11.3.18	S	G										combo 8a
BH105/0.0-0.2	7	11.3.18	S	G										combo 8a
BH106/0.0-0.2	8	11.3.18	S	G							X	X		combo 8a
BH106/0.9-1.0	9	11.3.18	S	G										combo 3
BH107/0.0-0.2	10	11.3.18	S	G										combo 8a
BH108/0.0-0.2	11	11.3.18	S	G										combo 8a
BH109/0.0-0.2	12	11.3.18	S	G										combo 8a
① BD1/20180311	—	11.3.18	S	G	X		X	X						Inter-lab
BD1/20180310	13	11.3.18	S	G	X		X	X						Intra-lab
PQL (S) mg/kg												**ANZECC PQLs req'd for all water analytes** ☐		

Environmental Division
Sydney
Work Order Reference
ES1807628

Telephone : +61-2-8784 8555

Ph: (02) 9910 6200
187018
12/3/18
16:30
MT 9.6
Ambient
Ice/Icepack
Intact/Broken/None

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 187018

Total number of samples in container:
Relinquished by:
Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: NM **Received by:** MT ELS **Date & Time:** 12/3/18 16:30

Relin: ELS JACK EMBLEN 13/3/18 12:45

Rec:- Sog no Ads. 13/3/18 12C

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Integrated Practical Solutions

Report on
Remediation Action Plan

Proposed Mixed Use Development
634 to 638 High Street, 87 to 89 Union Road, Penrith

Prepared for
Toga Penrith Developments Pty Ltd

Project 85867.03
September 2021

Douglas Partners
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author	p.p.	29 September 2021
Reviewer		29 September 2021

bsi. ISO 9001 Quality Management

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Report on Remediation Action Plan
Proposed Mixed Use Development
634 to 638 High Street, 87 to 89 Union Road, Penrith

1. Introduction

This report presents the Remediation Action Plan (RAP) for a proposed mixed use development at 634 to 638 High Street, and 87 to 89 Union Road, Penrith (herein referred to as “the site”). The RAP was commissioned by Toga Penrith Developments Pty Ltd (Toga). The subject site comprises Stage 1 of a mixed-use development proposed by Toga. The proposed development of Stage 1 comprises of residential buildings, commercial and associated parking. Buildings 1 and 2 are joined together by a common ground floor podium, underground three level basement and podium car parking areas.

The objectives of this RAP are to:

- Establish an appropriate remedial strategy so as to render the site suitable, from a site contamination perspective, for the proposed development;
- Establish the remediation acceptance criteria to be adopted for the remediation of the site and the validation requirements to verify the successful implementation of the remediation strategy;
- Establish appropriate environmental safeguards required to complete the remediation works in an environmentally acceptable manner;
- Establish appropriate occupational, health and safety (OH&S) procedures required to complete the remediation works in a manner that would not pose a threat to the health of site workers or users; and
- Establish a framework to minimise environmental risk on the site and the surrounding environment.

The scope of remediation outlined in the RAP is based on the results of previous contamination investigations conducted for the site.

2. Site Information

2.1 Site Identification

Stage 1 of the proposed mixed-use development (the site) is bounded by High Street to the north, John Tipping Grove to the west, Union Road to the south, with vacant land and high density residential development to the east. The site comprises the following three land parcels:

- Lot 1 in Deposited Plan 544302; and
- Lots 1 and 2 in Deposited Plan 1202310.

The site is located in the south-west of Penrith Central Business District. The surrounding area currently consists of a mix of commercial and residential properties. The following Table 1 summarises the information relating to the site and its surrounding environment.

Table 1: General Site Information

Item	**Description**
Lot and DP Number:	Lot 1, DP 544302 Lot 2, DP 1202310
Parish / County	Parish of Mulgoa in the County of Cumberland
Site Address:	634 to 638 High Street, and 87 to 89 Union Road Penrith
Local Government Authority:	City of Penrith
Total Site Area:	Approximately 5,480 m^2
Current Zoning:	Zone B4 - Mixed Use - under the Penrith Local Environmental Plan 2010
Current Site Use:	Warehouse leased for Christmas decoration supplies
Proposed Future Land Use:	Commercial and residential mixed use
Adjacent Land Use:	North - Penrith City Council chambers and a car park is located to the north beyond High Street. East - A vacant block and an eight storey residential building West - John Tipping Grove, then a car sales yard and Stage 2 area of the Toga development. South - Union Road, then medium density residential properties

2.2 Site Description

A site inspection was conducted on 10 and 11 March 2018 by DP, as part of the detailed site investigation discussed in Section 3, where it was observed that the site was generally flat with a very slight slope to the west, and is situated at an elevation of about 28 m AHD. The site contained a single building in the north-west corner (leased for the sale of Christmas decorations), a concreted area in front of the building, including old fuel bowsers and two underground storage tanks (UST) presumed to still be present, with the remainder of the site vacant and generally gravel covered.

No significant changes to the site layout have been observed since 11 March 2018, and the site has remained fenced off from the public over that period.

2.3 Proposed Development

It is understood that that the proposed development of Stage 1 involves:

- The demolition of the existing building and associated car parks / infrastructure;
- Removal of the two USTs (if still present);
- The construction of two buildings (identified as Tower A and Tower B) joined together by a common ground floor podium for residential and commercial land use, underground three level basement and podium car parking areas.;
- An adjacent public road extension to the east; and
- Landscaping around the edges of the buildings.

The building footprint of the proposed development will cover most of the site.

3. Previous Reports

The following relevant reports have been previously prepared for the site:

- Benviron Group *Preliminary Site Investigation (PSI), 614-652 High Street and 87-91 Union Road, Penrith, NSW,* Ref: E638, dated September 2015 (Benviron, 2015);
- DP *Due Diligence Contamination Investigation, 634 - 652A High Street, 87 - 8991 Union* Road, Penrith, Project 85867.01.R.001.Rev3, dated 29 September 2021 (DP, 2021a);
- DP *Detailed Site Investigation, Mixed Use Development, 634 - 652A High Street and 87 - 8991 Union* Road, Penrith, Project 85867.02.R.001.Rev2, dated 29 September 2021 (DP, 2021b);
- DP *Hazardous Building Materials (HBM) Register, 634-652 High Street & 87-91 Union Road, Penrith NSW 2750*, Project 85867.04.R.001.Rev1, dated 29 September 2021 (DP, 2021c); and
- DP *Additional Contamination Investigation, Proposed Mixed Development, 634-638 High Street and 87-89 Union Road, Penrith*, Project 85867.05.R.001.Rev2, dated 29 September 2021 (DP, 2021d).

It is noted that DP (2021a) covered the whole of the proposed Toga development (i.e., Stages 1 and 2).

3.1 Benviron (2015)

The PSI comprised a desktop study and a site inspection. The following summarises the pertinent information and findings presented in the PSI:

- A SafeWork search identified that several tanks were formally located on the site at 616 High Street (outside of the current site) and that these had been removed as part of the previous remediation works;
- A review of the EPA website by Benviron revealed the site was not listed on the database;

- A review of land titles indicated that the site has been owned and used for residential purposes between the early 1930s and 1960s when the site was generally redeveloped for commercial uses as a car yard; and
- A review of aerial photographs revealed that the site has been vacant and residential up until 1961 when the site was redeveloped for commercial uses (mostly car yard uses) and it remained this way up until 2002.

The PSI provided the following conclusions and recommendations:

'Based on the results of this investigation it is considered that the risks to human health and the environment associated with soil contamination at the site are medium to high in the context of the proposed use of the site. The site can be made suitable for the proposed development, subject to the following recommendations:

- *A Detailed Environmental Site Investigation should be undertaken across the entire site in order to clarify the data gaps identified with this report.*
- *A hazardous materials assessment of the buildings should be undertaken prior to demolition being carried out on site.*

If during any potential site works any significant unexpected occurrence us identified site works should cease in that area, at least temporarily, and the environmental consultant should be notified immediately to set up a response to this unexpected occurrence.'

DP notes that the PSI does not mention the bowser or potential USTs evidenced from the operational bowser on High Street, and detected using ground penetrating radar.

3.2 DP (2021a)

The due diligence investigation included five bores in the subject site (BH2, BH4, BH6, BH9 and BH10, as shown on Drawing 1, Appendix A), with BH2 positioned adjacent to and hydraulically down-gradient of the observed underground storage tanks (UST) in the area fronting High Street.

Selected fill, soil and groundwater samples from the bores were analysed at a NATA accredited laboratory for contaminants of concern including metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), polychlorinated biphenols (PCB), phenols and asbestos.

Reported concentrations of analytes in the soil samples were below the laboratory limits of reporting (LOR) and/or below the adopted health based assessment criteria, adopted primarily from the National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013* (ASC NEPM) Schedule B1, Guidelines on Investigation Levels for Soil and Groundwater. A few exceedances of the ecological based investigation levels for copper and zinc were reported in a primary and laboratory triplicate fill sample in BH10(0-0.2).

Reported concentrations of analytes in the groundwater sample from BH2 were below the LOR and / or the adopted site assessment criteria (SAC). Results were compared against the NSW EPA *Waste Classification Guidelines, Part One: Classifying Waste 2014* (NSW EPA 2014a) for the purposes of preparing a waste classification to facilitate disposal of material from the site.

Based on the investigation, the report concluded that there were not likely to be any significant contamination risks to human health or the ecology associated with the site, and that the site could be made suitable for the proposed development, subject to the following:

- Additional intrusive investigations undertaken, and investigations would be required to comply with the requirements of *State Environmental Planning Policy No 55 - Remediation of Land* (SEPP 55) as part of any future development application. The additional investigations would need to provide additional site coverage for both soils and groundwater, with respect to a proposed development layout, and it would be beneficial to more thoroughly identify the soil waste classifications in areas of proposed bulk excavation;
- A RAP would be required to document the remediation and validation process associated with the two USTs and associated infrastructure, and any other contaminants identified through the additional investigations. The RAP would also document the management process associated with any retained fill materials, given the reported ecological investigation and screening level exceedances (if applicable);
- A pre-demolition hazardous building materials survey was required to be undertaken prior to demolition of the existing structures and hardstands. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the current legislation;
- Incorporation of an unexpected finds protocol in the site construction environmental management plan (EMP) and the RAP; and
- Validation of any remediation undertaken, culminating in a validation report declaring that the site is suitable for the proposed development.

3.3 DP (2021b)

The DSI was undertaken to support the development application for the site, to supplement DP (20218a) and to address the requirements of SEPP 55. The objective of the DSI was to assess the risk of contamination being present at the site, the need (or otherwise) for further investigation and or remediation, and to comment on the suitability of the site for the proposed development from a contamination perspective.

The scope of work for the DSI included:

- Review of site and proposed development information, as provided by Toga;
- Review of previous contamination investigation reports;
- Site walkover to identify current features and site uses;
- Drilling of two bores (BH101 and BH102) to depths of about 10 m bgl and then conversion into groundwater monitoring wells. The bores were positioned close to the UST and close to the hydraulic down gradient boundary to Stage 1;
- Drilling of an additional seven bores (BH103 to BH107) in an approximate grid pattern across the site for general site coverage and completion of the sampling numbers to the NSW EPA *Sampling Design Guidelines* (1995);
- Soil samples were recovered at regular intervals for testing for potential contaminants;

- Laboratory analysis of selected soil samples for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc, TRH, BTEX, PAH, OCP, organophosphate pesticides (OPP), PCB, phenols, pH and cation exchange capacity and asbestos;
- Development, purge and sample groundwater from one previously installed well (Bore 2A) and the two wells at BH101 and BH102; and
- Laboratory analysis of the groundwater samples for heavy metals, TRH, BTEX, PAH, phenols, OPP, OCP, PCB and hardness.

The bore locations (previous and current) are shown on Drawing 1 in Appendix A.

Free groundwater was observed at approximately 7 m bgl in BH2, BH101 and BH102 during auger drilling. Recorded water levels in the three monitoring wells, on 19 March 2018 were approximately 7.3 m bgl.

There were no visual or olfactory indications of the presence of contaminants in the soils at the bore locations. There were no odours noted in the groundwater monitoring bores during installation of the monitoring wells, or at the time of sampling.

Reported concentrations of phenols, OCP, OPP, and asbestos in the soil samples were below the LOR and therefore the SAC.

The DSI reported the following exceedances (identified in DP, 2021a and the DSI):

Metals

- Lead in sample BH103 0-0.2 (2100 mg/kg) and BD1/20180311 (2040 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg);
- Copper in sample BH103 0-0.2 (250 mg/kg) and BD1/20180311 (255 mg/kg) - exceeding the EIL (230 mg/kg);
- Zinc in sample BH103 0-0.2 (690 mg/kg) and BD1/20180311 (1000 mg/kg) - exceeding the EIL (690 mg/kg);
- Copper in sample BH10/0.5 (2900 mg/kg) and replicate BH10/0.5 (500 mg/kg) - exceeding the EIL (230 mg/kg);
- Lead in sample BH10/0.5 (4400 mg/kg) and replicate BH10/0.5 (3500 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg); and
- Zinc in sample BH10/0.5 (1400 mg/kg) - exceeding the EIL of 690 mg/kg.

PAH

- B(a)P in sample BH102 0.2-0.3 (25 mg/kg) - exceeding the ESL (0.7 mg/kg);
- B(a)P in sample BH107 0-0.2 (1.1 mg/kg) - exceeding the ESL (0.7 mg/kg);
- Naphthalene in sample BH102 0.2-0.3 (6.4 mg/kg) - exceeding the HSL (3 mg/kg);
- Carcinogenic PAHs in sample BH102 0.2-0.3 (32.6 mg/kg) - exceeding the HIL B (4 mg/kg); and
- B(a)P in sample BH10/0.5 - concentration 1.2 mg/kg exceeded the ESL of 0.7 mg/kg.

PCB

- PCBs (total) in BH103 0-0.2 (5.2 mg/kg) - exceeding the HIL B (1 mg/kg). This sample was retested, and the repeat sample concentration was 8.0 mg/kg.

TRH

- C10-C16 (less Naphthalene) in BH102 0.2-0.3 (210 mg/kg) - exceeding the ESL (120 mg/kg); and
- C16-C34 in BH102 0.2-0.3 (2600 mg/kg), BH103 0-0.2 (2800 mg/kg) and BD1/ 20180311 (4110 mg/kg) - exceeding the ESL (300 g/kg) and the Management Limit (2500 g/kg).

BTEX

- Naphthalene in sample BH102 0.2-0.3 (8 mg/kg) - exceeding the HSL (3 mg/kg).

All remaining soil samples were below the SAC.

The DSI noted that of the above exceedances occurred at or close to the surface, in the filling layers. The elevated concentrations were considered to be related to either the presence of contaminated filling, or the historical use of the site as a car yard (i.e., lead, TRH and PAH related to spilt oils and fuels). PCBs are commonly associated with oils in motors and hydraulic systems, transformers and capacitors. BH103 (which recorded the elevated PCB concentration) is located close to the rear of the building on site, which may have been an area for car maintenance and the use of hydraulic lifting machines.

Reported concentrations of BTEX, TRH, OCP, OPP, PCB, PAH, As, Cd, Cr, Cu, Pb, and Hg in the groundwater samples were below the LOR and therefore the SAC. Reported concentrations of nickel were below the SAC, with the exception of the sample from BH102 which had a nickel concentration of 0.016 mg/L. This exceeded the Groundwater Investigation Level of 0.011 mg/L. The minor exceedance was not considered to be significant and further investigation of groundwater was not considered necessary.

3.3.1 Refined Waste Classification

For the purposes of more thoroughly identifying the soil waste classification with reference to NSW EPA (2014a), selected samples based on highest concentrations were analysed using toxicity characteristic leachate procedure (TCLP) to determine leachable concentrations. All results for soil samples analysed were below the General Solid Waste (GSW) criteria without leaching (CT1) or with leaching (SCC1, TCLP1) with the exception of the following:

- Lead in sample BH103 0-0.2 (2100 mg/kg) - exceeded the GSW (SCC1, TCLP) (1500 mg/kg), but complied with the Restricted Solid Waste (RSW) thresholds SCC2 and TCLP2;
- PAH (total) in sample BH102 0.2-0.3 (339 mg/kg) - exceeded the GSW (CT1) (200 mg/kg), but complied with the RSW threshold CT2;
- B(a)P in sample BH102 0.2-0.3 (25 mg/kg) - exceeded the RSW criteria (SCC2) of 23 mg/kg. This sample on current results fell into the hazardous waste category; and
- Lead TCLP in sample BH10/0.5 (44 mg/L) - exceeded the RSW criteria (TCLP2) of 20 mg/L. This sample on current results fell into the hazardous waste category.

Based on the results, the filling material encountered at the site was preliminarily classified for off-site disposal purposes as General Solid Waste (non-putrescible), with the exception of the following (refer to the waste classification tables provided in Appendix B):

- Filling soils in the vicinity of BH102 which were classified as hazardous waste;
- Filling soils in the vicinity of BH10 which were classified as hazardous waste; and
- Filling soils in the vicinity of BH103 which were classified as restricted solid waste.

Further investigations were recommended to delineate and confirm the waste classifications around these locations.

The DSI concluded that surficial soil contamination was identified, and there remained potentially localised soil contamination around the USTs and beneath the existing building footprint, which required management. The DSI also concluded that the site could be made suitable for the proposed land use provided:

- A RAP was prepared to document the remediation and validation process associated with the two USTs and associated infrastructure, the lead, TRH, PCB and PAH contaminated soil identified in the DSI and previous investigations, and any other contaminants identified through investigation of the building footprint, once demolished. The RAP would be required to document the management process associated with any retained fill materials, given the reported SAC exceedances; and
- A pre-demolition hazardous building materials survey was required prior to demolition of the existing building. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the then current legislation.

3.4 DP (2021c)

The hazardous building materials (HBM) survey was undertaken to assess the location, extent and condition of asbestos-containing materials (ACM) and other HBM in the single building at the site prior to demolition and redevelopment work. The survey consisted of a visual inspection supplemented by a limited program of sample collection and laboratory analysis.

HBM were identified or assumed present during the survey as summarised in Table 2 below.

Table 2: Summary of Results

Building / Area	Non-Friable Asbestos	Friable Asbestos	SMF	Lead Paint	Lead Dust	PCB
Main warehouse	✓	×	✓	✓	✓	✓
Exterior grounds, lighting	×	×	×	×	×	✓

Limited or no access was available to certain areas of the site.

The report provided recommendations for the removal of the identified HBM prior to general demolition.

3.5 DP (2021d)

In response to the need for delineation of known contaminants at the site and the need for more information regarding waste classification of the remaining fill and confirmation of the previous waste classification (from the DSI), further investigation was undertaken. Investigations included the following:

- The drilling of bores at 2 m and 5 m step-out locations in north, east, south and west directions to delineate the HIL/HSL and EIL/ESL exceedances at BH102, BH103 and BH10;
- Analysis of the delineation samples for contaminants of concern identified in the DSI (being metals (lead), PAH, TRH and/or PCB);
- The excavation of 18 test pits (WC1 to WC18) and drilling of an additional two boreholes (WC19 and WC20) across the site to assess the remaining fill at the site to waste classify the material;
- Fill samples for waste classification were analysed for the suite required under the NSW EPA (2014b) Excavated Natural Material (ENM) Order, being metals, total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons - TPH), monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene - BTEX), polycyclic aromatic hydrocarbons (PAH), pH, electrical conductivity (EC), and Foreign Materials; and
- The collection of four samples (SP1 to SP4) from a stockpile of fill located in the south of the site. Analyse the samples for the ENM suite as listed above.

The above sample locations are shown on Drawing 2, Appendix A.

Results of the investigation concluded the following:

- Delineation Sampling:
  - The fill around BH103 requires disposed off-site as GSW (non-putrescible);
  - The fill around BH102 requires disposal as RSW (non-putrescible); and
  - The fill around BH10 requires disposal as hazardous waste.

  The impacted areas are shown on Drawing 2, Appendix A.
- Waste Classification:
  - The waste classifications at the identified “hot spots” are listed above;
  - The fill at the site did not meet the requirements of the ENM Order and therefore could not be classified as ENM;
  - The spoil stockpile at the site did not meet the requirements of the ENM Order and therefore could not be classified as ENM. The stockpile was assessed to be suitable to remain at the site; and
  - Given failure to comply with the requirements of the ENM Order, all remaining fill (excluding the hot spots, WC18 [see dot point below] and the existing building footprint, which requires assessment following demolition) is classified as GSW (non-putrescible), if it cannot be retained on site.
- Non-friable ACM fragments were observed in WC18. As such the soils at this location are classified as Special (Asbestos) Waste GSW (non-putrescible). The extent of the ACM-impacted material will be confirmed at the time of excavation.

The waste classification and soil test results tables for this investigation are included in Appendix B.

4. Geology, Hydrogeology and Acid Sulphate Soils

4.1 Geology and Soils

The Geology of Penrith 1:100,000 Geology Sheet indicates the site is underlain by Cranebrook Formation from the Quaternary Period comprising gravel, sand, silt and clay. The site is underlain by the Wianamatta Group of rocks consisting of shale, carbonaceous claystone, laminate and sandstone. The bedrock is reported to be overlain by fluvial deposits consisting of gravel sand and clay of variable thickness.

Reference to the Penrith 1:100,000 Soils Landscape Sheet indicates that alluvial soils of the Richmond soil landscape are present at the site. Richmond soils are characterised by deep acid non-calcic brown soils, red earths, red podzolic soils and earthy sands

On the basis of the information obtained from the bores and cone penetration tests during the due diligence geotechnical investigation by DP in 2017, and observations made during the DP (2018a, 2018b and 2018c) investigations, the soil profile encountered generally comprised the following units:

PAVEMENT:	Typically, 20-150 mm of asphaltic concrete or concrete (with or without road base). BH6 and BH9 encountered no pavement;
FILLING:	Brown and grey silty sand filling, clayey sand and silty clay to depths of 0.1 m to 0.9 m bgl;
Silty CLAY:	Generally stiff, brown silty clay, to borehole termination depths (shallow bores), or to depths of up to 2.5 m bgl in deeper bores;
Silty SAND:	Generally loose to medium dense, brown, silty sand between depths of 0.3 to 3.5 m;
Sandy GRAVEL:	Dense to very dense, brown and grey gravel within a matrix of silty sand below depths of 1.7 m to 3.5 m; and
LAMINITE:	Extremely low to low strength laminite (interbedded sandstone and siltstone) below depths of 12.1 m to 13.8 m. Medium and high strength, slightly weathered to fresh laminite below depths of 12.8 m to 14.3 m.

There were no obvious indications of gross contamination (e.g., staining, or odours) within the boreholes and test pits, with the exception of some potential asbestos containing material in the form of fragments of fibre cement found in WC18. The analysis on a recovered fragment identified chrysotile and amosite asbestos.

4.2 Hydrogeology

The groundwater wells installed as part of the DP (2021a and 2021b) investigations reported groundwater depths of approximately 7 m bgl. It is anticipated that the direction of groundwater flow would be to the west and towards the Nepean River located approximately 800 m wast of the site. It is likely that stormwater at the site and region also discharges to the Nepean River.

4.3 Acid Sulfate Soils

A search of NSW Department of Land and Water Acid Sulphate Soil Risk Map indicates that the site is in a region of no known occurrence of acid sulfate soils.

5. Remedial Action Plan

5.1 Remediation Goals

Generally, site remediation works have been designed such that the remediated site will be suitable for the proposed mixed residential/retail development and that the works will pose:

- No unacceptable risk to human health; and
- No unacceptable risk to the environment.

5.2 Extent of Remediation Required

Based on the investigations undertaken at the site, and summarised in Section 3, the following areas of the site have been identified for remediation:

- Filling impacted with one or more of the following contaminants: lead, copper, zinc, PAH, TRH and PCB, were identified at concentrations exceeding health based investigation or screening levels at bore locations BH102, BH103, and BH10. The depths of filling in these locations ranges between 0.2 m and 0.8 m bgl. The initial remediation areas are shown on Drawing 2, Appendix A;
- The removal and disposal of hazardous building materials will need to be undertaken prior to building demolition, in accordance with DP (2018c). A clearance inspection is required after demolition, by a qualified occupational hygienist, to make sure that all potential ACM are removed from the site surface;
- ACM fragments and asbestos impacted soils reported at WC18 will require excavation and disposal as asbestos waste. The extent of ACM contamination will be confirmed during excavation; and
- An underground petroleum storage systems (UPSS) including potentially two USTs, bowers, and connecting pipes is located in the north-east of the site, to the north of the existing building. Whilst no associated soil or groundwater contamination has been identified to date, the decommissioning, removal and validation of the UPSS is required under this RAP.

It is noted that marginally elevated TRH and PAH concentrations, exceeding EILs, was reported for BH102N5 and BH107 respectively. These locations are within the proposed basement footprint and will be therefore removed from the site. The concentrations are not significant to warrant localised remediation prior to bulk excavation.

In addition to the currently identified areas requiring remediation, this RAP addresses the following additional items:

- The soils within the existing building footprint could not be sampled, and this area remains an unknown that requires assessment;
- Large amounts of soil require disposal from site as part of the works, particularly in the area of the proposed basement. DP (2018b) provided a preliminary waste classification for the bulk of the fill at the site as General Solid Waste (non-putrescible), with the exception of the identified remediation areas. The waste classification requires clarification during excavation, with a formal waste classification report issued; and
- Upon the excavation of fill overburden, the natural soils beneath, where proposed for further excavation and removal from the site, require confirmation of the waste classification, which is likely to be virgin excavated natural material (VENM), with a formal waste classification report issued.

5.3 Building Footprint

As presented in DP (2021c) and as summarised in Section 3, hazardous building materials including asbestos and lead based paint have been identified in the existing building on site. There is potential for these materials to impart contaminants to the building peripheries and beneath both prior to and during building demolition. As, the building footprint requires investigation / validation as follows:

- Following building demolition and removal of the concrete slab, a clearance inspection is required by a qualified occupational hygienist, to make sure that all potential ACM are removed from the site surface; and
- Following clearance of the site surface, an Environmental Consultant will conduct sampling and laboratory analysis of soil samples from the building footprint for metals, TRH, BTEX, PAH, PCB asbestos and phenols, at a minimum of two locations (to be assessed by the Environmental Consultant following a visual appraisal.

Should the sampling and testing identify additional areas of soil contamination, remediation and validation will be instigated under the unexpected finds protocol (UFP) presented in Section 10 of this RAP.

5.4 Typical Remedial Options Available

A number of remedial options were reviewed in light of the identified contamination. The suitability of the remedial options was examined in accordance with a number of relevant documents, including, *inter alia*, the following:

- NSW Environment Protection Authority, *Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd edition)*;

- National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013* (ASC NEPM); and
- NSW Department of Environment and Climate Change (DECC) *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008 (UPSS Regulation)*.

Possible soil remedial options to achieve the remedial goals are identified as follows:

- No action;
- On-site treatment of contaminated material;
- Removal of contaminated material to landfill; and
- Capping / on-site containment of contaminated materials.

The following is a summary of the review of remediation options.

5.4.1 No Action

The “No Action” option involves no remedial response to the contamination identified on the subject site. This option was not considered appropriate for the following reasons:

- It does not provide any means to improve the current condition of the site; and
- Appropriate management arrangements and procedures would be required to manage/alleviate the impacts due to asbestos contamination.

5.4.2 On-Site Treatment of Contaminated Material

On-site treatment of the contaminated material would typically involve the excavation, stockpiling, treatment and replacement of the treated contaminated material. Considering the nature of the identified contamination, the relatively small impacted soil volume, and the surplus of soil to be generated, on-site treatment is not considered a viable option.

5.4.3 Removal of Contaminated Material to Landfill

Off-site disposal of contaminated material is considered a suitable option for managing human health and environmental impacts from the contaminated materials, particularly in view of the extent of bulk excavation required for the construction of the basement level. On the basis of the proposed excavation plan for the basement car park, it is considered that the identified PAH, TRH, naphthalene, metals and PCB impacted filling material, USTs, and any potentially asbestos impacted filling from the demolition of the building, would be removed within the bulk excavation works to be conducted. In this regard, the bulk excavation of the proposed development will result in the removal of the areas of environmental concern and localised contamination, thus rendering the site suitable for the proposed development.

This option would adequately address the remediation goals via the complete removal of the contaminants and area of environmental concern from the subject site. Given the localised nature of the chemical contamination locations this option would be appropriate.

5.4.4 Capping / On-Site Containment of Contaminated Materials

Physical barrier (or encapsulation) systems involve the placement/installation of a layer of suitable capping material such as verified VENM, or permanent pavement over the contaminated filling that would limit the exposure of site users to contaminants. Should asbestos be present at the site, an environmental management plan would be required.

On the basis of the proposed excavation plan for the basement car park, it is envisaged that contaminated soil present in the proposed excavation footprint will be completely removed as part of the excavation process and therefore an engineered physical barrier system is not considered necessary.

The option is also not considered to be viable due to the relatively small volume of impacted soil.

5.5 Selected Remediation Option

In view of the fact that the impacts associated with the detected contamination are localised and the proposed development includes basement excavations, it is considered that the adopted remediation option with respect to soil contamination should comprise excavation and removal of contaminated areas and areas of potential concern, followed by validation of the remedial excavation(s) to confirm the completeness of the remediation.

5.6 Remediation Strategy

The anticipated remediation works required are listed below and described in the following Sections 5.6.1 to 5.6.4:

- Undertake the existing building validation as per Section 5.3, following building demolition;
- On the basis of the delineation and waste classification, excavate the impacted soils and dispose to landfill under the assigned waste classification;
- Validate the remedial excavations through sampling and testing;
- Decommission the USTs through removal of any liquids contained;
- Remove the UPSS in accordance with the EPA's *Underground Petroleum Storage System (UPSS)* Regulation 2008 requirements;
- Excavate and stockpile backfill soils existing around the UPSS. Sample and test the excavated soils for on-site re-use or off-site disposal (waste classification);
- Sample and test the side walls and base of the UPSS excavation to validate the removal of any impacted backfill soils; and
- Collate landfill disposal records, field and test data and prepare a site validation report.

5.6.1 Excavation and Dispose of Impacted Soils

Marking out of delineated impacted soils surrounding BH10, BH102, and BH103, as shown on Drawing 2, Appendix A, excavation and removal of the impacted material will be conducted ahead of the bulk basement excavation and will be supervised by an experienced environmental consultant.

Drawing 2 (Appendix A) shows the extent of impacted soils to be excavated. Fill at each location will be excavated to natural soils. The expected volume of material at each location (based on the delineation and DP (2018d) bore hole logs (Appendix C) are as follows:

- BH102 - Impacted soils cover an area approximately 5 m by 5 m (25 m^2). With an average approximate depth of 0.5 m, the expected volume is approximately 10 m^3. Soils at this location are to be disposed as Restricted Solid Waste (non-putrescible);
- BH103 - Impacted soils cover an area approximately 15 m by 10 m (150 m^2). With an average approximate depth of 0.3 m, the expected volume is approximately 45 m^3. Soils at this location are to be disposed as General Solid Waste (non-putrescible);
- BH10 - Impacted soils cover an area approximately 5 m by 10 m (50 m^2). With an average approximate depth of 0.6 m, the expected volume is approximately 23 m^3. Soils at this location are to be disposed / treated as Hazardous Waste; and
- WC18 - The extent of impacted soils is not yet known and will be determined during excavation. The ACM and associated soils are to be disposed as Asbestos Waste.

All materials excavated and removed from the site shall be disposed in accordance with the POEO Act and to a facility/site licenced (by the EPA) to accept the material. The landfill selected to receive the waste will be provided with a copy of the waste classification report prepared by the environmental consultant.

Details of all contaminated and spoil materials removed from the site (including VENM) shall be documented by the contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) provided to the environmental consultant for inclusion in the final validation report. A site log must be maintained to track disposed loads against on-site origin.

5.6.2 Removal of Underground Petroleum Storage System

The removal of the UPSS should be completed before the demolition of any above ground structures in the vicinity and before bulk excavation commences.

Prior to the removal of the USTs, any residual product (liquid / vapour) must be removed from the tank and disposed of appropriately in accordance with Australian Standard (AS 4976 - 2008 *The Removal and Disposal of Petroleum Underground Storage Tanks*). Records of disposal should be provided to the environmental consultant for the validation report.

The UST will be exposed and examined by the Environmental Consultant for potential leaks and general condition during the removal process. The USTs must be removed, and the structures disposed of by a qualified contractor in accordance with AS 4976 - 2008. Disposal records should be provided to the environmental consultant for inclusion in the validation report.

5.6.3 Post Removal of UST

During and following removal of the UPSS, all excavated spoil (former backfill) should be placed in a discrete stockpile avoiding any cross-contamination with other materials. Samples will be collected from the stockpile by the environmental consultant for waste classification and / or on-site re-use assessment. Once the stockpile has been classified, the waste soil will be transported to an EPA landfill licensed to accept the waste, or re-used within the site.

The surface of the resultant excavation will be assessed by the environmental consultant in regards to obvious contamination (e.g., staining and odours). Contaminated material will be 'chased out' until all odorous and visually impacted material is removed. The excavation will then be validated in accordance with *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008 (UPSS Regulation)* under the POEO Act 1997 and UPSS Technical Note: *Site Validation Reporting 2010 (NSW and Department of Environment, Climate Change and Water*, DECCW, 2010).

5.6.4 Hazardous Waste

As noted in Section 3.5 the previous waste classification was re-assessed through the delineation process. Results of the delineation investigation, soils surrounding BH10 classified under EPA (2014a) as hazardous waste. There is currently no landfill in NSW that can directly accept such waste, and as such, the following process applies:

- Materials will be carefully excavated, segregated and placed in well delineated locations;
- If storage on site is required, stockpiles of excavated materials will be appropriately bunded with hay bales / sandbags and if required conditioned with water, covered and/or lined with anchored impermeable plastic sheeting to prevent dust generation;
- If considered appropriate, further sampling and analysis will be conducted to more fully characterise the subject material, and confirm its contamination status; and
- Review the EPA's General Immobilisation Approvals on the EPA website. If an applicable General Immobilisation Approval exists, further assess / dispose of the waste in accordance with the approval and other approvals or licences as required by the EPA.

If no General Immobilisation Approval is applicable to the material, the following will be conducted:

- Conduct additional sampling and analysis as required based on the available results to provide information for immobilisation options. In general immobilisation options include natural immobilisation, chemical fixation, micro-encapsulation and macro-encapsulation;
- Investigate, including trials as appropriate, immobilisation treatment options for the material;
- Apply to the EPA for a Specific Immobilisation Approval; and
- Implement the requirements imposed on management/disposal of the material by the EPA.

There are a number of remediation contractors licensed to remove the soils from the site and conduct any of the above at a licensed off-site location.

6. Remediation Acceptance Criteria

The proposed development of the site is for mixed (residential and commercial) land use. The Remediation Acceptance Criteria (RAC) has been largely derived from DP (2018b) where a high density residential land use setting was adopted, being the most sensitive (in terms of human and ecological exposure) of the proposed land uses.

Soil results are to be assessed against the investigation and screening levels of Schedule B1of the ASC NEMP. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by ASC NEMP.

The following Table 3 presents the adopted RAC for chemical contaminants (derived from DP, 2021b). Refer to the DSI for more information relating to the inputs of derivation. Generic land uses are described in detail in the ASC NEMP, Schedule B7 Section 3.

Table 3: Remediation Acceptance Criteria (RAC).

Contaminants		ASC NEPM (2013) HIL and HSL (Residential B)[1]	ASC NEPM (2013) Management Limit (Residential)	ASC NEPM (2013) EIL or ESL (Urban Residential and Open Public Spaces)[2]	Adopted RAC
Heavy Metals	Arsenic	500	-	100	100
	Cadmium	150	-		150
	Chromium (III + IV)	500	-	410	410
	Copper	30,000	-	230	230
	Lead	1,200	-	1,100	1,100
	Mercury	120	-		120
	Nickel	1,200	-	230	230
	Zinc	60,000	-	690	690
PAHs	Benzo(a)pyrene TEQ	4	-	-	4
	Benzo(a)pyrene	-	-	0.7	0.7
	Naphthalene	3	-	170	3
	Total PAHs	400	-	-	400
TRH	F1 TRH C6-C10 less BTEX	45	-	180	45
	F2 TRH >C10-C16 less Naphthalene	110	-	120	110
	F3 TRH >C16-C34	-	2,500	300	300
	F4 TRH >C34-C40	-	10,000	2,800	2,800
	TRH C6-C10	-	700	-	700
	TRH >C10-C16	-	1,000	-	1,000

Contaminants		ASC NEPM (2013) HIL and HSL (Residential B)[1]	ASC NEPM (2013) Management Limit (Residential)	ASC NEPM (2013) EIL or ESL (Urban Residential and Open Public Spaces)[2]	Adopted RAC
BTEX	Benzene	0.5	-	50	0.5
	Toluene	160	-	85	85
	Ethylbenzene	55	-	70	55
	Total Xylene	40	-	105	40
PCB	PCB	1	-	-	1
OPP	Chlorpyrifos	340	-	-	340
Organochlorine Pesticides (OCP)	DDT+DDE+DDD	600	-	180	180
	Aldrin and dieldrin	10	-	-	10
	Chlordane	90	-	-	90
	Endosulfan	400	-	-	400
	Endrin	20	-	-	20
	Heptachlor	10	-	-	10
	HCB	15	-	-	15
	Methoxychlor	500	-	-	500

[1] HIL & HSL – Health Investigation Level and Health Screening Level as per the ASC NEPM

[2] EIL & ESL - Ecological Investigation Level and Ecological Screening Level as per the ASC NEPM

The RAC for asbestos have been derived from Schedule B1 of the ASC NEPM, which stipulates that the threshold for asbestos soil contamination under a Residential B land use scenario is:

- 0.001 % asbestos for FA and AF;
- 0.04 % w/w asbestos for ACM, for the impacted (soil) volume; and
- No visible asbestos for surface soils.

7. Site Validation Plan

7.1 Data Quality Objectives and Indicators

The validation assessment will be conducted in accordance with Data Quality Objectives (DQOs) and Quality Assurance / Quality Control (QA / QC) procedures to ensure the repeatability and reliability of the results.

The validation assessment will be planned in accordance with the following DQOs:

- State the Problem;
- Identify the Decision;
- Identify Inputs to the Decision;
- Define the Boundary of the Assessment;
- Develop a Decision Rule;
- Specify Acceptable Limits on Decision Errors; and
- Optimise the Design for Obtaining Data.

A checklist of Data Quality Indicators (DQI) in accordance with Appendix V of the NSW EPA *Contaminated Sites Guidelines for the NSW Site Auditor Scheme* (2nd edition) [2006] will be completed as part of the validation assessment. The DQIs are:

- Documentation completeness;
- Data completeness;
- Data comparability and representativeness; and
- Data precision and accuracy.

Based on a fulfilment of the DQOs and DQIs an assessment of the overall data quality will be presented in the validation assessment report.

7.2 Excavations

All remediation areas to be assessed and validated will first be subject to a visual inspection by the environmental consultant. If any signs of environmental concern (e.g., odours, staining or asbestos) are observed in the area / material being tested, the environmental consultant may direct further excavation and stockpiling prior to validation sampling.

Validation samples will be collected from each excavation for the contaminant or contaminants of concern (COC), as a minimum, as follows:

- PAH, TRH and naphthalene at BH102;
- TRH, lead, copper, zinc and PCB at BH103;
- PAH, lead, copper and zinc at BH10;
- Lead, TRH, BTEX, PAH at the UPSS; and
- Asbestos at WC18.

The validation sampling frequencies and analysis for soil excavations and stripping, and any formed stockpiles, will be as follows:

Small to Medium Excavations (Base <500 m^2):

- Base of excavation: 1 sample per 25-50 m^2 or part thereof. Where high local variation is expected, a minimum of 3 samples will be collected;
- Sides of excavation: 1 sample per 10-20 m length or part thereof. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of 1 sample per 1.5 m depth; and
- Recovered samples will be analysed for the contaminant(s) of concern at each location.

Large Excavations (Base ≥500 m^2):

- Base of excavation: sampling on a grid at a density in accordance with the EPA *Contaminated Sites: Sampling Design Guidelines* (1995). In sub-areas with any specific signs of concern, a higher sampling density may be required;
- Sides of excavation: 1 sample per 20 m length or part thereof. Additional samples will be collected at depths of concern where there is more than one depth of concern; and
- Recovered samples will be analysed for the contaminant(s) of concern at each location.

Stockpiles

Samples will be collected from stockpiles at various depths to characterise the full depth / height of the stockpile. Validation / assessment of stockpiled soils (note actual frequency will be determined based on volume, contamination risk and homogeneity of the material):

- Stockpiles ≤250 m^3: 1 sample per 25 m^3 or a minimum of 3 samples;
- Stockpiles 250-1,000 m^3: 1 sample per 50-100 m^3, or a minimum of 10 samples; and
- Stockpiles >2,500 m^3: 1 sample per 100-250 m^3, or a minimum of 12 samples.

Where contaminated soils are stored or treated on bare soils, the footprint of the stockpile requires validation following removal of the contaminated soils, in line with the base sample frequencies discussed above.

In general, stockpiles formed through the excavation of soils in a remediation area will be analysed for the identified contaminants in the excavation area, as well as asbestos and heavy metals for completion. Stockpiles of excavated fill may be subjected to a larger suite of analytes at the discretion of the environmental consultant.

7.3 Groundwater

Based on the assessment of groundwater at the site to date, as reported in DP (2021b) remediation of groundwater is not considered to be warranted. Furthermore, the depth to groundwater at the site has been reported at about 7 m bgl. With only a single basement level proposed it appears unlikely that dewatering will be required during or following basement excavation.

During and upon removal of the UPSS, the environmental consultant will observe any indicators of leakage from the UST (e.g., soil staining, odours) and may then ascertain whether there is a risk of localised groundwater contamination requiring further investigation.

7.4 Building Footprint

Following demolition, the building footprint will be validated for contaminants of potential concern as per Section 5.3. In general, the following validation process will be adopted:

- The footprint of the building and its peripheries will be inspected by the Occupational Hygienist and clear of ACM at the surface;
- The footprint of building, will then be sampled at a rate of 1 sample per 25-50 m^2 or a minimum of two sample locations. Samples will be recovered from the surface and at regular intervals or at signs of contamination within the fill; and
- Recovered samples will be analysed for a range of potential and/or common contaminants including a range of heavy metals, TRH, BTEX, PAH, OCP, OPP, PCB, Phenols, and asbestos, or as determined by the environmental consultant.

7.5 Sample Collection and Handling

Sampling data shall be recorded to comply with routine chain of custody requirements.

The general sampling, handling, transport and tracking procedures comprise:

- The use of stainless steel sampling equipment, where possible;
- Washing of all sampling equipment in a 3% solution of phosphate free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected; transfer of the sample into new glass jars, sealed with a Teflon lined lid to eliminate cross contamination during transportation to the laboratory;
- Labelling of the sample containers with individual and unique identification including Project No. and Sample No.;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of chain-of-custody documentation to ensure that sample tracking and custody can be cross checked at any point in the transfer of samples from the field to hand-over to the laboratory.

7.6 Quality Assurance Plan

7.6.1 Field QA

Quality assurance (QA) and quality control (QC) procedures will be adopted throughout the field sampling programme to ensure sampling precision and accuracy and prevent cross contamination.

DP will address sampling accuracy and precision through the analysis of 10% field duplicate / replicate samples, as well as the collection of field rinsate samples (if required), trip spike and trip blank samples.

Appropriate sampling procedures will be undertaken to ensure that cross contamination does not occur and will follow DP's *Standard Operating Procedures Manual*. This specifies that:

- Standard operating procedures are followed;
- Site safety plans are developed prior to commencement of works;
- Duplicate or replicate field samples are collected and analysed;
- Equipment rinsate samples are analysed as part of the QA / QC programme;
- Samples are stored under secure, temperature controlled conditions;
- Chain of custody documentation is employed for handling, transport and delivery of samples to the selected laboratory; and that
- Proper disposal of contaminated soil, fill or groundwater originating from the site area is completed.

7.6.2 Laboratory Quality Assurance / Quality Control

DP's preferred laboratories will be NATA accredited for the analysis undertaken and will undertake in-house QA / QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;
- Laboratory duplicate analysis;
- Analysis of control standards;
- Calibration standards and blanks; and
- Statistical analysis of QC data including control samples and recovery plots.

7.7 Validation Reporting

A validation assessment report will be completed by the environmental consultant at the completion of works outlined in this RAP, with reference to the NSW DEC Contaminated Sites *Guidelines for Consultants Reporting on Contaminated Sites* (2011) and other appropriate guidance documentation. The report will be submitted to the appropriate certifying authority at the completion of the remediation works program.

The validation report will confirm that the site has been remediated to a standard suitable for the proposed land use and that no adverse human health and environmental effects have occurred as a result of the temporary works. The validation report will include a summary of the information from previous investigations.

The report will also include details of the total volume of contaminated material removed from the site, detailed analytical results where applicable, confirmation that any imported placed fill is clean and suitable to be used within the site, and indicate the final disposal destination of the materials removed from site.

8. Environmental Management during Remediation and Construction

This generic construction environmental management plan (CEMP) should be followed in conjunction with any other environmental management protocols stipulated in relevant SafeWork NSW, Australian Standard and / or Council requirements.

A site specific CEMP shall be provided by the remediation contractor(s). The site specific CEMP shall be reviewed by the environmental consultant. As a minimum, the site specific CEMP shall detail the following:

Works will comply with all legislative requirements including, but not limited to, those set out under the following Acts (and their subsequent amendments and regulations):

- Environmentally Hazardous Chemicals Act, 1985;
- Hazardous Chemicals Act, 1985;
- Environmental Offences and Penalties Act, 1989;
- Agricultural and Veterinary Chemicals Act, 1994;
- Protection of the Environment Operations Act, 1997 (POEO Act);
- Contaminated Land Management Act, 1997 (CLM Act);
- Pesticide Act, 1999;
- Work Health and Safety Act, 2011 (WHS Act);
- OHS Amendment (Dangerous Goods) Act, 2003 (including OHS Amendment (Dangerous Goods) Regulation 2005); and
- POEO Amendment Act, 2005 (including POEO Amendment (Scheduled Activities and Waste) Regulation 2008).

The contractor shall also be responsible to ensure that the site works comply with the following conditions:

- Fugitive dust leaving the confines of the site is minimised. Where asbestos removal works are to take place appropriate ambient air monitoring, as directed by the Occupational Hygienist, is to be implemented;

- No water containing any suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles shall be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas; and
- Noise and vibration levels at the site boundaries comply with legislative requirements.

The remediation contractor(s) will be provided with a copy of this RAP so that they are aware of the contamination status of the soils and the remediation methodology to be adopted.

The environmental consultant will also review the CEMP and conduct an induction of workers into the requirements of the RAP.

The following sub-sections provide details of the environmental management practices to be employed as a minimum at the site in order to minimise and / or prevent environmental impact as a result of the remediation works. Again, it is noted that other statutory requirements must also be followed.

8.1 Specific Requirements for Asbestos

Should asbestos be encountered at the site, and in addition to the above, the WHS Act and associated Regulation has specific requirements for asbestos works. A suitably qualified Occupational Hygienist is responsible for providing advice on all regulatory requirements related to asbestos works and the appropriately licensed Asbestos Contractor is responsible for implementing these requirements.

8.2 Specific Requirements for Chemical Contaminants

The risk to workers during the remediation works from the chemical contaminants identified is considered to be low to medium. With all contaminated soils, measures should be undertaken to minimise the potential exposure of workers to contamination. These include:

- Minimising dermal contact with contaminated soil; and
- Minimising ingestion with contaminated soil/ water, including of dust.

The above can be achieved by the use of appropriate PPE (refer Section 9) and good hygiene (e.g., washing hands prior to eating / upon completion of work).

9. Occupational Health and Safety

A site specific Occupational Health and Safety (OHS) Plan is to be prepared and submitted for approval by the appointed remediation contractor(s). The following protocols are to be observed during the works and are to be incorporated into the appropriate contractors' plan.

- Site Induction. As part of the site induction, site workers are to be advised on:
    - The contamination status of the site including the location, nature, type and concentration of contaminants present;
    - The risks associated with the contaminants;
    - The location and the methods of field identification of contamination hot-spots;
    - The occupational health and safety monitoring to be undertaken (as required by site conditions); and
    - The occupational health and safety controls to mitigate the risks (including personal protective equipment [PPE] and, as required, air monitoring).
- Small scale earthmoving activities (for example, trenching, small excavations) will not create a significant dust problem, however, dust levels must be kept to a minimum at all times and water suppression techniques are to be available and used as appropriate;
- All earthworks plant to incorporate air-conditioned cabs and:
    - Cabs to be enclosed at all times during operation;
    - Cabs to be cleaned daily to remove accumulated dust and dirt;
    - Cabs to be monitored for dust and, in the case of asbestos works, asbestos; and
    - Appropriate personal PPE to be available within the cab.
- Work to cease immediately when odours, unusual discolouration or fibro (or other asbestos-based materials) found within the fill. When asbestos, odours or other indicators of environmental concern are noted, the project Environmental Manager must be informed immediately. He will assess the situation and make a determination on the steps to be taken to make the situation safe and to resolve the issue. This would include seeking advice from the environmental consultant and/or the Occupational Hygienist (for asbestos); and
- No material containing asbestos-based materials is to be left exposed for an extended period or compacted when exposed.

9.1 Personal Protective Equipment (PPE)

All personnel working where contact can be made with contaminated soil (dust or direct contact), will comply with a minimum level of PPE. The minimum level is in addition or complementary to PPE required for the project generally and will include the following:

- Hard hat complying with AS 1801 (type 1);
- Coloured reflective vest or high visibility work clothing complying with AS 462 and 1906.4;
- Steel-capped safety boots;
- Leather or nitrile gloves or similar when working directly in contaminated soil such as trench excavations and laying services; and

- Long sleeved shirt and long trousers (may be combined with safety vest as per above).

All staff shall be provided with safety goggles and a P2 disposable dust mask with a valve complying with AS 1716, for use as conditions dictate (e.g., dusty conditions).

In addition to PPE there are also management measures which should be observed. These will include washing hands and face before eating etc. Toolbox sessions and inductions will also emphasise the need to limit hand-to-mouth gestures.

9.2 PPE in Asbestos Affected Areas

The PPE for works associated with areas containing asbestos needs to conform to the requirements of the *Code of Practice for the Safe Removal of Asbestos*, NOHSC, 2005 but generally as follows:

- Masks suitable for asbestos removal work will be worn at all times during removal work by those involved and should be a P2 disposable dust mask or a particulate half-face mask with a P3 filter as determined for the asbestos removal task to be undertaken;
- Disposable coveralls, preferably orange in colour. Coveralls shall not be used more than once. A reflective orange vest needs to be worn if coveralls not coloured orange;
- Suitable gloves; and
- Steel capped boots.

9.3 Air Quality Monitoring

Air Quality Monitoring (AQM) for airborne asbestos fibres will be required throughout the duration of the excavation of ACM and associated soils at WC18.

AQM may be conducted by either an Environmental Consultant or licenced Asbestos Assessor for the duration of the works to monitor compliance with the RAP. However, should friable asbestos be discovered at any stage during works, AQM is required to be conducted by a Licenced Asbestos Assessor.

10. Unexpected Finds Protocol

All site personnel will be inducted into their responsibilities under this Unexpected Finds Protocol (UFP), which should be included in the Contractors CEMP.

All site personnel are required to report the following to the Site Manager if observed during the course of their works:

- Signs of unexpected environmental concern, e.g., presence of fibre cement, petroleum, or other chemical odours, unnatural staining, potential contamination sources (such as buried drums or tanks) or chemical spills, in areas other than those designated for remediation.

Should signs of concern be observed, the contractor will, as soon as practical:

- Place barricades around the affected area and cease work in that area;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g., fire brigade);
- Notify any of the authorities that the contractor is legally required to notify (e.g., EPA, Council);
- Notify the environmental consultant;
- The environmental consultant will inspect the issue of concern and determine the nature of the issue, whether it comprises an environmental concern, and the appropriate approach to assessing or (if appropriate) managing the issue;
- The environmental consultant will undertake an assessment considered necessary to determine the management strategy for the environmental concern;
- If contamination is found and remediation action is considered necessary, a remediation strategy for the environmental concern will be prepared by the environmental consultant as an addendum to the RAP; and
- If the environmental concern or proposed remediation strategy is significantly different than that detailed in the RAP, the consent authority will be notified of the proposed works. A revision of the RAP may then be warranted.

11. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at Penrith in accordance with DP's proposal dated 6 March 2018 and acceptance received from Toga. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Toga for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

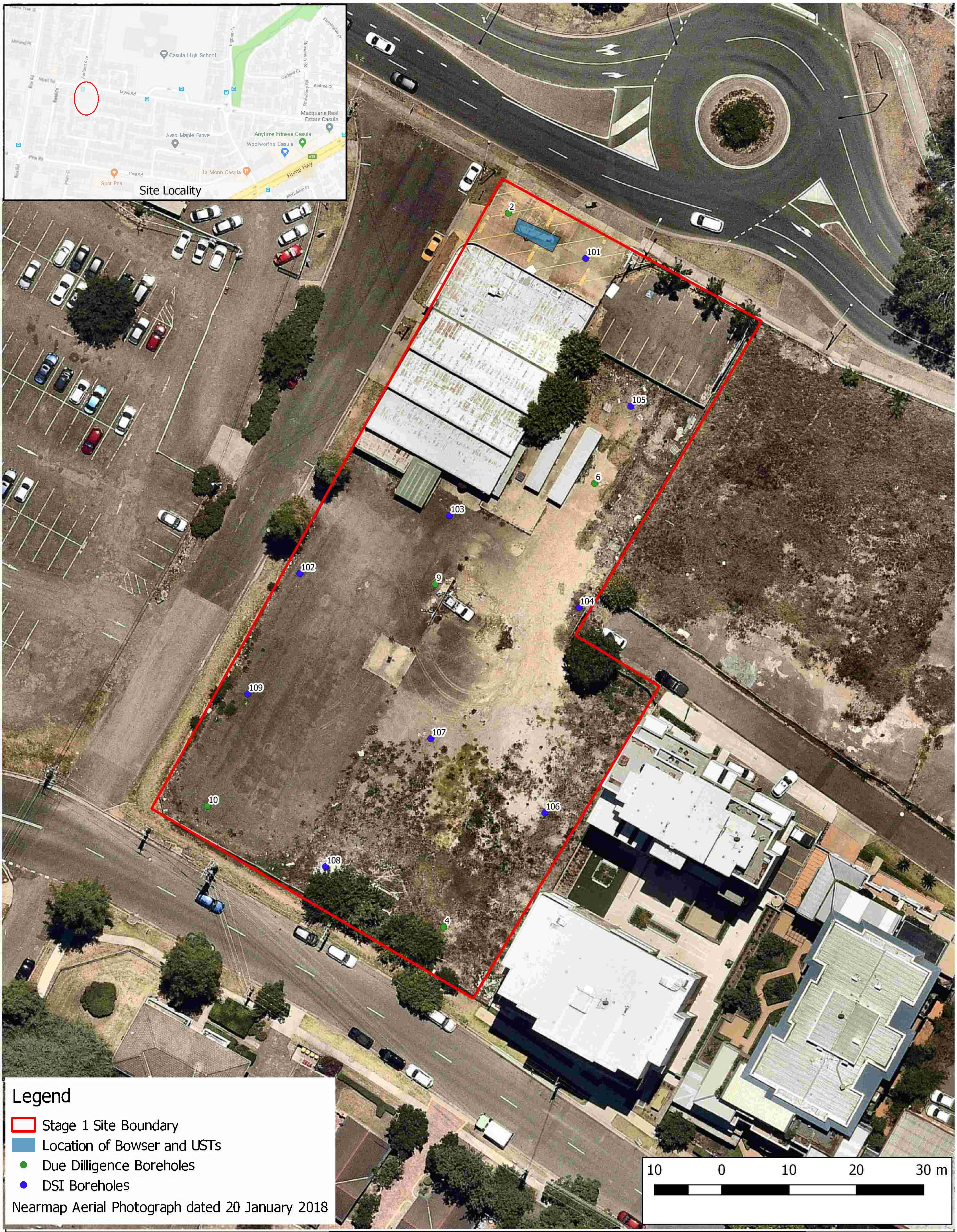
This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the (geotechnical / environmental / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

Drawings 1 and 2



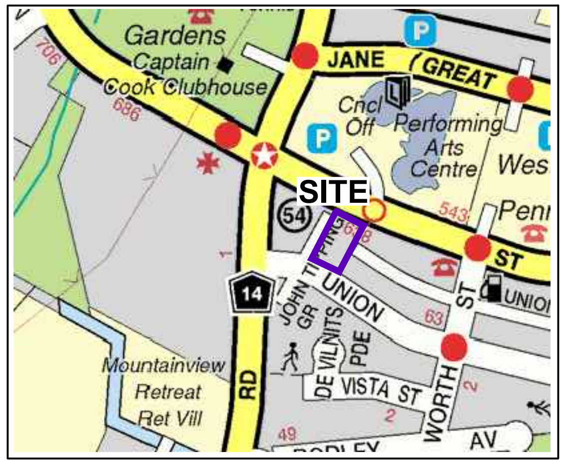
Douglas Partners
Geotechnics / Environment / Groundwater

TITLE: **Locations of Boreholes from DSI and Due Diligence**
Remediation Action Plan
634-638 High Street and 87-91 Union Road, Penrith

N

OFFICE: Macarthur
DRAWN BY: CKM
DATE: 1.5.18

CLIENT: Toga Development and Construction Pty Ltd
PROJECT No: 85867.03
DRAWING No: 1
REVISION: 0
SCALE: 1:3,018 (A3 Sheet)



Locality Plan

NOTE:
1: Base image from Nearmap.com (Dated 8.4. 2018)
2: Test locations are approximate only and were located using hand-held GPS.

0 5 10 15 20 30 40 50m
1:500 @ A3

LEGEND

- ⊕ Borehole location (DP, 2017)
- W Groundwater monitoring well (DP, 2017)
- ⊕ Groundwater monitoring well (DP, March 2018)
- ⊕ Borehole location (DP, March 2018)
- ▲ Additional borehole (DP, May 2018)
- ⊞ Test pit (DP, May 2018)
- ⊕ Borehole (DP, May 2018)
- ▲ Stockpile sample (DP, May 2018)

REMEDIATION AREAS

- ▭ –UST and infrastructure (refer remediation details in RAP)
- ◯ –Asbestos (fibre cement) in fill
  –Excavate and dispose as special waste (Asbestos)
- ▭ –Fill to a depth of ~0.3m; Approx. volume 45m^3
  –Contaminants include lead, copper, zinc, PCB, TRH
  –Excavate and dispose as GSW (non putrescible)
- ▭ –Fill to a depth ~0.4m: Approx volume 10m^3
  –Contaminants include PAH, TRH
  –Excavate and dispose as RSW (non putrescible)
- ▭ –Fill to a depth of ~0.5m; Approx volume 23m^3
  –Contaminants include lead, copper, zinc, PAH
  –Excavate and dispose as Hazardous Waste

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Toga Development and Construction Pty Ltd		TITLE: **Remediation Areas**	PROJECT No:	85867.05
OFFICE: Sydney	DRAWN BY: PSCH	**Remediation Action Plan**	DRAWING No:	2
SCALE: 1:500 @ A3	DATE: 8.6.2018	**87-91 High Street, PENRITH**	REVISION:	0

Appendix B

Laboratory Summary Tables

Table D2: Summary of Results - Waste Classification

						8 metals in soil									Asbestos ID - soils	Phenols
						Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Lead in TCLP	Mercury	Nickel	Zinc	Asbestos fibres	Phenolics Total
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	-	mg/kg
EQL						4	0.4	1	1	1	0.1	0.1	1	1		5
NSW EPA 2014 General Solid Waste (CT1)						100	20	100		100		4	40			288
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						500	100	1900		1500	5	50	1050			518
NSW EPA 2014 Restricted Solid Waste (CT2)						400	80	400		400		16	160			1152
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						2000	400	7600		6000	20	200	4200			2073
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**											
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	<4	<0.4	9	3	7	-	<0.1	4	9	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	6	16	23	255	2040	-	-	24	1000	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	10	5	19	-	<0.1	5	15	0	<5
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<4	<0.4	11	4	10	-	<0.1	4	10	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<4	<0.4	21	14	38	-	<0.1	23	43	0	<5
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<4	<0.4	10	7	14	-	<0.1	6	21	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	4	12	23	250	2100	5.9	0.2	24	690	0	<5
BH104	BH104	0-0.2	11/03/2018	187018	Filling	6	<0.4	11	9	29	-	<0.1	13	44	0	<5
BH105	BH105	0-0.2	11/03/2018	187018	Filling	35	0.5	19	31	130	<0.03	0.3	15	130	0	<5
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<4	<0.4	11	18	120	-	0.1	11	120	0	<5
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<4	<0.4	5	2	4	-	<0.1	2	7	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	4	<0.4	16	24	99	-	0.4	13	100	0	<5
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<4	0.6	17	39	450	0.04	0.2	10	320	0	<5
BH109	BH109	0-0.2	11/03/2018	187018	Filling	5	<0.4	6	8	16	-	<0.1	9	53	0	<5

			ESDAT Combined Compounds												
			Aldrin + Dieldrin	Benzo(a)pyrene	Endosulfan	Moderately Harmful Pesticides (NSW Waste 2014)	PAH (total, NSW Waste 2014)	PCB Total	Pesticides (total, NSW Waste 2008)	Pesticides (total, NSW Waste 2009)	Scheduled chemicals (NSW Waste 2008)	Scheduled chemicals (NSW Waste 2009)	Scheduled chemicals (NSW Waste 2014)	TPH+C10 - C36 (Sum of total)	Carcinogenic PAHs (as BaP TEQ)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL															
NSW EPA 2014 General Solid Waste (CT1)					60	250	200	50					50	10000	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)					108	250	200	50					50	10000	
NSW EPA 2014 Restricted Solid Waste (CT2)					240	1000	800	50					50	40000	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)					432	1000	800	50					50	40000	
Field_ID	**LocCode**	**Sample Depth**													
BD1/20180310	BH101	0.9-1	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BD1/20180311	BH103	0-0.2	-	<1.21	-	-	<7.5	-	-	-	-	-	-	-	<1.21
BH101	BH101	0.2-0.3	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172
BH101	BH101	0.9-1	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH102	BH102	0.2-0.3	<2	32.57	<2	<6	339	<7	<6	<6	<13	<13	<13	2949	32.57
BH102	BH102	0.9-1	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH103	BH103	0-0.2	<0.2	0.1275	<0.2	<0.6	1.21	6.45	<0.6	<0.6	<1.3	<1.3	<1.3	3025	0.1275
BH104	BH104	0-0.2	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172
BH105	BH105	0-0.2	<0.2	0.629	<0.2	<0.6	5.3	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.629
BH106	BH106	0-0.2	<0.2	0.121	<0.2	<0.6	1.01	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.121
BH106	BH106	0.9-1	-	<0.172	-	-	<1.35	-	-	-	-	-	-	<250	<0.172
BH107	BH107	0-0.2	<0.2	1.382	<0.2	<0.6	11.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	1.382
BH108	BH108	0-0.2	<0.2	0.691	<0.2	<0.6	6.25	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	0.691
BH109	BH109	0-0.2	<0.2	<0.172	<0.2	<0.6	<1.35	<0.7	<0.6	<0.6	<1.3	<1.3	<1.3	<250	<0.172

			OCs in Soil																				
			4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)																							
NSW EPA 2014 General Solid Waste (SCC1, TCLP)																							
NSW EPA 2014 Restricted Solid Waste (CT2)																							
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)																							
Field_ID	**LocCode**	**Sample Depth**																					
BD1/20180310	BH101	0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180311	BH103	0-0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH101	BH101	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH101	BH101	0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	0.2-0.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH102	BH102	0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103	BH103	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH104	BH104	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH105	BH105	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0.9-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH107	BH107	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH108	BH108	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH109	BH109	0-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

* different PQLs used by ALS labtoratory compared to Envirolab

Table D2: Summary of Results - Waste Classification

						OPs in Soil											
						Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)								4									
NSW EPA 2014 General Solid Waste (SCC1, TCLP)								7.5									
NSW EPA 2014 Restricted Solid Waste (CT2)								16									
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)								30									
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**												
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	-	-	-	-
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	-	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

						PAHs in Soil																					
						Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a) pyrene in TCLP	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total +ve PAH's	Benzo(b,j+k)fluoranthene	Benzo(k)fluoranthene	Benzo[b+j]fluoranthene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.05	0.005	0.5	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.2	0.5	0.5
NSW EPA 2014 General Solid Waste (CT1)										0.8																	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)										10																	
NSW EPA 2014 Restricted Solid Waste (CT2)										3.2																	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)										23																	
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**																						
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	13	<1	17	26	25	<0.001	36	36	36	14	33	3	66	7.3	15	6.4	54	57	370	38	-	-
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	0.06		<0.5	<0.5	<0.5	0.2	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	0.2	0.77	<0.2	-	-
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	0.3	0.5		0.6	0.7	0.7	0.4	0.5	<0.1	1.2	<0.1	0.4	<0.1	0.5	1.2	5.7	0.7	-	-
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	0.06		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	0.4	<0.2	-	-
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	0.2	0.2	0.6	1.1	<0.001	1.6	1.6	1.6	1.2	1	0.1	2.4	<0.1	1	<0.1	0.9	2.4	13	2	-	-
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	0.4	0.55		0.7	0.8	0.8	0.5	0.6	<0.1	1.5	<0.1	0.4	<0.1	0.6	1.4	6.8	0.9	-	-
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.05		<0.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	-	-

						PCBs in Soil								Total Mercury by FIMS	TRH Soil C10-C40 NEPM								
						Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (total)	Mercury	TPH C10-C40	TPH+C10 - C36 (Sum of total)	TRH >C10 - C16 less Naphthalene (F2)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	50	50	50	50	100	100	50	100	100
NSW EPA 2014 General Solid Waste (CT1)														4		10000							
NSW EPA 2014 General Solid Waste (SCC1, TCLP)													50	50		10000							
NSW EPA 2014 Restricted Solid Waste (CT2)														16		40000							
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)													50	200		40000							
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**																		
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	-	-	-	-	-	-	-	-	0.2	5650	4980	<50	<50	4110	1540	<50	2210	2770
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH101	BH101	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<1	<1	<1	<1	<1	<1	<1	<1	-	3200	-	210	210	2600	420	79	1900	970
BH102	BH102	0.9-1	10/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<2	5.2	5.2	-	3700	-	69	69	2800	830	<50	1200	1800
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH106	BH106	0.9-1	11/03/2018	187018	Natural	-	-	-	-	-	-	-	-	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	-	<50	<50	<100	<100	<50	<100	<100

* different PQLs used by ALS labtoratory compared to Envirolab

Table D2: Summary of Results - Waste Classification

						vTRH & BTEXN in Soil NEPM										
						Benzene	Ethylbenzene	Naphthalene	Toluene	TRH C6 - C10	TRH C6 - C9	vTPH C6 - C10 less BTEX (F1)	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.2	1	1	0.5	25	25	25	2	1	1	0.2
NSW EPA 2014 General Solid Waste (CT1)						10	600		288		650				1000	
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						18	1080		518		650				1800	
NSW EPA 2014 Restricted Solid Waste (CT2)						40	2400		1152		2600				4000	
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						72	4320		2073		2600				7200	
Field_ID	**LocCode**	**Sample Depth**	**Sampled Date**	**Lab_Report_Nun**	**Matrix_Description**											
BD1/20180310	BH101	0.9-1	11/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BD1/20180311	BH103	0-0.2	11/03/2018	ES1807628*	Filling	<0.2	<0.5	<1	<0.5	<10	<10	<10	<0.5	<0.5	<0.5	<0.2
BH101	BH101	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH101	BH101	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.2-0.3	10/03/2018	187018	Filling	<0.2	<1	8	<0.5	<25	<25	<25	<2	<1	<1	-
BH102	BH102	0.9-1	10/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH103	BH103	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH104	BH104	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH105	BH105	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH106	BH106	0.9-1	11/03/2018	187018	Natural	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH107	BH107	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH108	BH108	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-
BH109	BH109	0-0.2	11/03/2018	187018	Filling	<0.2	<1	<1	<0.5	<25	<25	<25	<2	<1	<1	-

* different PQLs used by ALS labtoratory compared to Envirolab

Table E2: Summary of Waste Classification Results

						Metals										Asbestos ID		Combined Comp		sc Inorg Soil - DRY S		PAH												
						Arsenic	Cadmium	Copper	Lead	Lead in TCLP	Mercury	Nickel	Nickel in TCLP	Chromium (III + IV)	Zinc	Asbestos ID in materials	Sample Mass Tested	PAH (total, NSW Waste 2008)	Carcinogenic PAHs as B(a)P TPE	Electrical Conductivity 1:5 soil:water	pH 1:5 soil:water	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(g,h,i)perylene	Benzo[a]pyrene	Benzo(a)pyrene TCLP	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg		mg/kg	mg/kg	-	g	mg/kg	mg/kg	µS/cm	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	0.005	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						4	0.4	1	1		0.1	1		1	1					1		0.1	0.1	0.1	0.1	0.1	0.05	mg/L	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)						100	20		100		4	40		100													0.8	-						
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						500	100		1500	5	50	1050	2	1900				200									10	0.04						
NSW EPA 2014 Restricted Solid Waste (CT2)						400	80		400		16	160		400													3.2	-						
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						2000	400		6000	20	200	4200	8	7600				800									23	0.16						
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																													
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	18	130	-	<0.1	7	-	11	83	-	-	4.65	0.669	87	7.4	<0.1	<0.1	<0.1	0.4	0.5	0.53	-	0.4	<0.1	1.4	<0.1	0.4	<0.1
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	11	13	-	<0.1	4	-	9	20	-	-	<1	<0.172	36	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	6	12	-	<0.1	4	-	10	18	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	26	0.9	61	170	-	<0.1	41	-	20	150	-	-	1.35	0.274	130	7.8	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.2	<0.1	0.3	<0.1	0.1	<0.1
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	8	<0.4	56	390	-	0.2	18	-	17	160	-	-	1.15	0.162	54	7.8	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.1	<0.1	0.3	<0.1	<0.1	<0.1
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	6	0.9	98	1100	0.04	0.5	15	-	23	560	-	-	2.55	0.396	57	7.9	<0.1	<0.1	<0.1	0.2	0.3	0.3	-	0.3	<0.1	0.7	<0.1	0.2	<0.1
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	22	250	-	0.2	6	-	12	230	-	-	<1	<0.172	38	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	5	<0.4	8	18	-	<0.1	9	-	7	51	-	-	<1	<0.172	57	7.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	13	400	<0.03	3.3	6	-	11	200	-	-	1.25	0.162	74	7.7	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.1	<0.1	0.3	<0.1	<0.1	<0.1
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	37	16	-	<0.1	78	-	73	54	-	-	0.65	<0.172	100	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	31	280	-	0.4	35	-	39	170	-	-	3.55	0.518	92	8.4	<0.1	<0.1	<0.1	0.3	0.4	0.4	-	0.4	<0.1	1	<0.1	0.3	<0.1
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	16	<0.4	34	48	-	<0.1	75	0.02	59	120	-	-	1.15	0.163	69	8.6	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.2	<0.1	0.2	<0.1	<0.1	<0.1
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	4	<0.4	29	39	-	<0.1	13	-	16	99	-	-	<1	<0.172	99	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	6	<0.4	17	35	-	<0.1	22	-	8	82	-	-	<1	<0.172	130	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	38	88	-	0.2	42	-	14	280	-	-	0.8	0.131	78	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	-	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	20	110	-	0.2	10	-	15	140	-	-	1.35	0.173	130	7.3	<0.1	<0.1	<0.1	0.1	0.2	0.1	-	0.1	<0.1	0.3	<0.1	0.1	<0.1
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	46	60	-	<0.1	73	<0.02	17	150	-	-	1.4	0.274	90	7.4	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.2	<0.1	0.4	<0.1	0.1	<0.1
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	7	<0.4	8	37	-	<0.1	8	-	7	51	-	-	<1	<0.172	41	7.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	5	<0.4	43	270	-	0.1	7	-	12	170	-	-	0.6	<0.172	40	7.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	16	170	-	<0.1	24	-	30	64	-	-	<1	<0.172	86	8.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	12	52	-	<0.1	14	-	15	45	-	-	<1	<0.172	240	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<4	0.4	16	260	-	<0.1	12	-	15	120	-	-	<1	<0.172	260	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	20	160	-	0.2	7	-	11	400	-	-	1.55	0.273	61	8.3	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.1	<0.1	0.4	<0.1	0.1	<0.1
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	5	19	-	<0.1	6	-	5	39	-	-	<1	<0.172	46	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	4	2	12	110	-	<0.1	8	-	7	160	-	-	<1	<0.172	74	8.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	8	1	37	190	-	0.4	34	-	24	290	-	-	0.85	0.1315	68	8.2	<0.1	<0.1	<0.1	<0.1	0.1	0.07	-	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<4	<0.4	9	60	-	<0.1	8	-	11	67	-	-	<1	<0.172	37	6.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	84	1	64	370	<0.03	2.1	31	-	38	310	-	-	7.1	1.175	61	7.7	<0.1	<0.1	0.1	0.8	0.8	0.97	<0.001	0.7	<0.1	2.2	<0.1	0.6	<0.1
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	0	1430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	120	-	0.2	8	-	11	75	-	-	0.55	0.1415	100	6.5	<0.1	<0.1	<0.1	<0.1	0.1	0.08	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	7	16	-	<0.1	5	-	10	18	-	-	<1	<0.172	40	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	72	-	<0.1	8	-	9	56	-	-	<1	0.111	170	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	4	<0.4	13	340	-	0.3	6	-	10	29	-	-	<1	<0.172	130	7.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Material Identification																																		
WC18-1	WC18		16/05/2018	192022	Material											Chrysotile & Amosite asbestos detected																		
Stockpile Classification																																		
SP1	SP1		14/05/2018	191743-A		<4	<0.4	46	14	-	<0.1	52	-	33	58	-	-	0.75	<0.172	130	8.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SP2	SP2		14/05/2018	191743-A		<4	<0.4	28	19	-	<0.1	24	-	13	31	-	-	1.35	0.272	130	8.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	-	0.1	<0.1	0.4	<0.1	0.1	<0.1
SP3	SP3		14/05/2018	191743-A		<4	<0.4	34	76	-	<0.1	22	-	20	74	-	-	0.6	0.121	210	8.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	-	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
SP4	SP4		14/05/2018	191743-A		<4	<0.4	56	35	-	<0.1	45	-	13	60	-	-	<1	<0.172	330	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table E2: Summary of Waste Classification Results

													ENM (FM)		TRH								BTEX									
						Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs	Foreign Material	Sample Mass Tested	TRH >C10 - C16 less Naphthalene (F2)	Total +ve TRH (>C10-C40)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Ethylbenzene	Naphthalene	o-Xylene	Toluene	Xylene Total	vTPH C6 - C10 less BTEX (F1)	m+p-xylene	TRH C6 - C9	TPH C6-C10
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.5	0.5	0.5	0.2	0.05	0.05		50	50	50	100	100	50	100	100	0.2	1	1	1	0.5	1	25	2	25	25
NSW EPA 2014 General Solid Waste (CT1)																							10	600			288	1000				
NSW EPA 2014 General Solid Waste (SCC1, TCLP)																							18	1080			518	1800			650	
NSW EPA 2014 Restricted Solid Waste (CT2)																							40	2400			1152	4000				
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)																							72	4320			2073	7200			2600	
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																											
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	0.8	1.3	0.7	0.8	0.8	0.9	6.6	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.8	<0.05	5900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	0.1	0.3	<0.5	<0.5	<0.5	0.2	1.2	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	0.3	0.7	<0.5	<0.5	0.5	0.6	3.7	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.4	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	0.2	<0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	7400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	0.5	1	0.5	0.6	0.6	0.6	4.9	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.7	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<0.1	0.3	<0.5	<0.5	<0.5	0.4	1.9	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	0.2	0.4	<0.5	<0.5	<0.5	0.3	1.9	<0.05	5600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.51	<0.05	7300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	0.9	2.2	1.3	1.3	1.4	2	11	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.05	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	5100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Material Identification																																
WC18-1	WC18		16/05/2018	192022	Material																											
Stockpile Classification																																
SP1	SP1		14/05/2018	191743-A		0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.3	<0.05	7800	<50	110	<50	110	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP2	SP2		14/05/2018	191743-A		0.1	0.4	<0.5	<0.5	<0.5	0.3	1.9	<0.05	6500	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP3	SP3		14/05/2018	191743-A		<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.3	<0.05	8300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP4	SP4		14/05/2018	191743-A		<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25

Table E3: Summary of Soil Results

						Metals								Asbestos ID		ESDAT Combined Compounds		Misc Inorg Soil - DRY 50g		PAH																		
						Arsenic	Cadmium	Copper	Lead	Mercury	Nickel	Chromium (III + IV)	Zinc	Asbestos ID in materials	Sample Mass Tested	PAH (total, NSW Waste 2008)	Carcinogenic PAHs as B(a)P TPE	Electrical Conductivity 1:5 soil:water	pH 1:5 soil:water	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(g,h,i)perylene	Benzo[a]pyrene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	g	mg/kg	mg/kg	µS/cm	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						4	0.4	1	1	0.1	1	1	1					1		0.1	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.2	0.05
NEPM 2013 Table 1A(1) HILs Res B Soil						500	150	30000	1200	120	1200		60000				4																					
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																															3							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil, 0-2m																									0.7													
NEPM EILs, Urban residential and public open space, Soil						100		230	1100		230		690																		170							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																						
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																																	
Borehole Delineation																																						
BH102E2	BH102E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	3.15	0.914	-	-	<0.1	0.2	0.1	0.4	0.9	0.71	0.5	0.1	0.4	<0.1	0.5	<0.1	0.2	0.7	1	1	1	0.9	5.5
BH102E2	BH102E2	0.3-0.4	16/05/2018	192022	Natural	-	-	-	-	-	-	-	-	-	-	1.25	0.273	-	-	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.7
BH102E5	BH102E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.65	0.66	-	-	<0.1	0.1	<0.1	0.1	0.8	0.5	0.2	0.1	0.1	<0.1	0.4	<0.1	<0.1	0.2	0.7	0.7	0.7	0.6	3.1
BH102N2	BH102N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.15	0.27	-	-	<0.1	<0.1	<0.1	<0.1	0.3	0.2	0.2	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.2	<0.5	<0.5	<0.5	0.3	1.4
BH102N2	BH102N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	2.65	0.497	-	-	<0.1	<0.1	<0.1	0.2	0.4	0.4	0.3	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	0.5	0.6	0.6	3.8
BH102N5	BH102N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH102S2	BH102S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	5.3	1.239	-	-	<0.1	0.1	<0.1	0.8	1	0.88	0.9	0.2	1	<0.1	0.6	<0.1	0.5	1.6	1.3	1.3	1.3	1	8.7
BH102S2	BH102S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	0.6	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2
BH102S5	BH102S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.15	0.164	-	-	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1
BH102W2	BH102W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.2	0.285	-	-	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2	<0.1	0.2	<0.1	0.2	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	0.4	1.8
BH102W2	BH102W2	0.3-0.4	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	2.45	0.395	-	-	<0.1	<0.1	<0.1	0.2	0.3	0.3	0.2	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	<0.5	0.5	0.5	3.6
BH103E2	BH103E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	270	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103E5	BH103E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	160	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103N2	BH103N2	0.2-0.3	16/05/2018	192022	Filling	-	-	-	1400	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103S2	BH103S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	380	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103S5	BH103S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	290	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103W2	BH103W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	290	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103W5	BH103W5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	67	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E2	BH10E2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	28	26	<0.1	55	52	55	-	-	0.8	0.0865	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.4
BH10E2	BH10E2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	17	1200	<0.1	5	10	210	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10E5	BH10E5	0.1-0.2	16/05/2018	192022	Filling	5	<0.4	21	190	<0.1	9	15	120	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10N2	BH10N2	0.1-0.2	16/05/2018	192022	Filling	4	<0.4	27	79	0.1	50	52	64	-	-	5.5	0.812	-	-	<0.1	<0.1	0.1	0.5	0.6	0.66	0.6	<0.1	1.5	<0.1	0.4	<0.1	1.1	1.4	0.9	0.9	1	1	8.1
BH10N2	BH10N2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	22	820	0.6	8	14	440	-	-	0.8	0.151	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.09	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4
BH10N5	BH10N5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	29	31	<0.1	61	62	52	-	-	1.25	0.274	-	-	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.2	<0.1	0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.3	1.8
BH10S2	BH10S2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	32	66	<0.1	51	50	58	-	-	3.65	0.791	-	-	<0.1	<0.1	<0.1	0.5	0.6	0.59	0.5	0.1	1	<0.1	0.4	<0.1	0.4	0.9	0.9	0.9	0.9	1	6.2
BH10S2	BH10S2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	11	48	<0.1	7	12	58	-	-	1.35	0.268	-	-	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.6
BD2/20180516	BH10S2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	5	15	<0.1	6	10	11	-	-	0.85	0.131	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.55
BH10S5	BH10S5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	28	80	<0.1	42	40	59	-	-	0.7	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.3
BH10S5	BH10S5	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	23	85	<0.1	28	31	77	-	-	3.4	0.528	-	-	<0.1	<0.1	0.1	0.4	0.4	0.4	0.4	<0.1	0.9	<0.1	0.3	<0.1	0.6	0.8	0.6	0.6	0.7	0.8	5
BD1/20180516	BH10S5	0-4-0.5	16/05/2018	ES1814627	Filling	<5	<1	22	172	0.1	31	32	174	-	-					<0.5	<0.5	<0.5	0.6	0.6	0.7	0.6	<0.5	1	<0.5	<0.5	<0.5	0.9	1	0.9	1.2	1.5	-	6.3
BH10W2	BH10W2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	20	22	<0.1	38	41	39	-	-	3.7	0.801	-	-	<0.1	0.1	<0.1	0.5	0.6	0.65	0.5	<0.1	1	<0.1	0.4	<0.1	0.4	0.9	0.9	0.9	1	1	6.3
BH10W2	BH10W2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	5	22	<0.1	6	10	33	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10W5	BH10W5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	24	57	<0.1	37	40	59	-	-	1.45	0.285	-	-	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2	<0.1	0.3	<0.1	0.2	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.4	2
Stockpile																																						
SP1	SP1		14/05/2018	191743-A		<4	<0.4	46	14	<0.1	52	33	58	-	-	0.75	<0.172	130	8.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.3
SP2	SP2		14/05/2018	191743-A		<4	<0.4	28	19	<0.1	24	13	31	-	-	1.35	0.272	130	8.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	0.1	<0.1	0.4	<0.1	0.1	<0.1	0.1	0.4	<0.5	<0.5	<0.5	0.3	1.9
SP3	SP3		14/05/2018	191743-A		<4	<0.4	34	76	<0.1	22	20	74	-	-	0.6	0.121	210	8.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.3
SP4	SP4		14/05/2018	191743-A		<4	<0.4	56	35	<0.1	45	13	60	-	-	<1	<0.172	330	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
Test Pits																																						
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	18	130	<0.1	7	11	83	-	-	4.65	0.669	87	7.4	<0.1	<0.1	<0.1	0.4	0.5	0.53	0.4	<0.1	1.4	<0.1	0.4	<0.1	0.8	1.3	0.7	0.8	0.8	0.9	6.6
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	11	13	<0.1	4	9	20	-	-	<1	<0.172	36	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	6	12	<0.1	4	10	18	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	26	0.9	61	170	<0.1	41	20	150	-	-	1.35	0.274	130	7.8	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.3	<0.1	0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.8
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	8	<0.4	56	390	0.2	18	17	160	-	-	1.15	0.162	54	7.8	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.2	1.2
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	6	0.9	98	1100	0.5	15	23	560	-	-	2.55	0.396	57	7.9	<0.1	<0.1	<0.1	0.2	0.3	0.3	0.3	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	<0.5	0.5	0.6	3.7
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	22	250	0.2	6	12	230	-	-	<1	<0.172	38	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	5	<0.4	8	18	<0.1	9	7	51	-	-	<1	<0.172	57	7.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	13	400	3.3	6	11	200	-	-	1.25	0.162	74	7.7	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.4
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	37	16	<0.1	78	73	54	-	-	0.65	<0.172	100	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	31	280	0.4	35	39	170	-	-	3.55	0.518	92	8.4	<0.1	<0.1	<0.1	0.3	0.4	0.4	0.4	<0.1	1	<0.1	0.3	<0.1	0.5	1	0.5	0.6	0.6	0.6	4.9
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	16	<0.4	34	48	<0.1	75	59	120	-	-	1.15	0.163	69	8.6	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	4	<0.4	29	39	<0.1	13	16	99	-	-	<1	<0.172	99	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	6	<0.4	17	35	<0.1	22	8	82	-	-	<1	<0.172	130	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	38	88	0.2	42	14	280	-	-	0.8	0.131	78	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	20	110	0.2	10	15	140	-	-	1.35	0.173	130	7.3	<0.1	<0.1	<0.1	0.1	0.2	0.1	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.7
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	46	60	<0.1	73	17	150	-	-	1.4	0.274	90	7.4	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.4	<0.1	0.1	<0.1	<0.1	0.3	<0.5	<0.5	<0.5	0.4	1.9
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	7	<0.4	8	37	<0.1	8	7	51	-	-	<1	<0.172	41	7.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	5	<0.4	43	270	0.1	7	12	170	-	-	0.6	<0.172	40	7.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	16	170	<0.1	24	30	64	-	-	<1	<0.172	86	8.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	12	52	<0.1	14	15	45	-	-	<1	<0.172	240	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<4	0.4	16	260	<0.1	12	15	120	-	-	<1	<0.172	260	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	20	160	0.2	7	11	400	-	-	1.55	0.273	61	8.3	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.1	<0.1	0.4	<0.1	0.1	<0.1	0.2	0.4	<0.5	<0.5	<0.5	0.3	1.9
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	5	19	<0.1	6	5	39	-	-	<1	<0.172	46	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	4	2	12	110	<0.1	8	7	160	-	-	<1	<0.172	74	8.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	8	1	37	190	0.4	34	24	290	-	-	0.85	0.1315	68	8.2	<0.1	<0.1	<0.1	<0.1	0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.51
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<4	<0.4	9	60	<0.1	8	11	67	-	-	<1	<0.172	37	6.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	84	1	64	370	2.1	31	38	310	-	-	7.1	1.175	61	7.7	<0.1	<0.1	0.1	0.8	0.8	0.97	0.7	<0.1	2.2	<0.1	0.6	<0.1	0.9	2.2	1.3	1.3	1.4	2	11
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	0	1430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	120	0.2	8	11	75	-	-	0.55	0.1415	100	6.5	<0.1	<0.1	<0.1	<0.1	0.1	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	7	16	<0.1	5	10	18	-	-	<1	<0.172	40	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	72	<0.1	8	9	56	-	-	<1	0.111	170	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.05
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	4	<0.4	13	340	0.3	6	10	29	-	-	<1	<0.172	130	7.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
Material Identification																																						
WC18-1	WC18		16/05/2018	192022	Material									Chrysotile & Amosite asbestos detected																								

Table E3: Summary of Soil Results

						PCB								ENM (FM)		TRH								BTEX									
						Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Polychlorinated Biphenyls (PCBs)	Foreign Material	Sample Mass Tested	TRH >C10 - C16 less Naphthalene (F2)	Total +ve TRH (>C10-C40)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Ethylbenzene	Naphthalene	o-Xylene	Toluene	Xylene isomers	vTPH C6 - C10 less BTEX (F1)	m+p-xylene	TRH C6 - C9	TPH C6-C10
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05		50	50	50	100	100	50	100	100	0.2	1	1	1	0.5	1	25	2	25	25
NEPM 2013 Table 1A(1) HILs Res B Soil													1																				
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																110								0.5	55	3		160	40	45			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil, 0-2m																		120	300	2800				50	70			85	105				180
NEPM EILs, Urban residential and public open space, Soil																										170							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																		1000	3500	10000													800
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																												
Borehole Delineation																																	
BH102E2	BH102E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	360	<50	210	150	<50	120	160	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102E2	BH102E2	0.3-0.4	16/05/2018	192022	Natural	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102E5	BH102E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N2	BH102N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	240	<50	100	130	<50	<100	120	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N2	BH102N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N5	BH102N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	420	<50	310	110	<50	200	180	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S2	BH102S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	290	<50	160	130	<50	<100	120	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S2	BH102S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S5	BH102S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102W2	BH102W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102W2	BH102W2	0.3-0.4	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103E2	BH103E2	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	-	-	<50	3300	<50	2300	960	<50	1300	1600	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103E5	BH103E5	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103N2	BH103N2	0.2-0.3	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	-	-	<50	4000	<50	3000	980	<50	1600	2000	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103S2	BH103S2	0.1-0.2	16/05/2018	192022	Filling	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	<50	1800	<50	1300	490	<50	600	890	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103S5	BH103S5	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	1.2	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103W2	BH103W2	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	-	52	2400	52	1600	760	<50	850	1100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103W5	BH103W5	0.1-0.2	16/05/2018	192022	Filling	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<50	1900	<50	1100	790	<50	470	970	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH10E2	BH10E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E2	BH10E2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E5	BH10E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N2	BH10N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N2	BH10N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N5	BH10N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S2	BH10S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S2	BH10S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD2/20180516	BH10S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S5	BH10S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S5	BH10S5	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180516	BH10S5	0-4-0.5	16/05/2018	ES1814627	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W2	BH10W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W2	BH10W2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W5	BH10W5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stockpile																																	
SP1	SP1		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	7800	<50	110	<50	110	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP2	SP2		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	6500	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP3	SP3		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	8300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP4	SP4		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	8200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Test Pits																																	
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	5900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	5600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	5100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Material Identification																																	
WC18-1	WC18		16/05/2018	192022	Material	-	-	-	-	-	-	-	-																				

Appendix C

Bore and Test Pit Logs

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285893
NORTHING: 6262956
DIP/AZIMUTH: 90°/--

BORE No: BH102E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = <1		
27	0.3	SILTY CLAY: red-brown silty clay		A	0.3 0.4		PID = <1		
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285897
NORTHING: 6262955
DIP/AZIMUTH: 90°/--

BORE No: BH102E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling, with some igneous gravel							
				A	0.1 0.2		PID = <1		
27									
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262950
DIP/AZIMUTH: 90°/--

BORE No: BH102N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some sand, some fine to medium sandstone gravel	▨	A	0.1 0.2		PID = <1		
27			▨						
			▨	A	0.4 0.5		PID = <1		
	0.6								
		SILTY CLAY: red-brown silty clay	▨						
	0.7								
		Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285896
NORTHING: 6262959
DIP/AZIMUTH: 90°/--

BORE No: BH102N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty sand filling with some igneous gravel							
				A	0.1 0.2		PID = <1		
27		0.3 m: clinker							
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262946
DIP/AZIMUTH: 90°/--

BORE No: BH102S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel, trace of sand		A	0.1 0.2		PID = <1		
27		0.3 m: turning yellow-brown							
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262951
DIP/AZIMUTH: 90°/--

BORE No: BH102S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel			0.1				
				A			PID = <1		
					0.2				
27									
		0.4 m: turning red-brown			0.4				
				A			PID = <1		
					0.5				
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 0.7m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262957
DIP/AZIMUTH: 90°/--

BORE No: BH102W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: silty clay filling with some sand, some fine to medium sandstone and igneous gravels		A	0.1 0.2		PID = <1		
27	0.3	FILLING: red-brown silty clay filling with some fine to medium igneous gravel		A	0.3 0.4		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285916
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: brown silty sand filling with some fine igneous gravel							
				A	0.1 0.2		PID = <1		
27				A	0.4 0.5		PID = <1		
	0.5	SILTY CLAY: red-brown silty clay							
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285918
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: light grey silty clay filling with some sand and igneous gravel							
				A	0.1 0.2		PID = <1		
		0.3 m: becoming grey-brown							
27				A	0.4 0.5		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262962
DIP/AZIMUTH: 90°/--

BORE No: BH103N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		CONCRETE: grey, 10-20 mm aggregate with reinforcements at 20 mm depth							
	0.1	FILLING: yellow-brown silty sand filling with some igneous gravel		A	0.2 0.3		PID = <1		
27				A	0.4 0.5		PID = <1		
	0.8	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262965
DIP/AZIMUTH: 90°/--

BORE No: BH103S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: yellow-brown silty clay filling with some sand and igneous gravel	☒	A	0.1 0.2		PID = <1		
		0.3 m: turning red-brown							
27				A	0.4 0.5		PID = <1		
		0.5 m: trace of charcoal							
	0.6	SILTY CLAY: red-brown silty clay	▨						
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: grey-brown silty clay filling with some igneous gravel	▨						
			▨	A	0.1 0.2		PID = <1		
27			▨	A	0.4 0.5		PID = <1		
		0.5 m: trace of charcoal	▨						
	0.8	SILTY CLAY: red-brown silty clay	▧						
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262963
DIP/AZIMUTH: 90°/--

BORE No: BH103W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: brown-grey silty clay filling with some sand and fine igneous gravel	▨	A	0.1 0.2		PID = 1		
27	0.3	FILLING: brown-black silty clay with some igneous gravel	▨	A	0.4 0.5		PID = 2		
	0.7	SILTY CLAY: red-brown silty clay	▨						
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285909
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: brown silty clay filling, with some sand fine to medium igneous gravel, and brick fragments							
				A	0.1 0.2				
		0.3 m: turning dark brown		A	0.3 0.4				
27									
	0.7	SILTY CLAY: brown silty clay		A	0.7 0.8				
		0.9 m: turning red-brown							
	1								1
	1.1	Bore discontinued at 1.1m Target depth reached							
26									

RIG: Scout 2
DRILLER: Steve
LOGGED: NW
CASING: Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with igneous gravel	▩	A	0.1 0.2		PID = 3		
27			▩	A	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay	▨						
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling, with some fine igneous gravel	▩	A	0.1 0.2		PID = 4		
27	0.3	SILTY CLAY: red-brown silty clay	▨						
	0.4	Bore discontinued at 0.4m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace sandstone gravels	⊠	A	0.1 0.2		PID = 7		
27									
				A	0.4 0.5		PID = 6		
	0.8	SILTY CLAY: red-brown silty clay	▨						
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285883
NORTHING: 6262928
DIP/AZIMUTH: 90°/--

BORE No: BH10N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some igneous gravel	▨	A	0.1 0.2		PID = 3		
27	0.3	Bore discontinued at 0.3m Auger refusal on concrete							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = 4		
27									
				A*	0.4 0.5		PID = 3		
	0.6	SILTY CLAY: red brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS: *BD2/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285874
NORTHING: 6262925
DIP/AZIMUTH: 90°/--

BORE No: BH10S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace medium sandstone gravel		A	0.1 0.2		PID = 6		
27									
				A*	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay							
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD1/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some igneous gravel	▨	A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 3		
	0.5	SILTY CLAY: red-brown silty clay, with a trace of charcoal	▨						
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown, silty clay filling with igneous gravel							
				A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 4		
	0.5	SILTY CLAY: red-brown silty clay with trace of charcoal							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285893
NORTHING: 6262956
DIP/AZIMUTH: 90°/--

BORE No: BH102E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = <1		
27	0.3	SILTY CLAY: red-brown silty clay		A	0.3 0.4		PID = <1		
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285897
NORTHING: 6262955
DIP/AZIMUTH: 90°/--

BORE No: BH102E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling, with some igneous gravel	▨						
				A	0.1 0.2		PID = <1		
27									
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay	▧						
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262950
DIP/AZIMUTH: 90°/--

BORE No: BH102N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some sand, some fine to medium sandstone gravel		A	0.1 0.2		PID = <1		
27									
				A	0.4 0.5		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285896
NORTHING: 6262959
DIP/AZIMUTH: 90°/--

BORE No: BH102N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty sand filling with some igneous gravel		A	0.1 0.2		PID = <1		
27		0.3 m: clinker							
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262946
DIP/AZIMUTH: 90°/--

BORE No: BH102S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel, trace of sand		A	0.1 0.2		PID = <1		
27		0.3 m: turning yellow-brown		A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
1	1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262951
DIP/AZIMUTH: 90°/--

BORE No: BH102S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = <1		
27									
	0.7	0.4 m: turning red-brown		A	0.4 0.5		PID = <1		
	1.0	SILTY CLAY: red-brown silty clay							
	1	Bore discontinued at 0.7m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262957
DIP/AZIMUTH: 90°/--

BORE No: BH102W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: silty clay filling with some sand, some fine to medium sandstone and igneous gravels		A	0.1 0.2		PID = <1		
27	0.3	FILLING: red-brown silty clay filling with some fine to medium igneous gravel		A	0.3 0.4		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285916
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: brown silty sand filling with some fine igneous gravel							
				A	0.1 0.2		PID = <1		
27									
				A	0.4 0.5		PID = <1		
	0.5	SILTY CLAY: red-brown silty clay							
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285918
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: light grey silty clay filling with some sand and igneous gravel							
				A	0.1 0.2		PID = <1		
		0.3 m: becoming grey-brown							
27				A	0.4 0.5		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262962
DIP/AZIMUTH: 90°/--

BORE No: BH103N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		CONCRETE: grey, 10-20 mm aggregate with reinforcements at 20 mm depth							
	0.1	FILLING: yellow-brown silty sand filling with some igneous gravel							
				A	0.2 0.3		PID = <1		
27				A	0.4 0.5		PID = <1		
	0.8	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262965
DIP/AZIMUTH: 90°/--

BORE No: BH103S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
		FILLING: yellow-brown silty clay filling with some sand and igneous gravel	▨						
					0.1				
				A			PID = <1		
					0.2				
		0.3 m: turning red-brown							
27					0.4				
				A			PID = <1		
		0.5 m: trace of charcoal			0.5				
	0.6	SILTY CLAY: red-brown silty clay	▧						
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: grey-brown silty clay filling with some igneous gravel	▨	A	0.1 0.2		PID = <1		
27			▨	A	0.4 0.5		PID = <1		
		0.5 m: trace of charcoal	▨						
	0.8	SILTY CLAY: red-brown silty clay	▨						
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262963
DIP/AZIMUTH: 90°/--

BORE No: BH103W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: brown-grey silty clay filling with some sand and fine igneous gravel	▨	A	0.1 0.2		PID = 1		
27	0.3	FILLING: brown-black silty clay with some igneous gravel	▨	A	0.4 0.5		PID = 2		
	0.7	SILTY CLAY: red-brown silty clay	▨						
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285909
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: brown silty clay filling, with some sand fine to medium igneous gravel, and brick fragments		A	0.1 0.2				
27		0.3 m: turning dark brown		A	0.3 0.4				
	0.7	SILTY CLAY: brown silty clay		A	0.7 0.8				
	1	0.9 m: turning red-brown							1
26	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with igneous gravel		A	0.1 0.2		PID = 3		
27									
				A	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling, with some fine igneous gravel	▩	A	0.1 0.2		PID = 4		
27	0.3	SILTY CLAY: red-brown silty clay	▨						
	0.4	Bore discontinued at 0.4m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace sandstone gravels		A	0.1 0.2		PID = 7		
27									
				A	0.4 0.5		PID = 6		
	0.8	SILTY CLAY: red-brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285883
NORTHING: 6262928
DIP/AZIMUTH: 90°/--

BORE No: BH10N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = 3		
27	0.3	Bore discontinued at 0.3m Auger refusal on concrete							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = 4		
27									
				A*	0.4 0.5		PID = 3		
	0.6	SILTY CLAY: red brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS: *BD2/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285874
NORTHING: 6262925
DIP/AZIMUTH: 90°/--

BORE No: BH10S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace medium sandstone gravel	▨	A	0.1 0.2		PID = 6		
27									
				A*	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay	▨						
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD1/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 3		
	0.5	SILTY CLAY: red-brown silty clay, with a trace of charcoal							
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown, silty clay filling with igneous gravel							
				A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 4		
	0.5	SILTY CLAY: red-brown silty clay with trace of charcoal							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285917
NORTHING: 6262897

PIT No: WC1
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some fine to medium igneous gravel with a trace of wood fragments and grass rootlets							
				D	0.1				
27	0.2	SILTY CLAY - brown silty clay			0.2				
				D*	0.3				
	0.4	Pit discontinued at 0.4m Target depth reached			0.4				
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD1/20180514

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285940
NORTHING: 6262938

PIT No: WC10
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)
				Type	Depth	Sample	Results & Comments		5 10 15 20
		FILLING - brown silty clay filling with some fine to medium igneous gravel, fine to medium sandstone gravel, with a trace of grass rootlets,plastic fragments, wood fragments and charcoal		D	0.1 0.2				
27	0.3	SILTY CLAY - red brown silty clay		D*	0.4 0.5				
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD3/20180514 taken at 0.4 m - 0.5m depth

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 2855932
NORTHING: 6262954

PIT No: WC11
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty clay filling with some igneous gravel, sandstone fragments (20-150mm) with a trace of grass rootlets, tile fragments and charcoal	▨						
			▨	D	0.1 0.2				
		- becoming darker brown	▨						
27			▨	D	0.4 0.5				
	0.5	SILTY CLAY - red brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285909
NORTHING: 6262945

PIT No: WC12
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ASPHALTIC CONCRETE	■						
	0.05	FILLING - dark brown silty clay filling with some sand and igneous gravel, some glass and tile fragments, and charcoal	▩	D	0.1 0.2				
27	0.3	SILTY CLAY - red brown silty clay	▨						
	0.5	Pit discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285900
NORTHING: 6262962

PIT No: WC13
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ASPHALTIC CONCRETE							
	0.05	FILLING - brown silty sand filling with some fine to medium igneous gravel with a trace of wood fragments, and whole bricks		D	0.1 0.2				
27	0.3	FILLING - light grey-brown silty sand filling with some fine to medium igneous gravel whole bricks and brick fragments with a trace of wire and tile fragments		D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay							
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285916
NORTHING: 6262956

PIT No: WC14
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)
				Type	Depth	Sample	Results & Comments		5 10 15 20
		ROADBASE							
	0.05	FILLING - brown silty sand filling with some igneous gravel, with a trace of wire, and brick fragments		D	0.1 0.2				
	0.2	ASH							
27	0.23	FILLING - red brown silty clay filling with some igneous gravel, brick fragments (150-200mm), and with a trace of charcoal, plastic sheeting, metal sheeting, and glass fragments		D	0.4 0.5				
	0.7	SILTY CLAY - red, brown silty clay							
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285928
NORTHING: 6262965

PIT No: WC15
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty sand filling with some fine to medium igneous gravel, with a trace of grass rootlets							
				D	0.1 0.2				
		- becoming darker brown with glass and plastic, tile fragments and concrete fragments and boulders (200mm)		D	0.3 0.4				
27									
	0.5	SILTY CLAY - red brown silty clay with a trace of charcoal							
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285936
NORTHING: 6262962

PIT No: WC16
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty clay filing with some medium sandstone gravel, with a trace of grass rootlets, plastic fragments, and bitumen		D	0.1 0.2				
27		- becoming darker brown, with a trace of glass and brick fragments and plastic sheets		D	0.4 0.5				
	0.5	FILLING - red brown silty clay filling with some brick fragments and a trace of glass fragments		D	0.5 0.6				
	0.7	SILTY CLAY - red brown silty clay with a trace of charcoal							
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.6 AHD
EASTING: 285947
NORTHING: 6262981

PIT No: WC17
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty sand filling with some fine to medium igneous and sandstone gravels with a trace of glass and brick fragments, and grass rootlets	▨	D	0.1 0.2				
	0.3	SILTY CLAY - red brown silty clay	▧						
	0.4	Pit discontinued at 0.4m Target depth reached							
27									
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.6 AHD
EASTING: 285937
NORTHING: 6262990

PIT No: WC18
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
				Type	Depth	Sample	Results & Comments		
		FILLING - light brown silty sand filling 0.1m - fibre cement sheets	▨	D	0.1 0.2				
	0.2	Pit discontinued at 0.2m Target depth reached							
27									
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.8 AHD
EASTING: 285940
NORTHING: 6262998

PIT No: WC19
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)
				Type	Depth	Sample	Results & Comments		5 10 15 20
		FILLING: yellow-brown silty clay filling	▨	A	0.1 0.2				
	0.3	FILLING: red-brown silty clay filling, trace of charcoal, some fine igneous gravel	▨	A	0.4 0.5				
	0.5	SILTY CLAY: red-brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
27									
	1								1
26									

RIG: Scout 2 **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285904
NORTHING: 6262910

PIT No: WC2
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some igneous gravel and a trace of charcoal, plastic fragments, metal fragments, grass rootlets, and brick fragments	▨	D	0.1 0.2				
27			▨	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.8 AHD
EASTING: 285949
NORTHING: 6262989

PIT No: WC20
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING: yellow-brown silty sand filling with some fine igneous gravel, trace fine to medium sandstone gravel	▨	A	0.1 0.2				
	0.3	FILLING: red-brown silty clay filling, trace charcoal and brick fragments	▨	A	0.4 0.5				
	0.6	SILTY CLAY: red-brown silty clay	▨						
	0.7	Pit discontinued at 0.7m Target depth reached							
27									
	1								1
26									

RIG: Scout 2

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285890
NORTHING: 6262920

PIT No: WC3
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - dark brown silty clay filling with some brick fragments (50-150mm), igneous gravel with a trace of glass fragments, tile fragments, and charcoal	☒						
					0.1				
				D					
27					0.2				
					0.3				
				D*					
	0.4	SILTY CLAY - red brown silty clay	▨		0.4				
	0.5	Pit discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD2/20180514 taken at 0.3 m - 0.4m depth

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285882
NORTHING: 6262947

PIT No: WC4
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.05	BITUMEN	■						
27	0.7	FILLING - brown silty clay filling with some sandstone fragments (10-100mm), with a trace of rootlets, glass and wood fragments, charcoal, igneous gravel 0.4m - becoming darker brown	▩	D D	0.1–0.2 0.4–0.5				
	0.8	SILTY CLAY - red brown silty clay	▨						
26	1	Pit discontinued at 0.8m Target depth reached							1

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285897
NORTHING: 6262929

PIT No: WC5
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ASPHALTIC CONCRETE	■						
	0.05	FILLING - brown silty clay filling with some igneous gravel, trace of grass rootlets, glass fragments, sandstone fragments, and brick fragments	▨	D	0.1 0.2				
27	0.2	FILLING - red brown silty clay filling with some igneous cobbles (50-200mm) trace of plastic fragments, and tile fragments	▨	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨						
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285918
NORTHING: 6262920

PIT No: WC6
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - brown silty clay filling with some igneous gravel and trace of grass rootlets, and sandstone fragments		D	0.1 0.2				
	0.3	SILTY CLAY - red brown silty clay		D	0.3 0.4				
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285930
NORTHING: 6262915

PIT No: WC7
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - brown silty clay filling with some igneous gravel, trace of grass rootlets, and plastic fragments	▨	D	0.1 0.2				
	0.3	FILLING - red brown silty clay filling with a trace of asphalt, wood fragments, and grass rootlets	▨	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285938
NORTHING: 6262932

PIT No: WC8
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some igneous gravel (10-100mm) and sandstone gravel (10-100mm), with a trace of grass rootlets, tile fragments, and plastic fragments	⊠	D	0.1 0.2				
27				D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨	D	0.7 0.8				
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285928
NORTHING: 6262938

PIT No: WC9
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Sampling & In Situ Testing Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty clay filling with some igneous gravel and sandstone gravel (10-50mm) a trace of wood fragments and sand	▨	D	0.1 0.2				
	0.2	ROADBASE	⁘	D	0.2 0.25				
27	0.25	FILLING - red brown silty clay filling with a trace of brick fragments, igneous gravel, sandstone gravel, ceramic pipe, charcoal	▨	D	0.3 0.4				
	0.4	SILTY CLAY - red brown silty clay	▨						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

Dry (D)	Non-cohesive and free-running.
Moist (M)	Soil feels cool, darkened in colour. Soil tends to stick together. Sand forms weak ball but breaks easily.
Wet (W)	Soil feels cool, darkened in colour. Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Descriptions

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

May 2017

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General

■	Asphalt
▨	Road base
▨	Concrete
▨	Filling

Soils

▨	Topsoil
▨	Peat
▨	Clay
▨	Silty clay
▨	Sandy clay
▨	Gravelly clay
▨	Shaly clay
▨	Silt
▨	Clayey silt
▨	Sandy silt
▨	Sand
▨	Clayey sand
▨	Silty sand
▨	Gravel
▨	Sandy gravel
▨	Cobbles, boulders
▨	Talus

Sedimentary Rocks

▨	Boulder conglomerate
▨	Conglomerate
▨	Conglomeratic sandstone
▨	Sandstone
▨	Siltstone
▨	Laminite
▨	Mudstone, claystone, shale
■	Coal
▨	Limestone

Metamorphic Rocks

▨	Slate, phyllite, schist
▨	Gneiss
▨	Quartzite

Igneous Rocks

▨	Granite
▨	Dolerite, basalt, andesite
▨	Dacite, epidote
▨	Tuff, breccia
▨	Porphyry

Appendix D

Notes About this Report

About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Douglas Partners

Geotechnics / Environment / Groundwater

Hazardous Building Materials (HBM) Register

634-652 High Street
& 87-91 Union Road, Penrith NSW 2750

Prepared for
Toga Penrith Developments Pty Ltd

Project 85867.04
September 2021

Integrated Practical Solutions

Douglas Partners
Geotechnics | Environment | Groundwater

Document History

Document details

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Revision 0	1	-	Jia Fernandez; Toga Development and Construction Pty Ltd
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, photographic logs and Register have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		29 September 2021
Reviewer		29 September 2021

Type te

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Executive Summary

Douglas Partners Pty Ltd (DP) was engaged by Toga Development and Construction Pty Ltd to conduct a Hazardous Building Materials (HBM) survey at 634-652 High Street and 87-91 Union Road, Penrith NSW 2750 (the site). The survey was undertaken to assess the location, extent and condition of asbestos-containing materials (ACM) and other HBM prior to demolition and redevelopment work. The survey consisted of a visual inspection supplemented by a limited program of sample collection and laboratory analysis.

HBM were identified or assumed present during the survey as summarised in Table 1 below.

Table 1: Summary of Results

Building / Area	Non-Friable Asbestos	Friable Asbestos	SMF	Lead Paint	Lead Dust	PCB
Main warehouse	✓	✓	✓	✓	✓	✓
Exterior grounds, lighting	✘	✘	✘	✘	✘	✓
Exterior grounds, fill	✓	✘	✘	✘	✘	✘

Note: Refer Section 6.2 regarding friable asbestos.

Limited or no access was available to certain areas of the site. Inaccessible areas should be assumed to contain HBM unless assessment of these areas by a Competent Person confirms otherwise.

HBM should be managed in accordance with the requirements of the NSW Work Health and Safety (WHS) Act 2011 (WHS Act), NSW WHS Regulation 2017 (WHS Regulation) and relevant Codes of Practice, Australian Standards and guidelines.

HBM should be removed prior to any significant disturbance including from maintenance, refurbishment and demolition work.

Limitations apply to this HBM survey and report as outlined in Section 7.

This report should be read in its entirety and may not be reproduced other than in full, except with the prior written approval of DP.

Table of Contents

Hazardous Building Materials (HBM) Register
634-652 High Street and 87-91 Union Road, Penrith NSW

1. Introduction

Douglas Partners Pty Ltd (DP) was engaged by Toga Penrith Developments Pty Ltd to conduct a Hazardous Building Materials (HBM) survey at 634-652 High Street and 87-91 Union Road, Penrith NSW 2750 (the site). The survey was undertaken to assess the location, extent and condition of the following HBM prior to demolition and redevelopment work:

- Asbestos containing materials (ACM);
- Synthetic mineral fibre (SMF);
- Polychlorinated biphenyls (PCBs) in fluorescent light fittings;
- Lead paint systems; and
- Lead dust in ceiling cavities.

An initial site inspection was conducted on 1 May 2018. A follow-up inspection was conducted on 30 July 2018 and comprised the previously inaccessible toilet block in the southwestern corner of the warehouse and the fenced car park adjacent the northeastern corner of the warehouse.

The results of the survey, including details of the HBM identified and the results of ACM risk assessments, are provided in the HBM Register (the Register) in Appendix A.

Laboratory analysis certificates for the samples collected and analysed as part of the survey are provided in Appendix B.

A photographic record was collected during the site inspection and is presented in Appendix C.

Limited or no access was available to certain areas as outlined in the Register and Section 5 of this report.

2. Site Description

The site is located at the intersection of High Street and John Tipping Grove in Penrith NSW and is bound by High Street to the north, commercial properties to the east, Union Road to the south and John Tipping Grove to the west.

The building inspected comprised a single storey commercial warehouse with associated showroom and amenities areas. The building was tenanted at the time of the initial site inspection on 1 May 2018. The building was vacant during a follow-up inspection of selected areas on 30 July 2018 which comprised the toilet block in the southwestern corner of the warehouse and the fenced car park adjacent the northeastern corner of the warehouse.

3. Survey Method

The survey consisted of a visual inspection of safely accessible areas supplemented by a limited program of sample collection and laboratory analysis.

Samples of suspected ACM were collected by DP using hand tools (e.g., knife or pliers) and analysed for asbestos by a National Association of Testing Authorities (NATA) accredited laboratory. Sample size is typically limited to minimise disturbance of the material and potential structural or aesthetic impacts. The samples were analysed by polarised light microscopy (PLM) with dispersion staining in accordance with AS4964-2004 *Method for the qualitative identification of asbestos in bulk samples*.

Samples of suspected lead paint were collected by DP and analysed for lead by a NATA accredited laboratory using Inductively Coupled Plasma - Atomic Emission Spectrometry / Mass Spectrometry (ICP-AES/MS). Paint samples contained approximately equal portions of all layers of paint at the location sampled, to the extent practicable, and therefore typically reflect the average lead content of the overall paint system at location sampled.

SMF was identified primarily by visual inspection or incidentally as a result of laboratory analysis for asbestos.

Where safe access (i.e., electrical isolation) is provided to DP selected light fittings are partially dismantled to obtain capacitor details. Capacitor details are then compared to the list of PCB-containing and PCB-free equipment in *Identification of PCB-Containing Capacitors: An Information Booklet for Electricians and Electrical Contractors, 1997* prepared by the Australian and New Zealand Environment and Conservation Council (ANZECC).

Dust samples are collected from ceiling cavities and similar areas found to contain significant settled dust loadings and then analysed for lead. Samples are collected from a specified surface area (normally 100 or 900 cm^2) and analysed by a NATA accredited laboratory using ICP-AES/MS. The sampling area and laboratory analysis result (total lead in µg) are then used to calculate the lead dust loading which is expressed as milligrams of lead per square metre (mg/m^2).

Material sampling and analysis programs are necessarily limited. In the case of repetitive buildings, building elements and/or rooms/areas of similar age it is often necessary to assume consistent use of construction materials including HBM.

4. Asbestos Risk Assessment Method

ACM poses a health risk if asbestos fibres are released to the atmosphere and inhaled. There is also a risk of environmental contamination whenever asbestos is disturbed. The degree of risk associated with any given ACM depends on a range of factors such as the friability, extent, condition, and location/accessibility of the material, the asbestos mineral type(s) present, the nature of site activities and ventilation.

The asbestos risk assessment method employed by DP considers several key factors that influence risk and a numerical score is assigned to each (refer Table 2 below). These scores are then added together to determine an overall risk rating for the ACM (refer Table 3 below). A degree of professional judgement may be applied when determining the final risk rating since it is not practicable to include in Table 2 all risk factors that may be relevant to a given situation.

Risk assessments for ACM should be reviewed on a regular basis including when:

- The Asbestos Management Plan is reviewed;
- Further asbestos or ACM is identified at the workplace;
- Asbestos is removed, disturbed, sealed, enclosed or undergoes any other change in condition;
- There is evidence that the risk assessment is no longer valid;
- There is evidence that control methods are not effective; or
- A significant change is proposed for the workplace or for work practices or procedures relevant to the risk assessment.

An asbestos risk assessment review is to be conducted at least every 5 years. The review is to be performed by a Competent Person.

Table 2: Key Risk Factors

Risk Factor	Score	Description
Friability	0	Non-friable (fibre reinforced vinyls, bituminous materials, adhesives)
	1	Non-Friable (fibre reinforced cement products such as wall and roof sheeting)
	2	Semi-Friable (low density insulation board, millboard, ropes, paper, textiles, gaskets or highly weathered asbestos cement)
	3	Friable (thermal insulation to pipes/boilers, sprayed insulation, loose fill insulation)
Condition	0	Very Good. Very little or no visible indication of damage. Structurally sound. No significant repairs required. Material performs as intended.
	1	Good - Minor damage in small, localised areas. Structurally sound. Minor preventative action may be required as a precaution and/or to prolong material life. Material generally performs as intended.
	2	Fair. Localised damage in various areas. Material is generally structurally sound however local removal and replacement of damaged sections may be required. Material performance may be somewhat impaired in areas.
	3	Poor. Material exhibits significant damage throughout. Overall structural stability may be compromised. Material performance is significantly impaired.
Treatment	0	Fully enclosed, encapsulated or sealed. ACM is entirely contained and the enclosure/encapsulation/sealing material is in good condition.
	1	Generally enclosed, encapsulated or sealed. ACM is generally contained however enclosure/encapsulation/sealing material may not be completely continuous or exhibits minor damage/penetrations.
	2	Partially enclosed, encapsulated or sealed. ACM is contained in area(s) however enclosure/encapsulation/sealing material is not present, significantly damaged or ineffective in area(s).
	3	Enclosure/encapsulation/sealing material is significantly damaged and/or generally ineffective or there is no treatment.
Accessibility	0	The ACM is not directly accessible to occupants. Contact is highly unlikely unless a significant, dedicated effort is made. Substantial demolition, dismantling and/or special access equipment would be required.
	1	The ACM is generally not accessible to occupants. Contact is unlikely but could be made with special tools or equipment (e.g. elevating work platform) or minor demolition/dismantling.
	2	Some portion(s) of ACM are accessible to occupants. Direct contact may occur periodically but often requires basic tools/equipment (e.g. step ladder).
	3	The majority of the ACM is accessible to occupants. Direct contact is a common occurrence and may be made with minimal or no effort.
Activity	0	Area generally not occupied. Normally very little or no activity. Activities may be highly restricted or area secured. Examples may include subfloor voids, ceiling cavities, confined spaces and other inaccessible areas.
	1	Low level occupancy. Some activity in parts or area only occupied periodically. Examples may include plant rooms and store rooms.
	2	Moderate level occupancy. Activity normally present throughout area. May include offices, laboratories, classrooms, workshops, and warehouses.
	3	High level occupancy. Generally high levels of activity. Activities may be wide-ranging and/or largely unrestricted. Examples may include production/manufacturing areas, construction sites and public areas/thoroughfares.
Ventilation	0	Exterior area where natural ventilation and associated dilution is largely unlimited. Significant retention and/or build-up of airborne contaminants is unlikely.
	1	Interior area. Natural ventilation and dilution is limited but area is not particularly confined. Limited retention and/or build-up of airborne contaminants is possible.
	2	Confined areas where ventilation and associated dilution is significantly limited. Significant retention and/or build-up of airborne contaminants is possible or likely.
	3	Asbestos material subject to direct ventilation (e.g. inside an AC system or near a fan or air exhaust) which may result in disturbance and/or elevated fibre concentrations in air.

Table 3: Risk Rating

Overall Score	Risk Rating	Description
15-18	High (H)	The ACM poses an elevated and typically unacceptable risk of exposure and/or environmental contamination. Controls should generally be implemented as soon as possible to address the risk. Removal of the whole or part of the ACM is typically required. Other controls such as enclosure, encapsulation and/or sealing may also be necessary if portion(s) of ACM are to remain in place. As an interim measure, access to the area should be appropriately restricted. Air monitoring is often recommended to confirm airborne asbestos concentrations and provide a written record for future reference.
10-14	Moderate (M)	The ACM poses a moderate risk of exposure and/or environmental contamination. Often there has been minor damage or there is potential for disturbance/degradation in the foreseeable future. Consideration should be given to implementing appropriate controls in the short to medium term to address the risk(s) and/or prolong the lifespan of the material. Relevant controls typically include enclosure, encapsulation and/or sealing. Extensive removal is generally not required and the material can generally be managed on site if desired and serving a useful purpose.
0-9	Low (L)	The risk of exposure and environmental contamination is generally low while the material remains undisturbed and in its present condition. The material may generally remain in place without the requirement for significant, material-specific control measures such as removal, enclosure, encapsulation or sealing.

Note: If the ACM is likely to be disturbed (e.g. by maintenance, refurbishment or demolition work) and/or is no longer serving a useful purpose then the ACM should generally be removed. All ACM should be clearly identified with a label where reasonably practicable.

5. Results

The results of the survey, including details of the HBM identified, are provided in the Register in Appendix A and summarised in Table 1 in the Executive Summary of this report.

A licensed electrician was not provided to DP to isolate and de-energise light fittings during the survey and therefore it was generally not possible to dismantle and inspect fluorescent light fittings to confirm the presence/absence of capacitors containing PCB.

Limited or no access was available to certain areas as outlined in the Register (Appendix A) and Table 4 below.

Table 4: Access Limitations*

Location / Area	Access Type	Reason(s)
Areas/materials at height (e.g. roofs)	Limited	Access limited to safely accessible areas and use of 1.8 m step ladder. Work at height and use of specialised access equipment not included in survey scope.
Energised plant, equipment and services in general (e.g. lighting, electrical panels, HVAC plant, generators, pumps, motors etc.)	Limited	Inspection limited to safely accessible exterior surfaces. Isolation and detailed dismantling and/or demolition typically required for further assessment.
Confined spaces	Nil	Not included in survey scope.
Air handling ductwork (interior portion) and sheathed plant/pipe work	Nil	Generally enclosed behind metal linings. Inspection of typically requires isolation by HVAC technician and/or electrician and/or detailed dismantling/demolition.
Ceiling cavities and subfloor voids	Limited	Access generally limited by building occupation, height, services and clearance within cavity/void. Inspection of crawl spaces not included in survey scope.
Below ceramic tiled surfaces (e.g., walls and floors in wet areas)	Generally nil	Typically requires destructive removal of tiles and damage to current finish.
Enclosed building cavities and voids	Nil	Detailed dismantling/demolition typically required. Access generally impractical.

* Refer also to the Register (Appendix A).

6. Recommendations

A summary recommendation for each HBM identified or assumed present at the site is provided in the Register (Appendix A).

The general recommendations in Section 6.1 onwards are provided for informative purposes and should be considered where the relevant HBM has been identified or assumed present by DP or is subsequently suspected to be present based on reasonable grounds.

The presence of identified and assumed HBM at the site, and the potential presence of any as-yet undetected HBM, should be considered during the risk assessment for any proposed work at the site or site use. Additional targeted inspection, sampling and analysis for HBM should be considered prior to any work that may result in the disturbance of such HBM.

6.1 General

HBM should be managed in accordance with the requirements of the WHS Act, WHS Regulation and subordinate Codes of Practice, Australian Standards and guidelines.

A hazardous materials management plan should be developed to aid compliance with the requirements of the WHS Act and Regulation including those that relate to the identification of hazards and control of associated risks.

HBM should be visually inspected on a regular basis. Any change to the condition of the material or relevant site conditions should be reported.

A destructive / intrusive HBM survey should be conducted after decanting of the building(s), and prior to any major refurbishment or demolition work, to help ensure that, so far as is reasonably practicable, all significant occurrences of HBM have been identified.

HBM should be removed prior to any significant disturbance such as maintenance, refurbishment and demolition work.

Prior to any work involving hazardous materials a risk assessment should be conducted and Safe Work Method Statement (SWMS) developed. The SWMS should outline the controls necessary to ensure that the risk of exposure to the hazardous materials is adequately controlled.

Hazardous materials remediation and removal work should be undertaken in controlled conditions.

Waste should be assessed and classified for disposal in accordance with the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste*, November 2014.

At the completion of hazardous material remediation and removal work a clearance inspection should be conducted by a Competent Person, or in the case of friable asbestos, by a Licensed Asbestos Assessor.

6.2 Asbestos-Containing Material (ACM)

ACM must be managed in accordance the WHS Regulation, the NSW *Code of Practice: How to Manage and Control Asbestos in the Workplace, 2016* and the NSW *Code of Practice: How to Safely Remove Asbestos, 2016.*

Dust / debris associated with the significantly damaged asbestos cement sheeting present in the toilet block at the southwestern corner of the warehouse is considered friable asbestos. As a precaution, it is recommended that removal of the damaged sheeting and associated dust / debris be conducted by a Class A licensed (i.e., friable) asbestos removalist.

Exposure to airborne asbestos in the workplace must be eliminated to the extent that is reasonably practicable. If it is not reasonably practicable to eliminate exposure it must be minimised to the extent that is reasonably practicable.

An Asbestos Management Plan must be developed to enable compliance with the WHS Regulation (Regulation 429).

The presence and location of asbestos or ACM identified at a workplace must be clearly indicated by a label if it is reasonably practicable to do so.

Warning labels and signs should be consistent with the examples provided in the SWA *Code of Practice: How to Manage and Control Asbestos in the Workplace, 2016* and comply with AS1319 *Safety Signs for the Occupational Environment*.

Non-friable ACM that are structurally intact and in good to fair condition may typically remain in place provided that they are not significantly disturbed.

Tools and equipment that generate dust must generally not be used on asbestos. These include high-speed abrasive power and pneumatic tools (e.g., angle grinders, sanders, saws and high-speed drills, brooms and brushes).

Tools and equipment that cause the release of asbestos, including power tools and brooms, may only be used on asbestos if the equipment is enclosed and/or designed to capture or suppress asbestos fibres and / or the equipment is used in a way that is designed to capture or suppress asbestos fibres safely. In such a case, other controls including PPE may also be required based upon the results of a pre-work risk assessment and the SWMS adopted.

The use of high-pressure water spray and compressed air on asbestos or ACM is specifically prohibited under the WHS Regulation.

If ACM become damaged they should be repaired or removed and replaced with an alternative, non-asbestos building product as soon as possible.

The scope of asbestos removal work should be outlined in a technical specification (i.e., Scope of Work Report) developed by a Competent Person (in the case of non-friable asbestos) or a Licensed Asbestos Assessor (in the case of friable asbestos).

Removal of friable asbestos must only be undertaken by a Class A licensed asbestos removal Contractor.

Removal of 10 m^2 or more of non-friable asbestos must only be undertaken by a Class A or Class B licensed asbestos removal contractor.

Air monitoring is required during removal of friable asbestos. Air monitoring should also be considered during removal of non-friable asbestos particularly where sensitive receptors exist such as at schools, hospitals and similar sites.

Air monitoring must be undertaken in accordance with the National Occupational Health and Safety Commission (NOHSC) *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition* [NOHSC:3003(2005)].

All air monitoring samples must be analysed by a National Association of Testing Authorities (NATA) Accredited laboratory that holds accreditation for the required analysis.

At the completion of asbestos removal a clearance inspection must be conducted by a Competent Person (for non-friable asbestos removal) or a licensed asbestos assessor (for friable asbestos removal).

Air monitoring and clearance inspections must be performed by person/s independent of the asbestos removal contractor.

All waste should be classified for disposal in accordance with the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste*, November 2014. Asbestos waste is preclassified as Special Waste under these guidelines.

Asbestos transporters and facilities receiving asbestos waste must report the movement of asbestos waste to the EPA. Entities involved with the transport or disposal of asbestos waste in NSW, or arranging the transport of asbestos waste in NSW, must use the EPA's online tool, WasteLocate.

All asbestos waste must be disposed at a waste collection facility licensed to receive asbestos waste. All disposal receipts should be retained.

A person who relinquishes management or control of the workplace must ensure that the Asbestos Register is given to the person, if any, assuming management or control of the workplace.

6.3 Synthetic Mineral Fibre (SMF)

SMF materials may generally remain in place providing that they are in good condition and unlikely to be disturbed.

To reduce the potential for disturbance, exposure and environmental contamination SMF materials may be encapsulated or enclosed. Higher risk materials, such as loose fill insulation, may also be removed and replaced.

SMF work is to be undertaken in accordance with the requirements of the WHS Regulation and subordinate Codes of Practice, Guidance Notes and other documents. These include:

- Safe Work Australia *Guide to Handling Refractory Ceramic Fibres, December 2013*;
- SafeWork NSW *Safe Management of Synthetic Mineral FIbres (SMF) - Glasswool and Rockwool* (information guide); and
- Guidance Note on the Membrane Filter Method for the Estimation of Airborne Synthetic Mineral Fibres [NOHSC:3006(1989)].

Where reasonable concern exists over possible respirable fibre concentrations in any application the first step should be to confirm that the work appropriate work practices are being followed. Air monitoring may not be required when it has been clearly established that appropriate work practices are being carried out.

Notwithstanding the above, exposures should not exceed the relevant SWA exposure standards outlined in Table 5 below.

Table 5: SWA Exposure Standards for SMF

Standard Name	**Time Weighted Average (TWA) Exposure Standard**
Glass wool, rock (stone) wool, slag wool and continuous glass filament and low biopersistence Man Made Vitreous Fibres (MMVF)	2 mg/m^3 (inhalable dust)
Refractory ceramic fibres (RCF), special purpose glass fibres and high biopersistence MMVF	0.5 f/mL (respirable) 2 mg/m^3 (inhalable dust)

SMF waste should be disposed at a licensed waste collection facility. Synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) packaged securely to prevent dust emissions is pre-classified as General Solid Waste (non-putrescible) under the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste*, November 2014.
All disposal receipts should be retained.

6.4 Polychlorinated Biphenyls (PCBs)

Prior to any significant disturbance, such as demolition, refurbishment or maintenance works, fluorescent light fittings should be electrically isolated and inspected in detail for metal canister-type capacitors that may contain PCB's. Any capacitors containing or suspected to contain PCB should be removed by a suitably qualified and experienced contractor.

PCB containing capacitors should be managed in accordance with the general requirements of the WHS Regulation 2017 and the:

- Environmentally Hazardous Chemicals (EHC) Act 2008 and subordinate *Polychlorinated Biphenyl (PCB) Chemical Control Order 1997*; and

- *Polychlorinated Biphenyls Management Plan, Revised Edition, April 2003*, issued by the Environment Protection and Heritage Council (EPHC).

Any PCB containing capacitors that exhibit leakage should be removed and replaced by a suitably qualified and experienced contractor as soon as possible. Access to areas containing leaking capacitors should be suitably restricted.

The conveyance and disposal of PCB material and PCB waste is subject to special requirements outlined in the *Polychlorinated Biphenyl (PCB) Chemical Control Order* 1997.

All disposal receipts should be retained.

6.5 Lead Paint

The potential presence of lead paint(s) at the Site should be considered during the risk assessment for any proposed works. Additional, targeted sampling and analysis for lead paints should be considered prior to any work that may result in significant disturbance of paint system(s).

Lead paints should be managed in accordance with the WHS Regulation including (including Chapter 7, Part 7.2 Lead) and:

- AS4361.1 - 2017, *Guide to hazardous paint management - Lead and other hazardous metallic pigments in industrial applications*; and
- AS4361.2 - 2017, *Guide to hazardous paint management - Lead paint in residential, public and commercial buildings*.

In accordance with AS4361.1 - 2017:

- When one or more tests from a building or portion of a building indicate that lead is present, the paint should be treated as lead paint; and
- A project should not be classified as free of lead, unless all samples within the area are proven to be free of lead.

Lead paint that is in sound condition, not directly accessible (e.g., over-painted with lead-free paint) and unlikely to be disturbed may not require any immediate action.

Area(s) of lead paint that are in poor condition (e.g., flaking, delaminating) should generally be removed along with any lead paint debris and associated dust.

Exposed area(s) of lead paint that are intact may be stabilised by over-painting with a lead-free paint, or by covering with a suitable encapsulant. Stabilisation can provide an interim to long-term solution to a lead paint hazard.

The lead paint removal method and control measures adopted should be determined by risk assessment and a detailed knowledge of the workplace and proposed use / activities.

Exposure to airborne lead must be maintained below the relevant SWA exposure standards pertaining to lead. The SWA 8 hour TWA exposure standard for lead (inorganic dusts and fumes) is 0.15 mg/m^3. Other exposure standards apply for substances such as lead chromate.

Air monitoring for lead may be required during lead paint remediation works based on risk assessment and the requirements to maintain airborne lead levels below the abovementioned exposure standards.

Air monitoring for lead should be conducted in accordance with:

- *AS 3640-2009 Workplace atmospheres - Method for sampling and gravimetric determination of inhalable dust*; and
- AS 3853.1-2006 Health and safety in welding and allied processes - Sampling of airborne particles and gases in the operator's breathing zone - Sampling of airborne particles.

At the completion of lead paint removal, a clearance inspection should be conducted by a Competent Person. The Competent Person should determine the requirements for clearance including any air monitoring or sample analysis that may be required.

Lead paint waste should be assessed and classified for disposal in accordance with the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste*, November 2014:

- Waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions is pre-classified as general solid waste (non-putrescible).
- Lead paint waste arising otherwise than from residential premises or educational or child care institutions is pre-classified as hazardous waste.

All disposal receipts should be retained.

6.6 Lead Contaminated Dust

Laboratory analysis results for lead contaminated dust should be taken as approximate only since sampling is limited and the concentration of lead in dust may vary considerably between locations within the same general area.

No recognised Australian guidelines have been identified for the direct assessment of lead concentrations in ceiling cavity dust. Notwithstanding this, AS4361.2-1998 *Guide to Lead Paint Management, Part 2: Residential and Commercial Buildings* (superseded) outlined acceptance limits for lead in surface dust after lead paint management activities. These limits were:

- Interior floors: 1 mg/m^2 (as lead).
- Interior window sills: 5 mg/m^2 (as lead); and
- Exterior surfaces: 8 mg/m^2 (as lead).

The United States Environmental Protection Authority (US EPA) 40 CFR Part 745 *Lead; Identification of Dangerous Levels of Lead; Final Rule* establishes the following standards for lead hazard identification:

- Floors - 40 µg/ft^2 (~0.43 mg/m^2) lead; and
- Interior Window sills - 250 µg/ft^2 (~2.7 mg/m^2) lead.

The above acceptance limits may be used as a guide to assessing lead concentrations in settled dust. As a precaution a lead concentration of 0.5 mg/m^2 may be used to identify potentially hazardous conditions in this assessment.

Where the concentration of lead in dust exceeds 0.5 mg/m^2 appropriate control and/or remedial measures should be identified via risk assessment and with a detailed knowledge of the workplace and proposed use/activities.

Where ceiling spaces are effectively enclosed and provide very limited or no opportunity for lead dust to enter occupied areas below the dust may typically remain in place. In such as case access to the ceiling cavity should be suitably restricted and all entrances signposted with appropriate warning signs.

Any personnel required to enter ceiling cavities containing elevated concentrations of lead in dust should undertake an appropriate risk assessment and develop a Safe Work Method Statement (SWMS) for the work. The SWMS must identify controls that ensure the risk of exposure to lead remains at an acceptable level for personnel entering the cavity and other building occupants.

Consideration should be given to removal of lead containing ceiling dust when:

- There is a significant risk of the lead entering into occupied areas below; or
- Significant disturbance of lead dust is likely due to maintenance, refurbishment or demolition work or other reason(s); or
- Removal is a reasonably practical means of eliminating the hazard.

Removal of lead dust should be undertaken by a suitably qualified and experienced removal contractor.

The lead dust removal method and control measures adopted should be determined by risk assessment and a detailed knowledge of the workplace and proposed use / activities.

Exposure to airborne lead must be maintained below the relevant SWA exposure standards pertaining to lead. The SWA 8 hour TWA exposure standard for lead (inorganic dusts and fumes) is 0.15 mg/m^3.

Air monitoring for lead may be required based on the results of the risk assessment and the requirement to maintain airborne lead concentrations below the abovementioned exposure standard(s).

Air monitoring for lead (particulate) should be conducted in accordance with *AS 3640-2009 Workplace atmospheres - Method for sampling and gravimetric determination of inhalable dust*. All air monitoring samples collected should be analysed by a NATA registered laboratory that holds NATA accreditation for the relevant test method.

At the completion of lead dust removal, a clearance inspection should be conducted by a Competent Person. The Competent Person should determine the requirements for clearance including any air monitoring or sample analysis that may be required.

Lead waste should be assessed and classified for disposal in accordance with the NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste*, November 2014.

All disposal receipts should be retained.

7. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at 634-652 High Street & 87-91 Union Road, Penrith NSW 2750 in accordance with DP's proposal SYD180245 dated 15 March 2018 and acceptance received from Jia Fernandez of Toga Development and Construction Pty Ltd on 18/04/2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Toga Development and Construction Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the conditions on the site only at the specific inspection, sampling and/or testing locations, and then only to the extent practicable and safely accessible at the time the work was carried out. Site conditions may change after DP's field inspection, sampling and testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in site conditions across the site between and beyond the inspection, sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling, or to occupants, furnishings or stored items preventing access for inspection and/or sampling. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that all HBM have been identified.

Inspections are limited to areas that are safely accessible at the time of the inspection without undue damage to building finishes or disturbance of occupants. Inspections exclude hidden and inaccessible locations such as within building cavities, voids and enclosed sections of risers/shafts as well as materials encased within the building structure or located below the exposed ground surface (e.g. pipes, drains and formwork). In addition, residual asbestos materials (e.g. asbestos lagging to pipes and vessels) may remain undiscovered below newer, asbestos-free materials (e.g. preformed SMF insulation). Such residual asbestos materials may not be identified without extensive intrusive investigation and/or dismantling/demolition work.

Any disturbance of building materials, such as during renovation, maintenance or demolition work, may reveal additional HBM.

Limitations apply to the laboratory analytical methods used. For example, it can be very difficult or impossible to detect the presence of asbestos in some bulk materials (e.g. vinyl tiles) using the polarised light microscopy analytical method, even after ashing or disintegration of samples. This is due to the small length or diameter of asbestos fibres present in the material, or attributed to the fact that very fine fibres have been dispersed individually throughout the material.

While work is undertaken in a professional manner the nature of HBM and the limitations of the method(s) used mean that we cannot guarantee that all HBM have been identified. This report should therefore not be considered a definitive account of all HBM that may be present at the site.

DP personnel are not licenced or accredited quantity surveyors. Any quantities quoted in this report are provided for general guidance only and should not be relied upon. The services of a licenced quantity surveyor should be engaged in order to determine reliable quantities.

The recommendations and conclusions contained in this report shall not abrogate a person of their responsibility to work in accordance with statutory requirements, codes of practice, standards, guidelines, safety data sheets, work instructions or industry best practice.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the (geotechnical / environmental / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

Hazardous Building Materials (HBM) Register

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	exterior, northeast	head lining to garage generally	fibre cement sheeting	BA04	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	No hazardous material identified.
Main Building	exterior, north	garage walls	white paint	PEN-LP01	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	refer 1	No hazardous material identified.
Main Building	exterior, north and west	upper fascia lining to showroom	fibre cement sheeting	PEN-A02 and BA05	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	No hazardous material identified.
Main Building	exterior, north and west	eave lining to showroom	fibre cement sheeting	refer PEN-A04	asbestos (assumed)	1	1	1	1	2	0	6	Low	3	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	exterior, north and west eaves	fluorescent light fittings (approx. 5)	capacitors/ballasts, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	Inaccessible area/material (electrical hazard and height) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	exterior, northern entrance	ceiling and fascia lining	fibre cement sheeting	PEN-A04	asbestos detected by analysis	1	1	1	1	2	0	6	Low	5	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	exterior, north	showroom, window frames	white paint	PEN-LP02	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6	No hazardous material identified.
Main Building	exterior, northwest	hardstand area	brown paint	PEN-LP04	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7	No hazardous material identified.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	exterior, west	amenities windows	glazing putty	PEN-A01	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	No hazardous material identified.
Main Building	exterior, west	head lining above sliding entrance door	fibre cement sheeting	PEN-A03	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9	No hazardous material identified.
Main Building	exterior, west	walls, concrete block	white paint	PEN-LP05	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	No hazardous material identified.
Main Building	exterior, west	metal window frames (approx. 4)	putty	PEN-15	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11	No hazardous material identified.
Main Building	exterior, west	metal window frames	white paint	PEN-LP03	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12	No hazardous material identified.
Main Building	interior	southwest toilet block, loose panels	fibre cement sheeting	PEN-A10 and BA01	asbestos (assumed)	1	3	2	2	2	2	12	Moderate	13	Material assumed to contain asbestos as a precaution due mixed analysis results. Remove asbestos (in full) - Restrict access. Asbestos should be removed in full by a licensed asbestos removalist. Removal should be undertaken as soon as practicable.
Main Building	exterior, north	light pole, fluorescent light fittings	capacitors/ballasts, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14	Inaccessible area/material (height) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	exterior, north	light pole	white paint	PEN-LP06	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	No hazardous material identified.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	exterior, north	perimeter wall, brick work	white paint	PEN-LP07	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16	No hazardous material identified.
Main Building	exterior, northeast	advertising signage, fluorescent light fittings (assumed)	capacitors/ballasts, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	Inaccessible area/material (electrical hazard and height) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	exterior, northeast	car parking compound	materials in general	N/A	nil hazardous materials identified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18	No hazardous material identified.
Main Building	interior	southwest toilet block, ceiling	fibre cement sheeting	BA01	asbestos detected by analysis	1	3	2	2	2	2	12	Moderate	19	Remove asbestos (in full) - Restrict access. Asbestos should be removed in full by a licensed asbestos removalist. Removal should be undertaken as soon as practicable.
Main Building	interior	southwest toilet block throughout, damaged sheeting and associated dust/debris	fibre cement sheeting	PEN-A10 and BA01	asbestos (assumed)	1	3	2	2	2	2	12	Moderate	20, 57, 58	Material assumed to contain asbestos as a precaution due mixed analysis results. Restrict access. Asbestos should be removed in full by a licensed asbestos removalist. As a precaution, a Class A (i.e. friable) licensed asbestos removalist is recommended. Removal should be undertaken as soon as practicable.
Main Building	exterior, southwest	toilet block, window sill	blue paint	PEN-LP10	lead paint (>0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21	Lead paint - Any areas of damaged/flaking lead paint and any associated debris should be removed by a suitably qualified and experienced contractor. Consider sealing or enclosing any remaining lead paint per AS4361. Reinspect condition on a regular basis. Avoid disturbance.
Main Building	exterior, east	typical wall lining	white paint	PEN-LP11	lead paint (>0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22	Lead paint - Any areas of damaged/flaking lead paint and any associated debris should be removed by a suitably qualified and experienced contractor. Consider sealing or enclosing any remaining lead paint per AS4361. Reinspect condition on a regular basis. Avoid disturbance.
Main Building	exterior, east	plant	typical gasket	PEN-A11	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	23	No hazardous material identified.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	exterior, south	roller door	red paint	PEN-LP12	lead paint (>0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	24	Lead paint - Any areas of damaged/flaking lead paint and any associated debris should be removed by a suitably qualified and experienced contractor. Consider sealing or enclosing any remaining lead paint per AS4361. Reinspect condition on a regular basis. Avoid disturbance.
Main Building	exterior, main roof	sections of parapet wall lining	fibre cement sheeting	PEN-A12	asbestos detected by analysis	1	1	1	1	1	0	5	Low	25	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	exterior, roofs in general	building joints	flashing	N/A	generally assumed lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	exterior, main roof and associated ceiling cavity	air conditioning plant and ductwork	internal insulation material(s)	N/A	SMF (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Inaccessible area/material (electrical hazard and dismantling required) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	interior	northern entrance, floor generally	bituminous adhesive (previous area of smaller gauge tiles)	PEN-A05	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27	No hazardous material identified.
Main Building	interior	northern entrance, floor in eastern area	remnant grey vinyl tile	PEN-A07	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	similar 28	No hazardous material identified.
Main Building	interior	northern entrance, floor adjacent eastern roller door	remnant grey vinyl tile	PEN-A06	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	28	No hazardous material identified.
Main Building	interior	northern entrance, floor near southeast doorway	remnant black vinyl tile	PEN-A08	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29	No hazardous material identified.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	interior	northern entrance area, alarm panel	internal components	N/A	unknown (inaccessible)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not known	30	Inaccessible area/material - Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	interior	northern entrance area, toilets, typical wall	grey paint	PEN-LP08	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	31	No hazardous material identified.
Main Building	interior	northern entrance area, toilets, typical ceiling	white paint	PEN-LP09	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	32	No hazardous material identified.
Main Building	interior	main warehouse, northeast corner	black electrical boards (2 units)	N/A	asbestos (assumed)	0	1	3	2	2	1	9	Low	33	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior	main warehouse, office area, external wall linings	fibre cement sheeting	PEN-A09	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	34	No hazardous material identified.
Main Building	interior	main warehouse, office area, top of ceiling	settled dust/debris	PEN-LD01	elevated lead (42 mg/m^2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	Remove lead dust - Ensure access is appropriately restricted. Lead dust should be removed in full by a suitably qualified and experienced removal contractor. Removal should be undertaken as soon as practicable.
Main Building	interior	main warehouse, southern end, ledge below windows of saw-tooth roof	settled dust/debris	PEN-LD02	elevated lead (61 mg/m^2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36	Remove lead dust - Ensure access is appropriately restricted. Lead dust should be removed in full by a suitably qualified and experienced removal contractor. Removal should be undertaken as soon as practicable.
Main Building	interior	warehouse area in general	settled dust/debris	refer PEN-LD01 and LD02	May contain elevated lead concentrations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	refer 35 & 36	Consider further detailed investigation of lead in dust to assess the magnitude and extent of possible contamination. Lead dust should be removed in full by a suitably qualified and experienced removal contractor. Removal should be undertaken as soon as practicable.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	interior	main warehouse, southwestern corner, hot water unit	primary insulation material	N/A	SMF identified visually	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37 & 56	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior	northwest corner, air conditioning unit	internal insulation material(s)	N/A	SMF (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	38	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior throughout	fluorescent light fittings in general (approx. 50)	capacitors/ballasts, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	39	Inaccessible area/material (electrical hazard and height) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	throughout	fans	capacitors, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	Inaccessible area/material (electrical hazard and height) - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	interior	northern entrance, ceiling cavity	settled dust/debris	PEN-LD03	elevated lead (120 mg/m^2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	41	Ceiling/floor cavity - Restrict access. Persons entering the area should undertake a risk assessment and implement suitable controls to prevent exposure. Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior	northern entrance, ceiling cavity	fibre cement sheeting debris	PEN-A14	asbestos detected by analysis	1	3	3	0	1	2	10	Moderate	42	Ceiling/floor cavity - Restrict access. Persons entering the area should undertake a risk assessment and implement suitable controls to prevent exposure. Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior	northern entrance, ceiling cavity	bituminous lining to fascia	PEN-A13	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	43	No hazardous material identified.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Main Building	exterior	eastern side, air conditioning unit	internal insulation material(s)	N/A	SMF (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	44	Reinspect hazardous material - Reinspect condition on a regular basis. Remove material prior to any significant disturbance (e.g. renovation, demolition or maintenance work).
Main Building	interior	main warehouse area, southwest corner, steel window frame	glazing putty	PEN-A16	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45	No hazardous material identified.
Main Building	interior	southwestern toilets, typical wall	olive green and white paints	BLP01	non-lead paint (≤0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46	No hazardous material identified.
Main Building	interior	southwestern toilets, typical wall	underlying blue paint	BLP02	lead paint (>0.1% lead w/w)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	47	Lead paint (damaged) - Areas of damaged/flaking lead paint and any associated debris should be removed by a suitably qualified and experienced contractor. Consider sealing or enclosing any remaining lead paint per AS4361. Reinspect condition on a regular basis. Avoid disturbance.
Main Building	interior	southwestern toilets, sink in northeast corner	bituminous lining	BA02	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	48	No hazardous material identified.
Main Building	interior	southwestern toilets, interior window	glazing putty	BA03	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	49	No hazardous material identified.
Exterior grounds	southern end of site	ground surfaces	fibre cement board	BA06	no asbestos detected by analysis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	No hazardous material identified.
Exterior grounds	southern end of site	ground surfaces, fill	fibre cement sheeting debris	BA07	asbestos detected by analysis	1	3	3	2	3	0	12	Moderate	51 & 52	Remove asbestos (in full) - Restrict access. Asbestos should be removed in full by a licensed asbestos removalist. Removal should be undertaken as soon as practicable.

DP Project No: 85867.04
Hazardous Building Materials (HBM) Register
634-652 High St & 87/91 Union Rd, Penrith NSW

						Asbestos Risk Assessment									
Building	**Location (General)**	**Location (Specific)**	**Material**	**Sample No.**	**Material Status**	**Friability**	**Condition**	**Treatment**	**Accessibility**	**Activity**	**Ventilation**	**Risk Score**	**Action Priority**	**Photo No.**	**Summary Recommendation (Management Survey)**
Exterior grounds	southern end of site	demolished signage, internal fluorescent light fittings (if present)	capacitors/ballasts, insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	53	Inaccessible area/material - Hazardous material(s) assumed present as a precaution. Confirm status of hazardous material(s) when safe access available and prior to any disturbance.
Main Building	interior	northern shopfront, fluorescent light fitting	metal capacitor (UCC, 3.5 MFD 250v AC 50 CP3, TYPE PBX) insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	54	PCB assumed (damaged) - Presence of PCB assumed. Restrict access where damaged. PCB should be removed as soon as possible by a suitably qualified and experienced contractor in accordance with the ANZECC PCB Management Plan, April 2003 and NSW EPA PCB Chemical Control Order 1997.
Main Building	interior	warehouse area, northwest corner, fluorescent light fitting	metal capacitor (DUCON, Type FPB 212) insulating oil	N/A	PCB (assumed)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	55	PCB assumed (intact) - Presence of PCB assumed. Avoid disturbance and reinspect condition on a regular basis. Remove in accordance with the ANZECC PCB Management Plan, April 2003 and NSW EPA PCB Chemical Control Order 1997 prior to any disturbance.

Appendix B

Laboratory Certificate(s) of Analysis

Envirolab Services Pty Ltd
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 190630

Client Details

Client	Douglas Partners Pty Ltd
Attention	Tim Kulmar
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.04, Penrith**
Number of Samples	16 Material, 12 Paint, 3 Swab
Date samples received	02/05/2018
Date completed instructions received	02/05/2018

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	09/05/2018
Date of Issue	09/05/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Jessica Hie
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Giovanni Agosti, Group Technical Manager
Ken Nguyen, Senior Chemist
Lucy Zhu, Asbsestos Analyst

Authorised By

Jacinta Hurst, Laboratory Manager

Asbestos ID - materials

Our Reference		190630-1	190630-2	190630-3	190630-4	190630-5
Your Reference	UNITS	PEN-A01	PEN-A02	PEN-A03	PEN-A04	PEN-A05
Date Sampled		01/05/2018	01/05/2018	01/05/2018	01/05/2018	01/05/2018
Type of sample		Material	Material	Material	Material	Material
Date analysed	-	08/05/2018	08/05/2018	08/05/2018	08/05/2018	08/05/2018
Mass / Dimension of Sample	-	35x25x4mm	18x12x5mm	30x23x4mm	20x20x4mm	30x20x2mm
Sample Description	-	Grey crumbly mastic material	Beige layered fibre cement material	Beige layered fibre cement material	Beige compressed fibre cement material	Brown sticky bituminous material
Asbestos ID in materials	-	No asbestos detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Organic fibres detected

Asbestos ID - materials

Our Reference		190630-6	190630-7	190630-8	190630-9	190630-10
Your Reference	UNITS	PEN-A06	PEN-A07	PEN-A08	PEN-A09	PEN-A10
Date Sampled		01/05/2018	01/05/2018	01/05/2018	01/05/2018	01/05/2018
Type of sample		Material	Material	Material	Material	Material
Date analysed	-	08/05/2018	08/05/2018	08/05/2018	08/05/2018	08/05/2018
Mass / Dimension of Sample	-	70x60x2mm	45x30x3mm	145x30x2mm	25x20x5mm	40x18x5mm
Sample Description	-	Grey brittle vinyl tile	Grey brittle vinyl tile	Black vinyl tile	Beige layered fibre cement material	Beige layered fibre cement material
Asbestos ID in materials	-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

Asbestos ID - materials

Our Reference		190630-11	190630-12	190630-13	190630-14	190630-15
Your Reference	UNITS	PEN-A11	PEN-A12	PEN-A13	PEN-A14	PEN-A15
Date Sampled		01/05/2018	01/05/2018	01/05/2018	01/05/2018	01/05/2018
Type of sample		Material	Material	Material	Material	Material
Date analysed	-	08/05/2018	08/05/2018	08/05/2018	08/05/2018	08/05/2018
Mass / Dimension of Sample	-	50x8x1mm	50x15x4mm	45x25x2mm	42x25x5mm	20x20x3mm
Sample Description	-	Brown bituminous fibrous material	Grey compressed fibre cement material	Brown fibrous bituminous membrane	Grey compressed fibre cement material	Beige hardened mastic material
Asbestos ID in materials	-	No asbestos detected Organic fibres detected	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Organic fibres detected	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Organic fibres detected

Asbestos ID - materials

Our Reference		190630-16
Your Reference	UNITS	PEN-A16
Date Sampled		01/05/2018
Type of sample		Material
Date analysed	-	08/05/2018
Mass / Dimension of Sample	-	60x25x6mm
Sample Description	-	Grey hardened mastic material
Asbestos ID in materials	-	No asbestos detected Organic fibres detected

Lead in Paint						
Our Reference		190630-17	190630-18	190630-19	190630-20	190630-21
Your Reference	UNITS	PEN-LP01	PEN-LP02	PEN-LP03	PEN-LP04	PEN-LP05
Date Sampled		01/05/2018	01/05/2018	01/05/2018	01/05/2018	01/05/2018
Type of sample		Paint	Paint	Paint	Paint	Paint
Date prepared	-	03/05/2018	03/05/2018	03/05/2018	03/05/2018	03/05/2018
Date analysed	-	07/05/2018	07/05/2018	07/05/2018	07/05/2018	07/05/2018
Lead in paint	%w/w	<0.05	<0.05	0.1	<0.05	0.1

Lead in Paint						
Our Reference		190630-22	190630-23	190630-24	190630-25	190630-26
Your Reference	UNITS	PEN-LP06	PEN-LP07	PEN-LP08	PEN-LP09	PEN-LP10
Date Sampled		01/05/2018	01/05/2018	01/05/2018	01/05/2018	01/05/2018
Type of sample		Paint	Paint	Paint	Paint	Paint
Date prepared	-	03/05/2018	03/05/2018	03/05/2018	03/05/2018	03/05/2018
Date analysed	-	07/05/2018	07/05/2018	07/05/2018	07/05/2018	07/05/2018
Lead in paint	%w/w	<0.05	<0.05	0.1	0.08	0.2

Lead in Paint			
Our Reference		190630-27	190630-28
Your Reference	UNITS	PEN-LP11	PEN-LP12
Date Sampled		01/05/2018	01/05/2018
Type of sample		Paint	Paint
Date prepared	-	03/05/2018	03/05/2018
Date analysed	-	07/05/2018	07/05/2018
Lead in paint	%w/w	0.2	0.3

Lead in swab				
Our Reference		190630-29	190630-30	190630-31
Your Reference	UNITS	PEN-LD01	PEN-LD02	PEN-LD03
Date Sampled		01/05/2018	01/05/2018	01/05/2018
Type of sample		Swab	Swab	Swab
Date prepared	-	08/05/2018	08/05/2018	08/05/2018
Date analysed	-	09/05/2018	09/05/2018	09/05/2018
Lead in Swabs	μg/swab	420	610	1,200

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.
Metals-004	Digestion of Paint chips/scrapings/liquids for Metals determination by ICP-AES/MS and or CV/AAS.
Metals-005	Digestion of Dust wipes/swabs and /or miscellaneous samples for Metals determination by ICP-AES/MS and/or CV-AAS

QUALITY CONTROL: Lead in Paint					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/05/2018	22	03/05/2018	03/05/2018		03/05/2018	[NT]
Date analysed	-			07/05/2018	22	07/05/2018	07/05/2018		07/05/2018	[NT]
Lead in paint	%w/w	0.05	Metals-004	<0.05	22	<0.05	<0.05	0	111	[NT]

QUALITY CONTROL: Lead in Paint					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	27	03/05/2018	03/05/2018		[NT]	[NT]
Date analysed	-			[NT]	27	07/05/2018	07/05/2018		[NT]	[NT]
Lead in paint	%w/w	0.05	Metals-004	[NT]	27	0.2	0.2	0	[NT]	[NT]

QUALITY CONTROL: Lead in swab					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			08/05/2018	[NT]	[NT]	[NT]	[NT]	08/05/2018	[NT]
Date analysed	-			09/05/2018	[NT]	[NT]	[NT]	[NT]	09/05/2018	[NT]
Lead in Swabs	μg/swab	1	Metals-005	<1	[NT]	[NT]	[NT]	[NT]	104	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Envirolab Services Pty Ltd
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 197293

Client Details

Client	Douglas Partners Pty Ltd
Attention	Tim Kulmar
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.04 Penrith**
Number of Samples	7 material, 2 paint
Date samples received	30/07/2018
Date completed instructions received	30/07/2018

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	06/08/2018
Date of Issue	01/08/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu
Results Approved By
Giovanni Agosti, Group Technical Manager
Lucy Zhu, Asbsestos Analyst

Authorised By

Jacinta Hurst, Laboratory Manager

Asbestos ID - materials						
Our Reference		197293-1	197293-2	197293-3	197293-4	197293-5
Your Reference	UNITS	BA01	BA02	BA03	BA04	BA05
Type of sample		material	material	material	material	material
Date analysed	-	01/08/2018	01/08/2018	01/08/2018	01/08/2018	01/08/2018
Mass / Dimension of Sample	-	50x45x4mm	45x15x1mm	30x25x10mm	90x70x3mm	30x20x3mm
Sample Description	-	Grey fibre cement material	Black bituminous material	Grey hard mastic	Beige fibre cement material	Beige fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

Asbestos ID - materials			
Our Reference		197293-6	197293-7
Your Reference	UNITS	BA06	BA07
Type of sample		material	material
Date analysed	-	01/08/2018	01/08/2018
Mass / Dimension of Sample	-	60x15x5mm	60x60x5mm
Sample Description	-	Beige fibre cement material	Grey compressed fibre cement material
Asbestos ID in materials	-	No asbestos detected Organic fibres detected	Chrysotile asbestos detected

Lead in Paint			
Our Reference		197293-8	197293-9
Your Reference	UNITS	BLP01	BLP02
Type of sample		paint	paint
Date prepared	-	31/07/2018	31/07/2018
Date analysed	-	31/07/2018	31/07/2018
Lead in paint	%w/w	0.11	0.20

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.
Metals-004	Digestion of Paint chips/scrapings/liquids for Metals determination by ICP-AES/MS and or CV/AAS.

QUALITY CONTROL: Lead in Paint						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			31/07/2018	8	31/07/2018	31/07/2018		31/07/2018	[NT]
Date analysed	-			31/07/2018	8	31/07/2018	31/07/2018		31/07/2018	[NT]
Lead in paint	%w/w	0.005	Metals-004	<0.005	8	0.11	0.12	9	98	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Appendix C

Plates

Photograph 1: Main Building, exterior, northeast, head lining to garage generally, fibre cement sheeting, no asbestos detected by analysis

Photograph 2: Main Building, exterior, north and west, upper fascia lining to showroom, fibre cement sheeting, no asbestos detected by analysis

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Site Photographs

Hazardous Building Materials (HBM) Register

634-652 High St & 87/91 Union Rd, Penrith NSW

CLIENT: Toga Development and Construction Pty Ltd

PROJECT: 85867.04
PLATE No: 1
REV: A
DATE: Jul-18

Photograph 3: Main Building, exterior, north and west, eave lining to showroom, fibre cement sheeting, asbestos (assumed)

Photograph 4: Main Building, exterior, north and west eaves, fluorescent light fittings (approx. 5), capacitors/ballasts, insulating oil, PCB (assumed).

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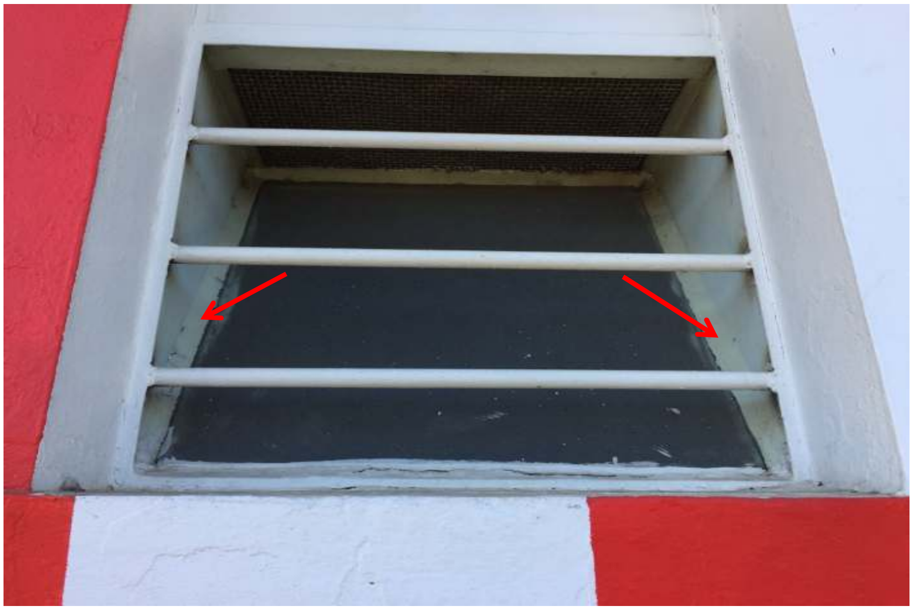
Site Photographs		PROJECT:	85867.04
Hazardous Building Materials (HBM) Register		PLATE No:	2
634-652 High St & 87/91 Union Rd, Penrith NSW		REV:	A
CLIENT:	Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 5: Main Building, exterior, northern entrance, ceiling and fascia lining, fibre cement sheeting, asbestos detected by analysis.

Photograph 6: Main Building, exterior, north, showroom, window frames, white paint, non-lead paint (≤0.1% lead w/w).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	3
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 7: Main Building, exterior, northwest, hardstand area, brown paint, non-lead paint (≤0.1% lead w/w).



Photograph 8: Main Building, exterior, west, amenities windows, glazing putty, no asbestos detected by analysis.

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	4
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 9: Main Building, exterior, west, head lining above sliding entrance door, fibre cement sheeting, no asbestos detected by analysis.

Photograph 10: Main Building, exterior, west, walls, concrete block, white paint, non-lead paint (≤0.1% lead w/w).

Photograph 11: Main Building, exterior, west, metal window frames (approx. 4), putty, no asbestos detected by analysis.

Photograph 12: Main Building, exterior, west, metal window frames, white paint, non-lead paint (≤0.1% lead w/w).

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Site Photographs

Hazardous Building Materials (HBM) Register

634-652 High St & 87/91 Union Rd, Penrith NSW

CLIENT: Toga Development and Construction Pty Ltd

PROJECT:	85867.04
PLATE No:	6
REV:	A
DATE:	Jul-18

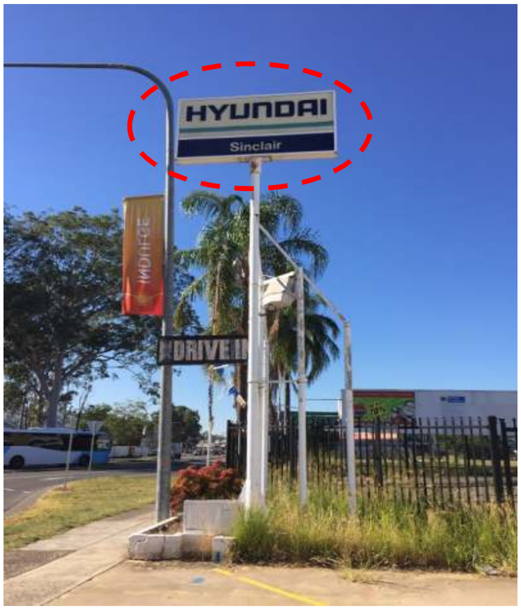
Photograph 13: Main Building, interior, southwest toilet block, loose panels, fibre cement sheeting, asbestos (assumed)

Photograph 14: Main Building, exterior, north, light pole, fluorescent light fittings, capacitors/ballasts, insulating oil, PCB (assumed).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	7
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 15: Main Building, exterior, north, light pole, white paint, non-lead paint (≤0.1% lead w/w).

Photograph 16: Main Building, exterior, north, perimeter wall, brick work, white paint, non-lead paint (≤0.1% lead w/w).



Photograph 17: Main Building, exterior, northeast, advertising signage, fluorescent light fittings (assumed), capacitors/ballasts, insulating oil, PCB (assumed).

Photograph 18: Main Building, exterior, northeast, car parking compound, materials in general, nil hazardous materials identified

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Site Photographs

Hazardous Building Materials (HBM) Register

634-652 High St & 87/91 Union Rd, Penrith NSW

CLIENT: Toga Development and Construction Pty Ltd

PROJECT:	85867.04
PLATE No:	9
REV:	A
DATE:	Jul-18

Photograph 19: Main Building, interior, southwest toilet block, ceiling, fibre cement sheeting , asbestos detected by analysis

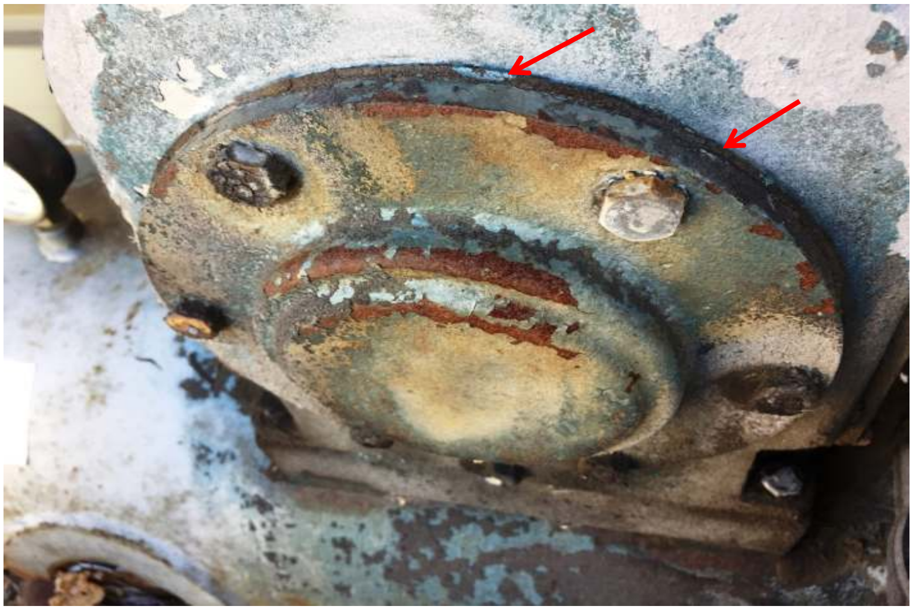
Photograph 20: Main Building, interior, southwest toilet block throughout, damaged sheeting and associated dust/debris, fibre cement sheeting, asbestos (assumed)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	10
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 21: Main Building, exterior, southwest, toilet block, window sill, blue paint, lead paint (>0.1% lead w/w).

Photograph 22: Main Building, exterior, east, typical wall lining, white paint, lead paint (>0.1% lead w/w).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	11
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18



Photograph 23: Main Building, exterior, east, plant, typical gasket, no asbestos detected by analysis.

Photograph 24: Main Building, exterior, south, roller door, red paint, lead paint (>0.1% lead w/w).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	12
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 25: Main Building, exterior, main roof, sections of parapet wall lining, fibre cement sheeting, asbestos detected by analysis

Photograph 26: Main Building, exterior, roofs in general, building joints, flashing, generally assumed lead.

Photograph 27: Main Building, interior, northern entrance, floor generally, bituminous adhesive (previous area of smaller gauge tiles), no asbestos detected by analysis.

Photograph 28: Main Building, interior, northern entrance, floor adjacent eastern roller door, remnant grey vinyl tile, no asbestos detected by analysis.

Photograph 29: Main Building, interior, northern entrance, floor near southeast doorway, remnant black vinyl tile, no asbestos detected by analysis.

Photograph 30: Main Building, interior, northern entrance area, alarm panel, internal components, unknown (inaccessible).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	15
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 31: Main Building, interior, northern entrance area, toilets, typical wall, grey paint, non-lead paint (≤0.1% lead w/w).

Photograph 32: Main Building, interior, northern entrance area, toilets, typical ceiling, white paint, non-lead paint (≤0.1% lead w/w).

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Site Photographs

Hazardous Building Materials (HBM) Register

634-652 High St & 87/91 Union Rd, Penrith NSW

CLIENT: Toga Development and Construction Pty Ltd

PROJECT:	85867.04
PLATE No:	16
REV:	A
DATE:	Jul-18

Photograph 33: Main Building, interior, main warehouse, northeast corner, black electrical boards (2 units), asbestos (assumed).

Photograph 34: Main Building, interior, main warehouse, office area, external wall linings, fibre cement sheeting, no asbestos detected by analysis.

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	17
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 35: Main Building, interior, main warehouse, office area, top of ceiling, settled dust/debris, elevated lead (42 mg/m^2)

Photograph 36: Main Building, interior, main warehouse, southern end, ledge below windows of saw-tooth roof, settled dust/debris, elevated lead (61 mg/m^2)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	18
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 37: Main Building, interior, main warehouse, southwestern corner, hot water unit, primary insulation material, SMF identified visually

Photograph 38: Main Building, interior, northwest corner, air conditioning unit, internal insulation material(s), SMF (assumed).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	19
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 39: Main Building, interior throughout, fluorescent light fittings in general (approx. 50), capacitors/ballasts, insulating oil, PCB (assumed).

Photograph 40: Main Building, throughout, fans, capacitors, insulating oil, PCB (assumed).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	20
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 41: Main Building, interior, northern entrance, ceiling cavity, settled dust/debris, elevated lead (120 mg/m^2)

Photograph 42: Main Building, interior, northern entrance, ceiling cavity, fibre cement sheeting debris, asbestos detected by analysis.

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	21
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 43: Main Building, interior, northern entrance, ceiling cavity, bituminous lining to fascia, no asbestos detected by analysis.

Photograph 44: Main Building, exterior, eastern side, air conditioning unit, internal insulation, SMF (assumed).

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	22
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 45: Main Building, interior, main warehouse area, southwest corner, steel window frame, glazing putty, no asbestos detected by analysis.

Photograph 46: Main Building, interior, southwestern toilets, typical wall, olive green and white paints, non-lead paint (≤0.1% lead w/w)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	23
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 47: Main Building, interior, southwestern toilets, typical wall, underlying blue paint, lead paint (>0.1% lead w/w)

Photograph 48: Main Building, interior, southwestern toilets, sink in northeast corner, bituminous lining, no asbestos detected by analysis

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	24
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 49: Main Building, interior, southwestern toilets, interior window, glazing putty, no asbestos detected by analysis

Photograph 50: Exterior grounds, southern end of site, ground surfaces, fibre cement board, no asbestos detected by analysis

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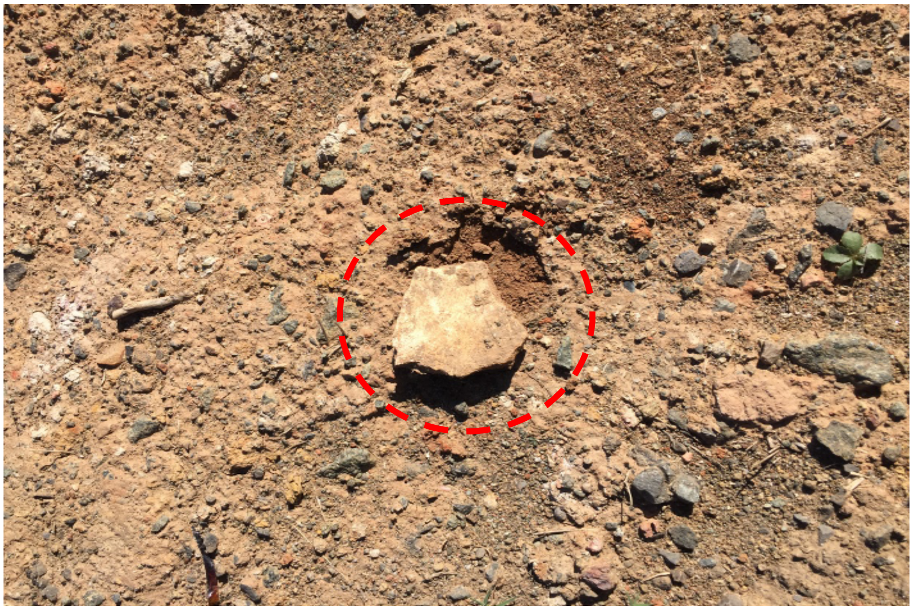
Site Photographs		PROJECT:	85867.04
Hazardous Building Materials (HBM) Register		PLATE No:	25
634-652 High St & 87/91 Union Rd, Penrith NSW		REV:	A
CLIENT:	Toga Development and Construction Pty Ltd	DATE:	Jul-18



Photograph 51: Exterior grounds, southern end of site, ground surfaces, fill, fibre cement sheeting debris, asbestos detected by analysis

Photograph 52: Exterior grounds, southern end of site, ground surfaces, fill, fibre cement sheeting debris, asbestos detected by analysis

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	26
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 53: Exterior grounds, southern end of site, demolished signage, internal fluorescent light fittings (if present), capacitors/ballasts, insulating oil, PCB (assumed)

Photograph 54: Main Building, interior, northern shopfront, metal capacitor (UCC, 3.5 MFD 250v AC 50 CP3, TYPE PBX) insulating oil, PCB (assumed)

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	27
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 55: Main Building, interior, warehouse area, northwest corner, metal capacitor (DUCON, Type FPB 212) insulating oil, PCB (assumed)

Photograph 56: Main Building, interior, main warehouse, southwestern corner, hot water unit, primary insulation material, SMF identified visually

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	85867.04
	Hazardous Building Materials (HBM) Register	PLATE No:	28
	634-652 High St & 87/91 Union Rd, Penrith NSW	REV:	A
	CLIENT: Toga Development and Construction Pty Ltd	DATE:	Jul-18

Photograph 57: Main Building, interior, southwest toilet block throughout, damaged sheeting and associated dust/debris, fibre cement sheeting, asbestos detected by analysis

Photograph 58: Main Building, interior, southwest toilet block throughout, damaged sheeting and associated dust/debris, fibre cement sheeting, asbestos detected by analysis

Appendix D

Notes About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666

Project 85867.05
29 September 2021
R.001.Rev2
NW:jl

Toga Penrith Developments Pty Ltd
Level 5 / 45 Jones Street, Ultimo
Sydney NSW 2007

Attention: Bernardo Reiter Landa

Email: breiter@toga.com.au

Dear Sirs

Additional Contamination Investigation
Proposed Mixed Use Development
634-638 High Street and 87-89 Union Road, Penrith

1. Introduction

This Additional Contamination Investigation was originally commissioned by Toga Development and Construction Pty Ltd (Toga) and was undertaken with reference to the Douglas Partners Pty Ltd (DP) Proposal SYD180245 dated 27 April 2018.

It is understood that the site at 634-638 High Street and 87-89 Union Road, Penrith, as shown on the attached Drawing 1 (herein referred to as “the site”), is proposed for a mixed use development including the construction of residential buildings, commercial and associated parking. Buildings 1 and 2 are joined together by a common ground floor podium, underground three level basement and podium car parking areas. Bulk excavation below existing ground level (bgl) will be required to allow for the construction of the basement car parking levels. All excavated materials which are surplus to the development will require disposal off-site.

The following contamination investigation reports have been completed by DP for the site:

- DP *Due Diligence Contamination Investigation, 634-652 High Street, 87-91 Union Road Penrith*, Project 85867.01.R.001.Rev3 dated 29 September 2021 (DP, 2021a); and
- DP *Report on Detailed Site Investigation for Proposed Mixed Use Development, 634-638 High Street, 87-91 Union Road Penrith*, Project 85867.02.R.001.Rev2, dated 29 September 2021 (DP, 2021b).

The findings of the above investigations are summarised in Section 3 of this report. The additional contamination investigation reported herein was instigated on the basis of the results reported in DP (2021b), and the objectives were as follows:

- To re-assess the existing fill across the site against the NSW Environment Protection Authority (EPA) NSW EPA *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The excavated natural material order 2014* (the ENM Order);

- To confirm the waste classification of fill across the site;
- To delineate the extent of soil contamination identified as “hot spots” in DP (2021b); and
- To assess the suitability of soils stockpiled on site for retention within the site or disposal off-site.

2. Scope of Works

The scope of works was as follows:

- A review of the previous investigation reports as summarised in Section 3;
- Conduct DBYD and services scanning at the site to position bores away from detectable buried services;
- Using a truck mounted rig, drilling of 22 “step out” bores as shown on the attached Drawing 1. The bores were taken to the depth of fill at each location, with one to two fill samples recovered from each;
- Analysis of fill samples from the above bores for the contaminants found at the original locations, as discussed in Section 3, being metals (lead), PAH, TRH and / or PCB;
- Using a small excavator, excavate eighteen (18) test pits (WC1 to WC18), as well as two (2) boreholes (WC19 and WC20) using a truck mounted rig, in a grid across the site as indicated on the attached Drawing 1, to comply with the sampling requirements of the ENM Order. Samples were recovered from the surface, then at every 0.5 m depth intervals to the full depth of fill;
- Fill samples were analysed for the suite required under the ENM Order, being metals, total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons - TPH), monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene - BTEX), polycyclic aromatic hydrocarbons (PAH), pH, electrical conductivity (EC), and Foreign Materials;
- Collect four (4) samples (SP1 to SP4) from a spoil stockpile situated at the southern end of the site. Analyse the samples for the ENM suite as listed above;
- Standard QA / QC samples were included; and
- Preparation of this report.

3. Previous Investigations

As stated in Section 1, DP prepared a due diligence contamination investigation report followed by a detailed site investigation report. DP (2021a) is summarised in DP (2021b) and therefore the summary in this section relates to the findings reported on both investigations.

The scope of DP (2021a) and DP (2021b) included the following:

- Review of previous reports for the site prepared by others;
- Site walkover to identify current features and site uses;

- Drilling two bores (BH101 and BH2A) with a truck mounted drilling rig to depths of about 10 metres (m) below ground level (bgl), then converting into groundwater monitoring wells. The bores were positioned close to the underground storage tank (UST) in the northern part of the site;
- Drilling another deep bore (BH102) with a truck mounted drilling rig to a depth of about 10 m bgl, then converting into a groundwater monitoring well. The bore was positioned at the hydraulic down-gradient boundary of the site;
- Drilling 11 bores (BH103 to BH107, BH4, BH6, BH9, and BH10) in an approximate grid pattern across the site for general site coverage and completion of the sampling numbers to the NSW EPA *Sampling Design Guidelines* (1995);
- Soil samples were recovered at regular intervals for testing for potential contaminants;
- Laboratory analysis of selected soil samples for the following potential contaminants:
    - Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
    - TRH / BTEX;
    - PAH;
    - Phenols (total);
    - Organochlorine pesticides (OCP);
    - Organophosphate pesticides (OPP);
    - Polychlorinated biphenyls (PCB);
    - Asbestos (40 g samples for screening purposes); and
    - pH and cation exchange capacity (CEC).
- Development, purge and sample groundwater from the three groundwater monitoring wells at Bore 2A, BH101 and BH102;
- Laboratory analysis of the groundwater samples for heavy metals, TRH, BTEX, PAH, phenols, OPP, OCP, PCB, volatile organic compounds (VOC) and hardness; and
- QA / QC analysis including replicates, trip spike and trip blank samples.

The bore locations are shown on the attached Drawing 1.

The following summarises the pertinent information and findings presented in a previous report by Benviron Group in 2015:

- A WorkCover search identified that several tanks were formally located on the site at 616 High Street (outside of the current site) and that these had been removed as part of the previous remediation works;
- A review of the EPA website by Benviron revealed the site was not listed on the database;
- A review of land titles indicates that the site has been owned and used for residential purposes between the early 1930s and 1960s when the sites were generally redeveloped for commercial uses as a car yard; and
- A review of aerial photographs revealed that the site has been vacant and residential up until 1961 when the site was redeveloped for commercial uses (mostly car yard uses) and it remained this way up until 2002.

A ‘source-pathway-receptor’ approach was used in DP (2021b) to assess the potential risks of harm being caused to human, water or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (complete pathways). The possible pathways between the identified contamination sources (S1 to S4) and receptors (R1 to R6) are provided in Table 1 below.

Table 1: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor
Diffuse Sources **S1: Filling and demolition rubble** Metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols, VOCs, asbestos and SMF **S2 - Historic Land use (caryard , service, USTs)** COPC include metals, TPH, BTEX, PAH, PCB, OCP, OPP, phenols and VOC **S3 - Off-Site Sources Site/s** metals, TPH, BTEX, PAH and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)
	P2: Inhalation of dust and/or vapours	R3: Adjacent users (commercial)
	P3 - Leaching of contaminants and vertical mitigation into groundwater	R4 - Groundwater
	P4 – Lateral migration of groundwater providing baseflow to watercourses (Nepean River) P5 - Lateral migration of groundwater providing base flow to water bodies	R5 - Surface water (Nepean River)
	P6 - Contact with terrestrial ecology	R6 - Terrestrial ecology
S4: Existing buildings lead, PCB, asbestos and SMF	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Current and future users (commercial)

A high density residential land use setting was adopted as the land use in determining the Site Assessment Criteria (SAC), being the most sensitive (in terms of human and ecological exposure) of the proposed land uses.

The general sequence of subsurface materials encountered in the bores is described below in increasing depth order:

PAVEMENT:	Typically 20-150 mm of asphaltic concrete or concrete (with or without roadbase). BH6 and BH9 encountered no pavement.
FILLING:	Brown and grey silty sand filling, clayey sand and silty clay to depths of 0.1 m to 0.9 m bgl.
Silty CLAY:	Generally stiff, brown silty clay, to borehole termination depths (shallow bores), or to depths of up to 2.5 m bgl in deeper bores.
Silty SAND:	Generally loose to medium dense, brown, silty sand between depths of 0.3 to 3.5 m.
Sandy GRAVEL:	Dense to very dense, brown and grey gravel within a matrix of silty sand below depths of 1.7 m to 3.5 m .
LAMINITE:	Extremely low to low strength laminite (interbedded sandstone and siltstone) below depths of 12.1 m to 13.8 m. Medium and high strength, slightly weathered to fresh laminite below depths of 12.8 m to 14.3 m.

Free groundwater was observed at approximately 7 m bgl in BH2A, BH101 and BH102 during auger drilling. Recorded water levels in the three monitoring wells, on 19 March 2018 were approximately 7.3 m bgl.

There were not visual or olfactory indications of the presence of contaminants in the soils at the bore locations. There were no odours noted in the groundwater monitoring bores during installation of the monitoring wells, or at the time of sampling.

Reported concentrations of phenols, OCP, OPP, and asbestos in the soil samples were below the laboratory limits of reporting (LOR) and therefore the SAC.

Reported concentrations of metals, TRH, PAH and PCB were below SAC with the exception of:

- BH103 / 0-0.2 m: lead at 2100 mg/kg, exceeding the HIL B of 1200 mg/kg;

  copper at 250 mg/kg exceeding the EIL of 230 mg/kg;

  zinc at 690 mg/kg, equal to the EIL of 690 mg/kg;

  PCBs (total) at 5.2 mg/kg, exceeding the HIL B of 1 mg/kg; and

  TRH (C16-C34) at 2800 mg/kg, exceeding the ESL of 300 mg/kg and the Management Limit of 2500 mg/kg.

•	BH10 / 0.5 m:	copper at 2900 mg/kg, exceeding the EIL of 230 mg/kg; lead at 4400 mg/kg, exceeding the HIL B of 1200 mg/kg; zinc at 1400 mg/kg, exceeding the EIL of 690 mg/kg; and B(a)P at 1.2 mg/kg, exceeded the ESL of 0.7 mg/kg.
•	BH102 / 0.2-0.3 m:	B(a)P at 25 mg/kg), exceeding the ESL of 0.7 mg/kg; Naphthalene at 6.4 mg/kg, exceeding the HSL of 3 mg/kg; Carcinogenic PAH (BaP TEQ) 32.6 mg/kg, exceeding the HIL B of 4 mg/kg; TRH (C10-C16) of 210 mg/kg, exceeding the ESL of 120 mg/kg; and TRH (C16-C34) of 2600 mg/kg, exceeding the ESL of 300 mg/kg and the Management Limit of 2500 mg/kg.

The above mentioned locations were identified as “hot spots” for the purposes of remediation.

All of the above exceedances occurred at or close to the surface, in the filling layers. The elevated concentrations are considered to be related to either the presence of contaminated filling, or the historical use of the site as a car yard (i.e., lead, TRH and PAH related to spilt oils and fuels). PCBs are commonly associated with oils in motors and hydraulic systems, transformers and capacitors. BH103 (which recorded the elevated PCB concentration) is located close to the rear of the building on site, which may have been an area for car maintenance and the use of hydraulic lifting machines.

The filling material encountered at the site was preliminarily classified for off-site disposal purposes in accordance with the EPA (2014) *Waste Classification Guidelines* as General Solid Waste (non-putrescible), with the exception of the following:

- Fill soils in the vicinity of BH102 which classified as hazardous waste on then current data;
- Fill soils in the vicinity of BH10 which classified as hazardous waste on then current data; and
- Fill soils in the vicinity of BH103 which classified as restricted solid waste on then current data.

Reported concentrations of BTEX, TRH, OCP, OPP, PCB, PAH, As, Cd, Cr, Cu, Pb, and Hg in the groundwater samples were below the LOR and therefore the SAC. Reported concentrations of nickel and zinc were below the SAC, with the exception of the sample from BH102 which had a nickel concentration of 0.016 mg/L. This exceeded the GIL of 0.011 mg/L. The minor exceedance was not considered to be significant and further investigation of groundwater was not considered to be necessary at this stage.

Based on the scope of works undertaken and the results presented in DP (2021b) it was considered that there are not likely to be any significant contamination risks to human health or the ecology associated with the site. Surficial soil contamination had been identified and there is potentially localised soil contamination around the USTs and beneath the existing building footprint, which need to be managed.

The report concluded that the site can be made suitable for the proposed development, subject to the following:

- A remediation action plan (RAP) will be required to document the remediation and validation process associated with the two USTs and associated infrastructure, the lead, TRH, PCB and PAH contaminated soil identified in this current and the previous investigations, and any other contaminants identified through investigation of the existing building footprint, once demolished. The RAP will also document the management process associated with any retained fill materials, given the reported SAC exceedances; and
- A pre-demolition hazardous building materials survey must be undertaken prior to demolition of the existing building. Should such materials be identified, the removal must be undertaken by licensed contractors in accordance with the then current legislation.

A more detailed investigation for waste classification, including delineation of "hot spot" areas, was recommended as part of the RAP to inform the soil excavation and off-site disposal process.

4. Site Information

At the time of conducting the field work for the assessment (14 and 16 May 2018) the site was primarily vacant and covered in a gravel / asphalt layer. A single, one storey warehouse was located in the northern corner of the site. A single stockpile of miscellaneous construction waste and other rubbish/debris was located in the centre of the site. A second spoil stockpile, apparently sourced from works on the adjacent Stage 2 site was also located on the southern boundary of the site, as shown on the attached Drawing 1. The site is bounded by High Street to the north, John Tipping Grove to the west, Union Road to the south and vacant land and high density residential development to the east (Drawing 1).

No significant changes to the site layout have been observed since 16 May 2018, and the site has remained fenced off from the public over that period.

5. Field Work Rationale and Methodology

5.1 ENM Assessment

The area subject to the ENM assessment is approximately 5,500 m^2. The rationale for the fieldwork is based on the requirements of the ENM Order, targeting the fill soils to a maximum depth of 1 m below the proposed basement excavation depth or to natural soils. With reference to Table 2 of the ENM Order for an area of 5,500 m^2 18 test pits (WC1-18) were excavated to depths of between 0.1 m and 0.8 m bgl, along with two additional boreholes for grid completion (WC19-20) in the north-eastern corner. All pits and bores were taken through to natural soils.

Environmental sampling was performed with reference to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on attached test pit logs and samples selected for laboratory analysis were recorded on DP chain-of-custody (COC) sheets. The general soil sampling procedure comprised:

- Collection of representative soil samples directly from the test pits (WC1-18) using a 3.5T Excavator with a 300 mm bucket;
- Collection of soil samples were recovered directly from augers from (WC19-20). The lead augers were replaced between samples;
- The use of disposable gloves for each sampling event;
- Collection of two replicate sample(s) for QA / QC purposes;
- Transfer of samples into laboratory-prepared glass jars, capping immediately, minimising the headspace within the sample jar;
- Collection of 6kg soil samples in plastic bags at each depth for ENM screening;
- Labelling of sample containers and bags with individual and unique identification, including project number, sample location and sample depth;
- Placing the glass jars into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain-of-custody documentation so that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory. Copies of completed chain-of0custody forms (COC) are attached.

Envirolab Services Pty Ltd (Envirolab), accredited by NATA for the analysis undertaken, was employed to conduct the sample analysis. The laboratory is required to carry out in-house QC procedures.

The test pit and bore locations are shown on the attached Drawing 1.

5.2 Stockpile Assessment

An ENM assessment was also undertaken on the stockpile of spoil located at the southern end of the site. The stockpile was approximately 18 m x 15 m x 1 m, as shown on Drawing 1 and in attached Photographs 1 and 2. The source of the stockpile material is understood to be from the Stage 2 area of the development, on the western side of John Tipping Grove, as a result of minor works associated with the display suite.

The inspection and environmental sampling was performed by an Environmental Scientist from DP. All sampling data was recorded on DP chain-of-custody sheets, and the general sampling procedure comprised:

- Collection of four (4) representative soil samples directly from four test pits in the stockpile (SP1-4) using a 3.5T Excavator with a 300 mm bucket;
- The use of disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared glass jars, capping immediately, minimising the headspace within the sample jar;

- Collection of 6kg soil samples in plastic bags at each depth for ENM screening;
- Labelling of sample containers and bags with individual and unique identification, including project number, sample location and sample depth;
- Placing the glass jars into a cooled, insulated and sealed container for transport to the laboratory; and
- Use of chain-of-custody documentation so that sample tracking and custody could be cross-checked at any point in the transfer of samples from the field to the laboratory. Copies of completed chain-of-custody forms (COC) are attached.

Envirolab was employed to conduct the sample analysis.

The test pit locations within the stockpile are shown on the attached Drawing 1.

5.3 Delineation of Contaminated Areas

Previous investigations (DP, 2018b) found that the fill soils in BH10 and BH102 were classified as hazardous waste and BH103 was classified as restricted solid waste. All had specific identified contaminants exceeding health investigation or screening levels and were therefore identified as "hot spots" for remediation. In order to understand the extent of the contamination around these boreholes, areas around these boreholes were delineated, using "step outs" of 2 m and 5 m from the boreholes on four sides. The bores were taken to the depth of fill at each location, with one to two fill samples recovered from each step-out bore.

Environmental sampling was performed with reference to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on attached bore logs and samples selected for laboratory analysis were recorded on DP COC sheets. The general soil sampling procedure comprised:

- Soil samples were recovered directly from augers. The lead augers were replaced between samples;
- Use of disposable sampling equipment including disposal nitrile gloves;
- Collection of two replicate sample(s) for QA / QC purposes;
- Transfer of samples into laboratory-prepared glass jars and capping immediately with Teflon lined lids;
- Labelling of sampling containers with individual and unique identification, including project number, sample location and sample depth; and
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory.

Envirolab was employed to conduct the sample analysis.

The borehole locations are shown on the attached Drawing 1.

6. Field Work Observations

The test pit and borehole logs are attached which should be read in conjunction with the attached explanatory notes that define classification methods and terms used to describe the soils. The general sequence of subsurface materials encountered in the test pits and bores (including the previous bores from DP, 2018a and DP, 2018b) is described below in increasing depth order:

PAVEMENT:	*Typically 20-150 mm of asphaltic concrete or concrete (with or without roadbase).*
FILLING:	*Brown and grey silty sand filling, clayey sand and silty clay to depths of 0.1 m to 0.9 m bgl.*
Silty CLAY:	*Generally stiff, brown silty clay, to borehole termination depths (shallow bores), or to depths of up to 2.5 m bgl in deeper bores.*
Silty SAND:	*Generally loose to medium dense, brown, silty sand between depths of 0.3 to 3.5 m.*
Sandy GRAVEL:	*Dense to very dense, brown and grey gravel within a matrix of silty sand below depths of 1.7 m to 3.5 m .*
LAMINITE:	*Extremely low to low strength laminite (interbedded sandstone and siltstone) below depths of 12.1 m to 13.8 m. Medium and high strength, slightly weathered to fresh laminite below depths of 12.8 m to 14.3 m.*

There were no obvious indications of gross contamination (e.g., staining, or odours) within the boreholes and test pits, with the exception of some potential asbestos containing material in the form of fragments of fibre cement found in WC18 (refer attached Photograph 3). The analysis on a recovered fragment identified chrysotile and amosite asbestos.

Replicate samples for each bore hole soil sample were screened for the presence of volatile organic compounds (VOCs), using a MiniRAE 3000 photo-ionisation detector (PID) with a 10.6 eV lamp, calibrated to 100 ppm Isobutylene. The readings ranged from <1ppm to 7ppm.

7. ENM Assessment

The ENM Order provides a definition of excavated natural material as *naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:*

a) Been excavated from the ground, and

b) Contains at least 98% (by weight) natural material, and

c) Does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.

In terms of sampling numbers the ENM Order states that *for in situ material, the generator must:*

- *Undertake sampling by collecting discrete samples. Compositing of samples is not permitted for in-situ materials;*
- *Undertake characterisation sampling for the range of chemicals and other attributes listed in Column 1 of Table 4 according to the requirements listed in Columns 1, 2 and 3 of Table 2 (*based on area*);*
- *Undertake sampling at depth according to Column 1 of Table 3 (*sampling at 1 m depth intervals*);*
- *Collect additional soil samples (and analyse them for the range of chemicals and other attributes listed in Column 1 of Table 4), at any depth exhibiting discolouration, staining, odour or other indicators of contamination inconsistent with soil samples collected at the depth intervals indicated in Table 3; and*
- *Segregate and exclude hotspots identified in accordance with Table 2, from material excavated for reuse.*

The ENM Order states that the *generator must not supply excavated natural material waste to any person if, in relation to any of the chemical and other attributes of the excavated natural material:*

- *The chemical concentration or other attribute of any sample collected and tested as part of the characterisation of the excavated natural material exceeds the absolute maximum concentration or other value listed in Column 3 of Table 4; and*
- *The average concentration or other value of that attribute from the characterisation of the excavated natural material (based on the arithmetic mean) exceeds the maximum average concentration or other value listed in Column 2 of Table 4; and*
- *The absolute maximum concentration or other value of that attribute in any excavated natural material supplied under this order must not exceed the absolute maximum concentration or other value listed in Column 3 of Table 4.*

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.

The following Table 2 presents the results of the assessment of fill across the site with reference to the ENM Order.

Table 2: ENM Classification Procedure

Item	Comments	Rationale
1. Are the materials acid sulphate soils?	No	A review of the Acid Sulfate Soil Risk Map shows the site in an area of no ASS occurrence.
2. Does the material contain asbestos?	Yes / No	Asbestos-containing materials (ACM) was observed in WC18. Chrysolite and amosite were detected in a sample from WC18. No ACM was identified in any of the remaining test pits.
3. Has the sampling been undertaken in accordance with Tables 2 and 3 of the ENM Order?	Yes	Sample numbers (based on area) and depths are in accordance with the ENM Order.
4. Has the analysis been carried out in accordance with the ENM Order?	Yes	All fill samples were analysed in a NATA accredited laboratory for the chemical and other attributes listed in Table 4 of the ENM Order.
5. Do the maximum and average chemical concentrations comply with Table 4 of the ENM Order?	No	Refer to the attached Table E1.

The laboratory test results applicable to the ENM assessment are presented in the attached Table E1. A summary of the results is as follows:

- Concentrations of TRH and BTEX for all the analysed fill samples were within the average and maximum concentrations listed in the ENM Order;
- Concentrations of PAH, chromium (III + IV), copper and foreign materials for all the analysed fill samples were within the maximum concentrations listed in the ENM Order;
- Concentrations of arsenic, cadmium, mercury, nickel and zinc for some of the analysed were above the maximum concentrations in the ENM Order in a number of the samples;
- Concentrations of lead for seventeen (17) of the analysed samples were above the maximum concentration in the ENM Order; and
- Chrysotile and amosite asbestos detected in material found in WC 18.

Based on the outcomes presented in Table 2, the fill within the site **is not classified as ENM.**

The results from the test pits were assessed against the EPA (2014) waste classification guidelines, as shown on the attached Table E2. Several samples reporting the highest concentrations of lead, nickel and benzo(a)pyrene, were subjected to TCLP testing to assist in the waste classification process. The results are considered to be conservatively representative of other lower concentrations reported for similar soil samples. As shown on Table E2, with the exception of asbestos encountered in fill at WC18, all analyte concentrations were within either the CT1 or SCC1 / TCLP1 criteria (allowing for TCLP results for a select number of samples) for general solid waste.

8. Stockpile Assessment

Samples from the spoil stockpile located at the southern end of the site were assessed against the ENM assessment criteria (attached Table E1) and also the waste classification guidelines (attached Table E2).

As shown on Table E1, all analyte concentration were within the absolute maximum concentrations, however the average concentration for nickel exceeded the absolute maximum average concentration. Based on the outcomes presented in Table E1, the spoil stockpile within the site **is not classified as ENM.**

The results from the test pits were assessed against the EPA (2014) waste classification guidelines, as shown on the attached Table E2. As shown on Table E2, all analyte concentrations were within the CT1 criteria for general solid waste, with the exception of nickel. TCLP testing for nickel is pending and it is likely that the total and TCLP results for nickel will fall within the SCC1/TCLP1 criteria for general solid waste.

9. Contamination Delineation Investigation Results

Samples of fill material collected from step outs surrounding the previously investigated areas at BH10, BH102 and BH103, were analysed and the results can be found in the attached Table E3.

Reported concentrations of BTEX and asbestos in the soil samples were below the laboratory limits of reporting (LOR) and therefore the SAC.

Reported concentrations of metals were below SAC with the exception of:

- Lead in sample BH103N2 / 0.2-0.3 (1400 mg/kg) and BH10E2 / 0.4-0.5 (1200 mg/kg) - exceeding the HIL B (1200 mg/kg) and EIL (1100 mg/kg).

Reported concentrations of PAH were below the SAC with the exception of:

- B(a)P in sample BH102E2 / 0.1-0.2 (0.71 mg/kg) - exceeding the ESL (0.7 mg/kg); and
- B(a)P in sample BH102S2 / 0.1-0.2 (0.88 mg/kg) - exceeding the ESL (0.7 mg/kg).

Reported concentrations of PCBs were below SAC with the exception of:

- PCBs (total) in BH103N2 / 0.2-0.3 (1.4 mg/kg) and BH103S5 / 0.1-0.2 (1.2 mg/kg) - exceeding the HIL B (1 mg/kg).

Reported concentrations of TRHs were below SAC with the exception of:

- C16-C34 in BH102N5 / 0.1-0.2 (310 mg/kg), BH103E2 / 0.1-0.2 (2300 mg/kg), BH103N2 / 0.2-0.3 (3000 mg/kg), BH103S2 / 0.1-0.2 (1300 mg/kg), BH103W2 / 0.1-0.2 (1600 mg/kg), BH103W5 / 0.1-0.2 (1100 mg/kg)- exceeding the ESL (300 mg/kg)

All of the above exceedances occurred at or close to the surface, in the filling layers, similar to those depths reporting elevated contaminant concentrations in the original samples.

10. Data Quality Control

All sample analysis was conducted by Envirolab Services Pty Ltd in accordance with the chain-of-custody prepared by DP. Based on a comparison of the test results for the field replicate samples with their original samples, a review of the trip spike and trip blank results, and a review of the laboratory reported QC results, it is considered that the laboratory test data obtained are reliable and useable for this assessment. The laboratory test results certificates are attached.

11. Conclusions and Recommendations

Based on the field observations and results of laboratory analysis reported herein, in conjunction with the results reported in DP (2021b), the following conclusions are drawn:

- The soils beneath the existing building have not been assessed and must be assessed as part of any future investigation or remediation strategy;
- The fill at the site does not meet the requirements of the ENM Order and therefore cannot be classified as ENM;
- The spoil stockpile at the site does not meet the requirements of the ENM Order and therefore cannot be classified as ENM;
- Asbestos sheets were found in one location at WC18. The sheets and surrounding soil would need to be disposed off-site as Special Waste (Asbestos);
- The fill around BH103 will need to be disposed off-site as general solid waste (non-putrescible). The impacted area will be defined as part of the remediation strategy;
- The fill around BH102 will need to be disposed as restricted solid waste (non-putrescible). The impacted area will be defined as part of the remediation strategy;
- The fill around BH10 will need to be disposed as hazardous waste. The impacted area will be defined as part of the remediation strategy;
- All remaining fill (excluding the existing building footprint, which needs to be assessed) will need to be disposed as general solid waste (non-putrescible), if it cannot be retained on site; and
- A remediation action plan (RAP) will be required to document the remediation and validation process associated with the two USTs and associated infrastructure, the areas mentioned above as requiring remediation, and any other contaminants identified through investigation of the existing building footprint, once demolished. The RAP will also document the management process associated with any retained fill materials, given the reported SAC exceedances.

12. Limitations

Douglas Partners (DP) has prepared this report for this project at 634-638 High Street and 87-89 Union Road, Penrith in accordance with DP Proposal SYD180245 dated 27 April 2018 and acceptance received from Jia Fernandez dated 8 May 2018. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Toga Penrith Developments Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in conditions across the site between and beyond the sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.
This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The results provided in the report are indicative of the surface and sub-surface conditions only at the specific sampling locations, and then only to the depths investigated and at the time the work was carried out. Surface and sub-surface conditions can change as a result of human influences, and such changes may occur after DP's field testing has been completed. Furthermore, fill is by its nature heterogeneous and therefore some parts of the fill may not be represented by the visual and analytical results reported herein.

Part 5.6, Section 143 of The Protection of the Environment Operations Act 1997 states that it is an offence for waste to be transported to a place that cannot lawfully be used as a facility to accept that waste. It is the duty of the owner and transporter of the waste to ensure that the waste is disposed of appropriately. DP does not accept liability for the unlawful transport or disposal of materials from any site. DP accepts no responsibility for tracking, loading, management, transport or disposal of the materials from the site.

It is noted that the conditions set out in the relevant general resource recovery order / exemption are designed to minimise the risk of potential harm to human health or the environment, however, they do not guarantee that human health or the environment will not be harmed. The suitability of the exempted material should be confirmed by the supplier and the consumer with respect to the particular use proposed (i.e., it is fit for purpose), as stated in the relevant order / exemption.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP.

Yours faithfully

Douglas Partners Pty Ltd Reviewed by

p.p.

Nicola Warton
Environmental Scientist

Paul Gorman
Principal

Attachment A:	Notes About this Report
Attachment B:	Drawing 1
Attachment C:	Photographs
Attachment D:	Test Pits Logs, Borehole Logs and Explanatory Notes
Attachment E:	Table E1: ENM Classification Table
	Table E2: Waste Classification Results Summary
	Table E3: Soil Results Summary
Attachment F:	NATA Laboratory Certificates, Chain-of-Custody documentation, Sample Receipt Advice

Attachment A

Notes About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

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

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

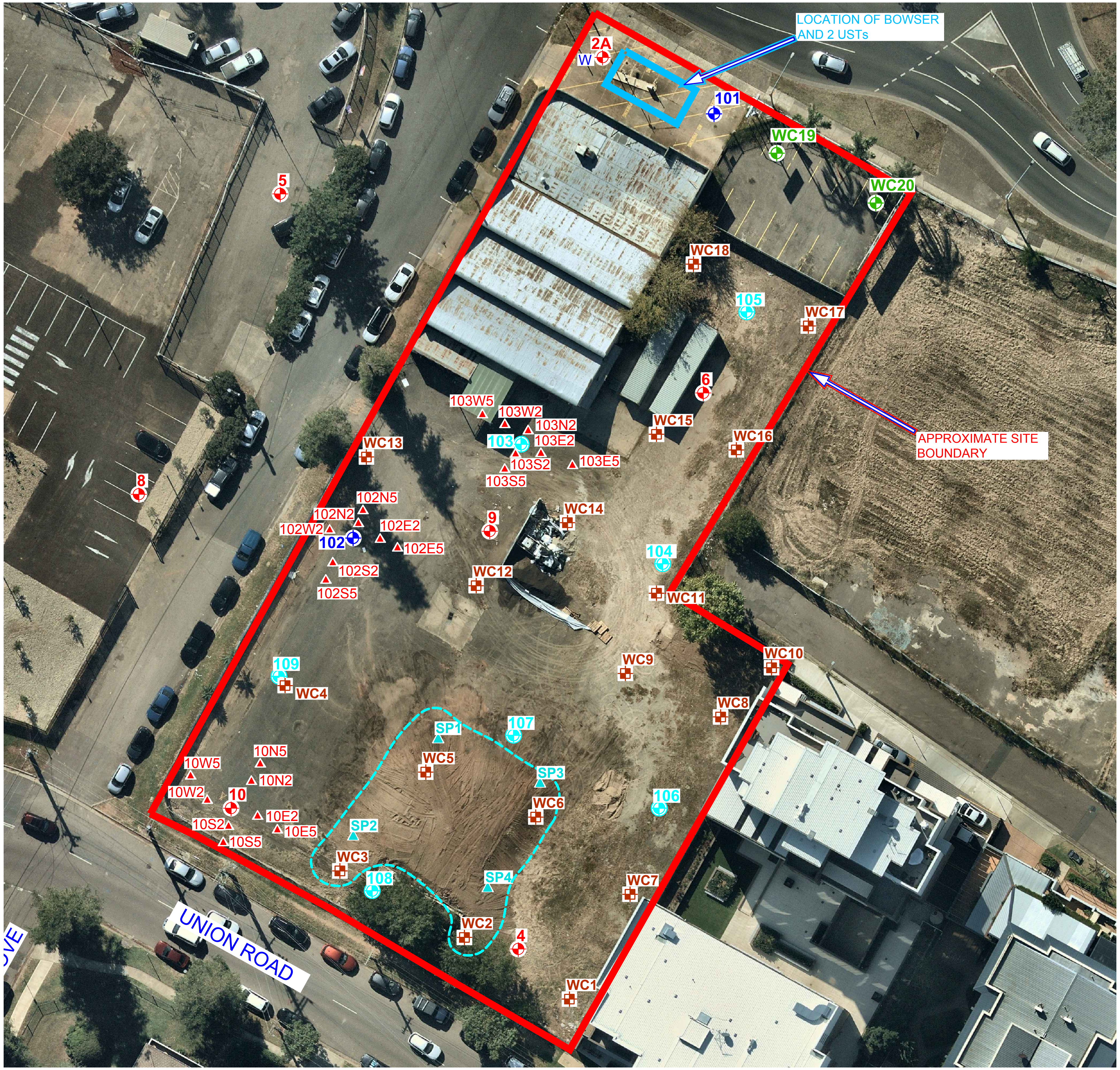
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

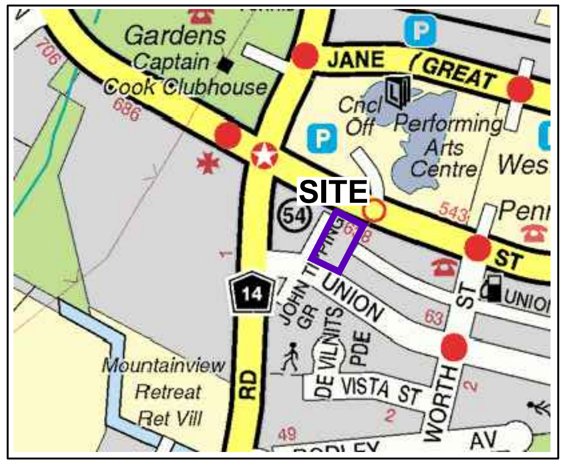
Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Attachment B

Drawing 1





Locality Plan

NOTE:
1: Base image from Nearmap.com
(Dated 8.4. 2018)
2: Test locations are approximate only and were
located using hand-held GPS.

0 5 10 15 20 30 40 50m
1:500 @ A3

LEGEND

- 🔴 Borehole location (DP, 2017)
- W Groundwater monitoring well (DP, 2017)
- 🔵 Groundwater monitoring well (DP, March 2018)
- ● Borehole location (DP, March 2018)

CURRENT INVESTIGATION (MAY 2018)

- ▲ Additional borehole (DP, May 2018)
- ✚ Test pit (DP, May 2018)
- 🟢 Borehole (DP, May 2018)
- ▲ Stockpile sample

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Toga Development and Construction Pty Ltd
OFFICE: Sydney
DRAWN BY: PSCH
SCALE: 1:500 @ A3
DATE: 4.6.2018

TITLE: **Locations of Tests**
Additional Contamination Investigation
87-91 High Street, PENRITH

N

PROJECT No: 85867.05
DRAWING No: 1
REVISION: 0

Attachment C

Photographs

Photo 1 - Spoil stockpile on the southern end of the site

Photo 2 - Spoil stockpile on the southern end of the site

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Additional Contamination Investigation** **87-89 Union Road, 634-638 High Street Penrith**	PROJECT:	85867.05
		PLATE No:	1
		REV:	A
	CLIENT: Toga Development and Construction F	DATE:	4-Jun-18

Photo 3 - Fibre cement found at test pit WC18

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Site Photographs		PROJECT:	85867.05
Additional Contamination Investigation		PLATE No:	2
87-89 Union Road, 634-638 High Street Penrith		REV:	A
CLIENT:	Toga Development and Construction F	DATE:	4-Jun-18

Attachment D

Test Pit Logs, Borehole Logs and Explanatory Notes

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285917
NORTHING: 6262897

PIT No: WC1
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some fine to medium igneous gravel with a trace of wood fragments and grass rootlets		D	0.1 0.2				
27	0.2	SILTY CLAY - brown silty clay		D*	0.3 0.4				
	0.4	Pit discontinued at 0.4m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD1/20180514

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285940
NORTHING: 6262938

PIT No: WC10
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some fine to medium igneous gravel, fine to medium sandstone gravel, with a trace of grass rootlets,plastic fragments, wood fragments and charcoal	▩	D	0.1 0.2				
27	0.3	SILTY CLAY - red brown silty clay	▨	D*	0.4 0.5				
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD3/20180514 taken at 0.4 m - 0.5m depth

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 2855932
NORTHING: 6262954

PIT No: WC11
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
				Type	Depth	Sample	Results & Comments		
		FILLING - light brown silty clay filling with some igneous gravel, sandstone fragments (20-150mm) with a trace of grass rootlets, tile fragments and charcoal	▨						
			▨	D	0.1 0.2				
		- becoming darker brown	▨						
27			▨	D	0.4 0.5				
	0.5	SILTY CLAY - red brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285909
NORTHING: 6262945

PIT No: WC12
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Sampling & In Situ Testing Sample	Sampling & In Situ Testing Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.05	ASPHALTIC CONCRETE	■						
		FILLING - dark brown silty clay filling with some sand and igneous gravel, some glass and tile fragments, and charcoal	▩	D	0.1 0.2				
27	0.3	SILTY CLAY - red brown silty clay	▨						
	0.5	Pit discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285900
NORTHING: 6262962

PIT No: WC13
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ASPHALTIC CONCRETE	■						
	0.05	FILLING - brown silty sand filling with some fine to medium igneous gravel with a trace of wood fragments, and whole bricks	▨	D	0.1 0.2				
27	0.3	FILLING - light grey-brown silty sand filling with some fine to medium igneous gravel whole bricks and brick fragments with a trace of wire and tile fragments	▨	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285916
NORTHING: 6262956

PIT No: WC14
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ROADBASE							
	0.05	FILLING - brown silty sand filling with some igneous gravel, with a trace of wire, and brick fragments		D	0.1				
	0.2	ASH			0.2				
27	0.23	FILLING - red brown silty clay filling with some igneous gravel, brick fragments (150-200mm), and with a trace of charcoal, plastic sheeting, metal sheeting, and glass fragments		D	0.4 0.5				
	0.7	SILTY CLAY - red, brown silty clay							
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285928
NORTHING: 6262965

PIT No: WC15
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty sand filling with some fine to medium igneous gravel, with a trace of grass rootlets							
				D	0.1 0.2				
27		- becoming darker brown with glass and plastic, tile fragments and concrete fragments and boulders (200mm)		D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay with a trace of charcoal							
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285936
NORTHING: 6262962

PIT No: WC16
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - light brown silty clay filing with some medium sandstone gravel, with a trace of grass rootlets, plastic fragments, and bitumen - becoming darker brown, with a trace of glass and brick fragments and plastic sheets	☒	D D	0.1–0.2 0.4–0.5				
	0.5	FILLING - red brown silty clay filling with some brick fragments and a trace of glass fragments	☒	D	0.5–0.6				
	0.7	SILTY CLAY - red brown silty clay with a trace of charcoal	▨						
26	0.8	Pit discontinued at 0.8m Target depth reached							

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.6 AHD
EASTING: 285947
NORTHING: 6262981

PIT No: WC17
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
				Type	Depth	Sample	Results & Comments		
		FILLING - brown silty sand filling with some fine to medium igneous and sandstone gravels with a trace of glass and brick fragments, and grass rootlets	▨	D	0.1 0.2				
	0.3	SILTY CLAY - red brown silty clay	▨						
	0.4	Pit discontinued at 0.4m Target depth reached							
27									
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.6 AHD
EASTING: 285937
NORTHING: 6262990

PIT No: WC18
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Dynamic Penetrometer Test (blows per mm)
				Type	Depth	Sample	Results & Comments		5 10 15 20
		FILLING - light brown silty sand filling 0.1m - fibre cement sheets	▨	D	0.1 0.2				
	0.2	Pit discontinued at 0.2m Target depth reached							
27									
	1								1
26									

RIG: 3.5T excavator
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.8 AHD
EASTING: 285940
NORTHING: 6262998

PIT No: WC19
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING: yellow-brown silty clay filling	⊠	A	0.1 0.2				
	0.3	FILLING: red-brown silty clay filling, trace of charcoal, some fine igneous gravel	⊠	A	0.4 0.5				
	0.5	SILTY CLAY: red-brown silty clay	▨						
	0.6	Pit discontinued at 0.6m Target depth reached							
27									
	1								1
26									

RIG: Scout 2
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285904
NORTHING: 6262910

PIT No: WC2
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some igneous gravel and a trace of charcoal, plastic fragments, metal fragments, grass rootlets, and brick fragments	▨	D	0.1 0.2				
27			▨	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.8 AHD
EASTING: 285949
NORTHING: 6262989

PIT No: WC20
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING: yellow-brown silty sand filling with some fine igneous gravel, trace fine to medium sandstone gravel		A	0.1 0.2				
	0.3	FILLING: red-brown silty clay filling, trace charcoal and brick fragments		A	0.4 0.5				
	0.6	SILTY CLAY: red-brown silty clay							
	0.7	Pit discontinued at 0.7m Target depth reached							
27									
	1								1
26									

RIG: Scout 2
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285890
NORTHING: 6262920

PIT No: WC3
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - dark brown silty clay filling with some brick fragments (50-150mm), igneous gravel with a trace of glass fragments, tile fragments, and charcoal		D	0.1 0.2				
				D*	0.3 0.4				
	0.4	SILTY CLAY - red brown silty clay							
	0.5	Pit discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: 3.5T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD2/20180514 taken at 0.3 m - 0.4m depth

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285882
NORTHING: 6262947

PIT No: WC4
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		BITUMEN							
27	0.05	FILLING - brown silty clay filling with some sandstone fragments (10-100mm), with a trace of rootlets, glass and wood fragments, charcoal, igneous gravel 0.4m - becoming darker brown		D D	0.1 0.2 0.4 0.5				
	0.7	SILTY CLAY - red brown silty clay							
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285897
NORTHING: 6262929

PIT No: WC5
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Sampling & In Situ Testing Sample	Sampling & In Situ Testing Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		ASPHALTIC CONCRETE	■						
	0.05	FILLING - brown silty clay filling with some igneous gravel, trace of grass rootlets, glass fragments, sandstone fragments, and brick fragments	▩	D	0.1				
27	0.2	FILLING - red brown silty clay filling with some igneous cobbles (50-200mm) trace of plastic fragments, and tile fragments	▩		0.2				
				D	0.3				
					0.4				
	0.5	SILTY CLAY - red brown silty clay	▨						
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285918
NORTHING: 6262920

PIT No: WC6
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Sampling & In Situ Testing Depth	Sampling & In Situ Testing Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - brown silty clay filling with some igneous gravel and trace of grass rootlets, and sandstone fragments		D	0.1 0.2				
	0.3	SILTY CLAY - red brown silty clay		D	0.3 0.4				
26	0.6 1	Pit discontinued at 0.6m Target depth reached							1

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.2 AHD
EASTING: 285930
NORTHING: 6262915

PIT No: WC7
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
27		FILLING - brown silty clay filling with some igneous gravel, trace of grass rootlets, and plastic fragments	▩	D	0.1 0.2				
	0.3	FILLING - red brown silty clay filling with a trace of asphalt, wood fragments, and grass rootlets	▩	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator
LOGGED: NW
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285938
NORTHING: 6262932

PIT No: WC8
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some igneous gravel (10-100mm) and sandstone gravel (10-100mm), with a trace of grass rootlets, tile fragments, and plastic fragments	▩	D	0.1 0.2				
27			▩	D	0.3 0.4				
	0.5	SILTY CLAY - red brown silty clay	▨	D	0.7 0.8				
	0.8	Pit discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: 3.5T excavator **LOGGED:** NW **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285928
NORTHING: 6262938

PIT No: WC9
PROJECT No: 85867.05
DATE: 14/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - light brown silty clay filling with some igneous gravel and sandstone gravel (10-50mm) a trace of wood fragments and sand	▨	D	0.1 0.2				
	0.2	ROADBASE	⁘	D	0.2 0.25				
27	0.25	FILLING - red brown silty clay filling with a trace of brick fragments, igneous gravel, sandstone gravel, ceramic pipe, charcoal	▨	D	0.3 0.4				
	0.4	SILTY CLAY - red brown silty clay	▧						
	0.6	Pit discontinued at 0.6m Target depth reached							
	1								1
26									

RIG: 3.5T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285893
NORTHING: 6262956
DIP/AZIMUTH: 90°/--

BORE No: BH102E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some igneous gravel	▩	A	0.1 0.2		PID = <1		
27	0.3	SILTY CLAY: red-brown silty clay	▨	A	0.3 0.4		PID = <1		
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285897
NORTHING: 6262955
DIP/AZIMUTH: 90°/--

BORE No: BH102E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling, with some igneous gravel		A	0.1 0.2		PID = <1		
27									
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262950
DIP/AZIMUTH: 90°/--

BORE No: BH102N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
27	0.6	FILLING: brown silty clay filling with some sand, some fine to medium sandstone gravel	▩	A A	0.1 – 0.2 0.4 – 0.5		PID = <1 PID = <1		
	0.7	SILTY CLAY: red-brown silty clay	▨						
26	1	Bore discontinued at 0.7m Target depth reached							

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285896
NORTHING: 6262959
DIP/AZIMUTH: 90°/--

BORE No: BH102N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty sand filling with some igneous gravel	▨	A	0.1 0.2		PID = <1		
27		0.3 m: clinker	▨						
			▨	A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay	▨						
	1.0	Bore discontinued at 1.0m Target depth reached							
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262946
DIP/AZIMUTH: 90°/--

BORE No: BH102S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel, trace of sand		A	0.1 0.2		PID = <1		
27		0.3 m: turning yellow-brown							
				A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

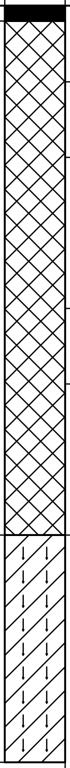
Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285889
NORTHING: 6262951
DIP/AZIMUTH: 90°/--

BORE No: BH102S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1



RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel							
				A	0.1 0.2		PID = <1		
27									
		0.4 m: turning red-brown		A	0.4 0.5		PID = <1		
	0.7	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 0.7m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285891
NORTHING: 6262957
DIP/AZIMUTH: 90°/--

BORE No: BH102W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: silty clay filling with some sand, some fine to medium sandstone and igneous gravels		A	0.1 0.2		PID = <1		
27	0.3	FILLING: red-brown silty clay filling with some fine to medium igneous gravel		A	0.3 0.4		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285916
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: brown silty sand filling with some fine igneous gravel	☒						
				A	0.1 0.2		PID = <1		
27				A	0.4 0.5		PID = <1		
	0.5	SILTY CLAY: red-brown silty clay	▨						
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285918
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
		FILLING: light grey silty clay filling with some sand and igneous gravel	▨	A	0.1 0.2		PID = <1		
27		0.3 m: becoming grey-brown	▨	A	0.4 0.5		PID = <1		
	0.6	SILTY CLAY: red-brown silty clay	▧						
1	1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262962
DIP/AZIMUTH: 90°/--

BORE No: BH103N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.1	CONCRETE: grey, 10-20 mm aggregate with reinforcements at 20 mm depth							
		FILLING: yellow-brown silty sand filling with some igneous gravel		A	0.2 0.3		PID = <1		
27				A	0.4 0.5		PID = <1		
	0.8								
		SILTY CLAY: red-brown silty clay							
1	1.0								1
		Bore discontinued at 1.0m Target depth reached							
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262965
DIP/AZIMUTH: 90°/--

BORE No: BH103S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: yellow-brown silty clay filling with some sand and igneous gravel	▨	A	0.1 0.2		PID = <1		
		0.3 m: turning red-brown	▨						
27			▨	A	0.4 0.5		PID = <1		
		0.5 m: trace of charcoal	▨						
	0.6	SILTY CLAY: red-brown silty clay	▨						
	0.8	Bore discontinued at 0.8m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285914
NORTHING: 6262961
DIP/AZIMUTH: 90°/--

BORE No: BH103S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
		FILLING: grey-brown silty clay filling with some igneous gravel	☒						
			☒	A	0.1 0.2		PID = <1		
27			☒	A	0.4 0.5		PID = <1		
		0.5 m: trace of charcoal	☒						
	0.8	SILTY CLAY: red-brown silty clay	▨						
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285912
NORTHING: 6262963
DIP/AZIMUTH: 90°/--

BORE No: BH103W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: brown-grey silty clay filling with some sand and fine igneous gravel	▩						
				A	0.1 0.2		PID = 1		
	0.3	FILLING: brown-black silty clay with some igneous gravel	▩						
27				A	0.4 0.5		PID = 2		
	0.7	SILTY CLAY: red-brown silty clay	▨						
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.4 AHD
EASTING: 285909
NORTHING: 6262964
DIP/AZIMUTH: 90°/--

BORE No: BH103W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING: brown silty clay filling, with some sand fine to medium igneous gravel, and brick fragments	▨						
			▨	A	0.1 0.2				
		0.3 m: turning dark brown	▨	A	0.3 0.4				
27			▨						
	0.7	SILTY CLAY: brown silty clay	▨	A	0.7 0.8				
		0.9 m: turning red-brown	▨						
	1		▨						1
	1.1	Bore discontinued at 1.1m Target depth reached							
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Sampling & In Situ Testing: Depth	Sampling & In Situ Testing: Sample	Sampling & In Situ Testing: Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with igneous gravel		A	0.1 0.2		PID = 3		
27									
				A	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay							
	1 1.0	Bore discontinued at 1.0m Target depth reached							1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285886
NORTHING: 6262921
DIP/AZIMUTH: 90°/--

BORE No: BH10E5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling, with some fine igneous gravel	▨	A	0.1 0.2		PID = 4		
27	0.3	SILTY CLAY: red-brown silty clay	▨						
	0.4	Bore discontinued at 0.4m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10N2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace sandstone gravels	▨	A	0.1 0.2		PID = 7		
27			▨						
			▨	A	0.4 0.5		PID = 6		
	0.8	SILTY CLAY: red-brown silty clay	▧						
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285883
NORTHING: 6262928
DIP/AZIMUTH: 90°/--

BORE No: BH10N5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some igneous gravel	▨	A	0.1 0.2		PID = 3		
27	0.3	Bore discontinued at 0.3m Auger refusal on concrete							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285880
NORTHING: 6262922
DIP/AZIMUTH: 90°/--

BORE No: BH10S2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some igneous gravel		A	0.1 0.2		PID = 4		
27									
				A*	0.4 0.5		PID = 3		
	0.6	SILTY CLAY: red brown silty clay							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD2/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285874
NORTHING: 6262925
DIP/AZIMUTH: 90°/--

BORE No: BH10S5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown silty clay filling with some fine to medium igneous gravel, trace medium sandstone gravel		A	0.1 0.2		PID = 6		
27									
				A*	0.4 0.5		PID = 4		
	0.6	SILTY CLAY: red-brown silty clay							
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst excavating

REMARKS: *BD1/20180516 taken at 0.4 m - 0.5 m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W2
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing				Water	Well Construction Details
				Type	Depth	Sample	Results & Comments		
	0.02	ASPHALTIC CONCRETE	■						
		FILLING: brown silty clay filling with some igneous gravel	☒	A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 3		
	0.5	SILTY CLAY: red-brown silty clay, with a trace of charcoal	▨						
	0.7	Bore discontinued at 0.7m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Toga Development and Construction Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 87-91 Union Road, Penrith

SURFACE LEVEL: 27.3 AHD
EASTING: 285878
NORTHING: 6262924
DIP/AZIMUTH: 90°/--

BORE No: BH10W5
PROJECT No: 85867.05
DATE: 16/5/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.02	ASPHALTIC CONCRETE							
		FILLING: brown, silty clay filling with igneous gravel		A	0.1 0.2		PID = 4		
27									
				A	0.4 0.5		PID = 4		
	0.5	SILTY CLAY: red-brown silty clay with trace of charcoal							
	0.9	Bore discontinued at 0.9m Target depth reached							
	1								1
26									

RIG: Scout 2 **DRILLER:** Steve **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Solid flight auger
WATER OBSERVATIONS: No free groundwater observed whilst excavating
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:
  4,6,7
  N=13
- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:
  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.

  Soil tends to stick together.

  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.

  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Descriptions

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100\text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

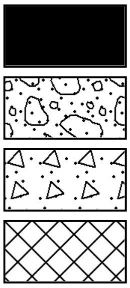
Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

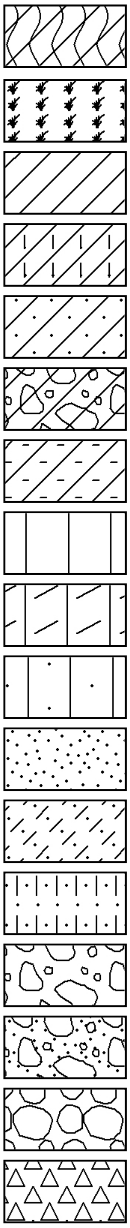
Graphic Symbols for Soil and Rock

General



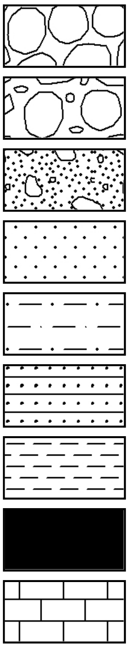
- Asphalt
- Road base
- Concrete
- Filling

Soils



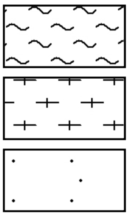
- Topsoil
- Peat
- Clay
- Silty clay
- Sandy clay
- Gravelly clay
- Shaly clay
- Silt
- Clayey silt
- Sandy silt
- Sand
- Clayey sand
- Silty sand
- Gravel
- Sandy gravel
- Cobbles, boulders
- Talus

Sedimentary Rocks



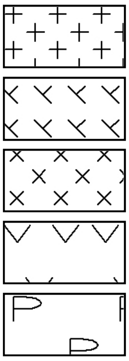
- Boulder conglomerate
- Conglomerate
- Conglomeratic sandstone
- Sandstone
- Siltstone
- Laminite
- Mudstone, claystone, shale
- Coal
- Limestone

Metamorphic Rocks



- Slate, phyllite, schist
- Gneiss
- Quartzite

Igneous Rocks



- Granite
- Dolerite, basalt, andesite
- Dacite, epidote
- Tuff, breccia
- Porphyry

Attachment E

Table E1: ENM Classification Table

Table E2: Waste Classification Results Summary

Table E3: Soil Results Summary

Table E1: Summary of ENM Results

							Metals								TRH		BTEX					PAH		Foreign Materials
					Electrical conductivity	pH (aqueous extract)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6 - C9	C10-C36	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Benzo(a) pyrene	Total PAH (+ve)	
					ds/m	pH_Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
EQL							4	0.4	1	1	1	0.1	1	1	25	250	0.2	1	0.5	2	1	0.05	0.1	
ENM Order (2014) Maximum Average Concentration					1.5	5 to 9	20	0.5	75	100	50	0.5	30	150	NA	250	NA	NA	NA	NA		0.5	20	0.05
ENM Order (2014) Absolute Maximum Concentration					3	4.5 to 10	40	1	150	200	100	1	60	300	NA	500	0.5	25	65	15		1	40	0.1
Field_ID	**Sample_Depth_Range**	**Sampled_Date-Time**	**Lab_Report_Number**	**Matrix_Description**																				
WC1	0.1-0.2	14/05/2018	191743	Filling	0.087	7.4	<4	<0.4	11	18	130	<0.1	7	83	<25	<250	<0.2	<1	<0.5	<2	<1	0.53	6.6	<0.05
WC1	0.3-0.4	14/05/2018	191743	Filling	0.036	8	<4	<0.4	9	11	13	<0.1	4	20	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
BD1/2018051	0.3-0.4	14/05/2018	191743	Filling	-	-	<4	<0.4	10	6	12	<0.1	4	18	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	-
WC2	0.1-0.2	14/05/2018	191743	Filling	0.13	7.8	26	0.9	20	61	170	<0.1	41	150	<25	<250	<0.2	<1	<0.5	<2	<1	0.2	1.8	<0.05
WC2	0.3-0.4	14/05/2018	191743	Filling	0.054	7.8	8	<0.4	17	56	390	0.2	18	160	<25	<250	<0.2	<1	<0.5	<2	<1	0.1	1.2	<0.05
WC3	0.1-0.2	14/05/2018	191743	Filling	0.057	7.9	6	0.9	23	98	1100	0.5	15	560	<25	<250	<0.2	<1	<0.5	<2	<1	0.3	3.7	<0.05
WC3	0.3-0.4	14/05/2018	191743	Filling	0.038	8	<4	<0.4	12	22	250	0.2	6	230	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC4	0.1-0.2	14/05/2018	191743	Filling	0.057	7.3	5	<0.4	7	8	18	<0.1	9	51	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC4	0.4-0.5	14/05/2018	191743	Filling	0.074	7.7	<4	<0.4	11	13	400	3.3	6	200	<25	<250	<0.2	<1	<0.5	<2	<1	0.1	1.4	<0.05
WC5	0.1-0.2	14/05/2018	191743	Filling	0.1	8.6	<4	<0.4	73	37	16	<0.1	78	54	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	0.2	<0.05
WC5	0.3-0.4	14/05/2018	191743	Filling	0.092	8.4	<4	<0.4	39	31	280	0.4	35	170	<25	<250	<0.2	<1	<0.5	<2	<1	0.4	4.9	<0.05
WC6	0.1-0.2	14/05/2018	191743	Filling	0.069	8.6	16	<0.4	59	34	48	<0.1	75	120	<25	<250	<0.2	<1	<0.5	<2	<1	0.1	1.1	<0.05
WC7	0.1-0.2	14/05/2018	191743	Filling	0.099	8.8	4	<0.4	16	29	39	<0.1	13	99	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC8	0.1-0.2	14/05/2018	191743	Filling	0.13	8.6	6	<0.4	8	17	35	<0.1	22	82	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC8	0.3-0.4	14/05/2018	191743	Filling	0.078	8.3	<4	<0.4	14	38	88	0.2	42	280	<25	<250	<0.2	<1	<0.5	<2	<1	0.07	0.4	<0.05
WC9	0.3-0.4	14/05/2018	191743	Filling	0.13	7.3	<4	<0.4	15	20	110	0.2	10	140	<25	<250	<0.2	<1	<0.5	<2	<1	0.1	1.7	<0.05
WC10	0.1-0.2	14/05/2018	191743	Filling	0.09	7.4	<4	<0.4	17	46	60	<0.1	73	150	<25	<250	<0.2	<1	<0.5	<2	<1	0.2	1.9	<0.05
WC11	0.1-0.2	14/05/2018	191743	Filling	0.041	7.9	7	<0.4	7	8	37	<0.1	8	51	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC11	0.4-0.5	14/05/2018	191743	Filling	0.04	7.8	5	<0.4	12	43	270	0.1	7	170	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	0.2	<0.05
WC12	0.1-0.2	14/05/2018	191743	Filling	0.086	8.7	<4	<0.4	30	16	170	<0.1	24	64	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC13	0.1-0.2	14/05/2018	191743	Filling	0.24	8.8	<4	<0.4	15	12	52	<0.1	14	45	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC13	0.3-0.4	14/05/2018	191743	Filling	0.26	8.8	<4	0.4	15	16	260	<0.1	12	120	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC14	0.4-0.5	14/05/2018	191743	Filling	0.061	8.3	<4	<0.4	11	20	160	0.2	7	400	<25	<250	<0.2	<1	<0.5	<2	<1	0.2	1.9	<0.05
WC15	0.1-0.2	14/05/2018	191743	Filling	0.046	8	<4	<0.4	5	5	19	<0.1	6	39	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC15	0.3-0.4	14/05/2018	191743	Filling	0.074	8.1	4	2	7	12	110	<0.1	8	160	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC16	0.4-0.5	14/05/2018	191743	Filling	0.068	8.2	8	1	24	37	190	0.4	34	290	<25	<250	<0.2	<1	<0.5	<2	<1	0.07	0.51	<0.05
WC16	0.5-0.6	14/05/2018	191743	Filling	0.037	6.7	<4	<0.4	11	9	60	<0.1	8	67	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC17	0.1-0.2	14/05/2018	191743	Filling	0.061	7.7	84	1	38	64	370	2.1	31	310	<25	<250	<0.2	<1	<0.5	<2	<1	0.97	11	<0.05
WC19	0.1-0.2	16/05/2018	192022	Filling	0.1	6.5	7	<0.4	11	13	120	0.2	8	75	<25	<250	<0.2	<1	<0.5	<2	<1	0.08	0.2	<0.05
WC19	0.4-0.5	16/05/2018	192022	Filling	0.04	6.9	<4	<0.4	10	7	16	<0.1	5	18	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
WC20	0.1-0.2	16/05/2018	192022	Filling	0.17	6.9	7	<0.4	9	13	72	<0.1	8	56	<25	<250	<0.2	<1	<0.5	<2	<1	0.05	0.05	<0.05
WC20	0.4-0.5	16/05/2018	192022	Filling	0.13	7.2	4	<0.4	10	13	340	0.3	6	29	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
										0														
Stockpile																								
SP1		14/05/2018	191743-A		0.13	8.4	<4	<0.4	33	46	14	<0.1	52	58	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	0.3	<0.05
SP2		14/05/2018	191743-A		0.13	8.1	<4	<0.4	13	28	19	<0.1	24	31	<25	<250	<0.2	<1	<0.5	<2	<1	0.2	1.9	<0.05
SP3		14/05/2018	191743-A		0.21	8.2	<4	<0.4	20	34	76	<0.1	22	74	<25	<250	<0.2	<1	<0.5	<2	<1	0.06	0.3	<0.05
SP4		14/05/2018	191743-A		0.33	8.3	<4	<0.4	13	56	35	<0.1	45	60	<25	<250	<0.2	<1	<0.5	<2	<1	<0.05	<0.05	<0.05
Stockpile Average					0.2	8.25	4	0.4	20	41	36	0.1	36	56	25	250	0.2	1	0.5	2	1	<0.05	<0.05	0.05

Table E2: Summary of Waste Classification Results

						Metals										Asbestos ID		Combined Comp		sc Inorg Soil - DRY		PAH												
						Arsenic	Cadmium	Copper	Lead	Lead in TCLP	Mercury	Nickel	Nickel in TCLP	Chromium (III + IV)	Zinc	Asbestos ID in materials	Sample Mass Tested	PAH (total, NSW Waste 2008)	Carcinogenic PAHs as B(a)P TPE	Electrical Conductivity 1:5 soil:water	pH 1:5 soil:water	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(g,h,i)perylene	Benzo[a]pyrene	Benzo(a)pyrene TCLP	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg		mg/kg	mg/kg	-	g	mg/kg	mg/kg	µS/cm	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	0.005	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						4	0.4	1	1		0.1	1		1	1					1		0.1	0.1	0.1	0.1	0.1	0.05	mg/L	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)						100	20		100		4	40		100													0.8	-						
NSW EPA 2014 General Solid Waste (SCC1, TCLP)						500	100		1500	5	50	1050	2	1900				200									10	0.04						
NSW EPA 2014 Restricted Solid Waste (CT2)						400	80		400		16	160		400													3.2	-						
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)						2000	400		6000	20	200	4200	8	7600				800									23	0.16						
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																													
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	18	130	-	<0.1	7	-	11	83	-	-	4.65	0.669	87	7.4	<0.1	<0.1	<0.1	0.4	0.5	0.53	-	0.4	<0.1	1.4	<0.1	0.4	<0.1
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	11	13	-	<0.1	4	-	9	20	-	-	<1	<0.172	36	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	6	12	-	<0.1	4	-	10	18	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	26	0.9	61	170	-	<0.1	41	-	20	150	-	-	1.35	0.274	130	7.8	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.2	<0.1	0.3	<0.1	0.1	<0.1
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	8	<0.4	56	390	-	0.2	18	-	17	160	-	-	1.15	0.162	54	7.8	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.1	<0.1	0.3	<0.1	<0.1	<0.1
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	6	0.9	98	1100	0.04	0.5	15	-	23	560	-	-	2.55	0.396	57	7.9	<0.1	<0.1	<0.1	0.2	0.3	0.3	-	0.3	<0.1	0.7	<0.1	0.2	<0.1
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	22	250	-	0.2	6	-	12	230	-	-	<1	<0.172	38	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	5	<0.4	8	18	-	<0.1	9	-	7	51	-	-	<1	<0.172	57	7.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	13	400	<0.03	3.3	6	-	11	200	-	-	1.25	0.162	74	7.7	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.1	<0.1	0.3	<0.1	<0.1	<0.1
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	37	16	-	<0.1	78	-	73	54	-	-	0.65	<0.172	100	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	31	280	-	0.4	35	-	39	170	-	-	3.55	0.518	92	8.4	<0.1	<0.1	<0.1	0.3	0.4	0.4	-	0.4	<0.1	1	<0.1	0.3	<0.1
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	16	<0.4	34	48	-	<0.1	75	0.02	59	120	-	-	1.15	0.163	69	8.6	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	0.2	<0.1	0.2	<0.1	<0.1	<0.1
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	4	<0.4	29	39	-	<0.1	13	-	16	99	-	-	<1	<0.172	99	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	6	<0.4	17	35	-	<0.1	22	-	8	82	-	-	<1	<0.172	130	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	38	88	-	0.2	42	-	14	280	-	-	0.8	0.131	78	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	-	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	20	110	-	0.2	10	-	15	140	-	-	1.35	0.173	130	7.3	<0.1	<0.1	<0.1	0.1	0.2	0.1	-	0.1	<0.1	0.3	<0.1	0.1	<0.1
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	46	60	-	<0.1	73	<0.02	17	150	-	-	1.4	0.274	90	7.4	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.2	<0.1	0.4	<0.1	0.1	<0.1
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	7	<0.4	8	37	-	<0.1	8	-	7	51	-	-	<1	<0.172	41	7.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	5	<0.4	43	270	-	0.1	7	-	12	170	-	-	0.6	<0.172	40	7.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	16	170	-	<0.1	24	-	30	64	-	-	<1	<0.172	86	8.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	12	52	-	<0.1	14	-	15	45	-	-	<1	<0.172	240	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<4	0.4	16	260	-	<0.1	12	-	15	120	-	-	<1	<0.172	260	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	20	160	-	0.2	7	-	11	400	-	-	1.55	0.273	61	8.3	<0.1	<0.1	<0.1	0.1	0.2	0.2	-	0.1	<0.1	0.4	<0.1	0.1	<0.1
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	5	19	-	<0.1	6	-	5	39	-	-	<1	<0.172	46	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	4	2	12	110	-	<0.1	8	-	7	160	-	-	<1	<0.172	74	8.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	8	1	37	190	-	0.4	34	-	24	290	-	-	0.85	0.1315	68	8.2	<0.1	<0.1	<0.1	<0.1	0.1	0.07	-	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<4	<0.4	9	60	-	<0.1	8	-	11	67	-	-	<1	<0.172	37	6.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	84	1	64	370	<0.03	2.1	31	-	38	310	-	-	7.1	1.175	61	7.7	<0.1	<0.1	0.1	0.8	0.8	0.97	<0.001	0.7	<0.1	2.2	<0.1	0.6	<0.1
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	0	1430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	120	-	0.2	8	-	11	75	-	-	0.55	0.1415	100	6.5	<0.1	<0.1	<0.1	<0.1	0.1	0.08	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	7	16	-	<0.1	5	-	10	18	-	-	<1	<0.172	40	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	72	-	<0.1	8	-	9	56	-	-	<1	0.111	170	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	4	<0.4	13	340	-	0.3	6	-	10	29	-	-	<1	<0.172	130	7.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Material Identification																																		
WC18-1	WC18		16/05/2018	192022	Material											Chrysotile & Amosite asbestos detected																		
Stockpile Classification																																		
SP1	SP1		14/05/2018	191743-A		<4	<0.4	46	14	-	<0.1	52	-	33	58	-	-	0.75	<0.172	130	8.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SP2	SP2		14/05/2018	191743-A		<4	<0.4	28	19	-	<0.1	24	-	13	31	-	-	1.35	0.272	130	8.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	-	0.1	<0.1	0.4	<0.1	0.1	<0.1
SP3	SP3		14/05/2018	191743-A		<4	<0.4	34	76	-	<0.1	22	-	20	74	-	-	0.6	0.121	210	8.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	-	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
SP4	SP4		14/05/2018	191743-A		<4	<0.4	56	35	-	<0.1	45	-	13	60	-	-	<1	<0.172	330	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table E2: Summary of Waste Classification Results

													ENM (FM)		TRH								BTEX									
						Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs	Foreign Material	Sample Mass Tested	TRH >C10 - C16 less Naphthalene (F2)	Total +ve TRH (>C10-C40)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Ethylbenzene	Naphthalene	o-Xylene	Toluene	Xylene Total	vTPH C6 - C10 less BTEX (F1)	m+p-xylene	TRH C6 - C9	TPH C6-C10
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.5	0.5	0.5	0.2	0.05	0.05		50	50	50	100	100	50	100	100	0.2	1	1	1	0.5	1	25	2	25	25
NSW EPA 2014 General Solid Waste (CT1)																							10	600			288	1000				
NSW EPA 2014 General Solid Waste (SCC1, TCLP)																							18	1080			518	1800			650	
NSW EPA 2014 Restricted Solid Waste (CT2)																							40	2400			1152	4000				
NSW EPA 2014 Restricted Solid Waste (SCC2, TCLP)																							72	4320			2073	7200			2600	
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																											
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	0.8	1.3	0.7	0.8	0.8	0.9	6.6	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.8	<0.05	5900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	0.1	0.3	<0.5	<0.5	<0.5	0.2	1.2	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	0.3	0.7	<0.5	<0.5	0.5	0.6	3.7	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.4	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	0.2	<0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	7400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	0.5	1	0.5	0.6	0.6	0.6	4.9	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.7	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<0.1	0.3	<0.5	<0.5	<0.5	0.4	1.9	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	0.2	0.4	<0.5	<0.5	<0.5	0.3	1.9	<0.05	5600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.51	<0.05	7300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	0.9	2.2	1.3	1.3	1.4	2	11	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.2	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	6200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.05	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	5100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Material Identification																																
WC18-1	WC18		16/05/2018	192022	Material																											
Stockpile Classification																																
SP1	SP1		14/05/2018	191743-A		0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.3	<0.05	7800	<50	110	<50	110	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP2	SP2		14/05/2018	191743-A		0.1	0.4	<0.5	<0.5	<0.5	0.3	1.9	<0.05	6500	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP3	SP3		14/05/2018	191743-A		<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.3	<0.05	8300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP4	SP4		14/05/2018	191743-A		<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05	<0.05	8200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25

Table E3: Summary of Soil Results

						Metals								Asbestos ID		ESDAT Combined Compounds		Misc Inorg Soil - DRY 50g		PAH																		
						Arsenic	Cadmium	Copper	Lead	Mercury	Nickel	Chromium (III + IV)	Zinc	Asbestos ID in materials	Sample Mass Tested	PAH (total, NSW Waste 2008)	Carcinogenic PAHs as B(a)P TPE	Electrical Conductivity 1:5 soil:water	pH 1:5 soil:water	Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benzo(g,h,i)perylene	Benzo[a]pyrene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)	Benzo(b,j+k)fluoranthene	Total +ve PAHs
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	g	mg/kg	mg/kg	µS/cm	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						4	0.4	1	1	0.1	1	1	1					1		0.1	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.2	0.05
NEPM 2013 Table 1A(1) HILs Res B Soil						500	150	30000	1200	120	1200		60000				4																					
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																															3							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil, 0-2m																									0.7													
NEPM EILs, Urban residential and public open space, Soil						100		230	1100		230		690																		170							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																																						
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																																	
Borehole Delineation																																						
BH102E2	BH102E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	3.15	0.914	-	-	<0.1	0.2	0.1	0.4	0.9	0.71	0.5	0.1	0.4	<0.1	0.5	<0.1	0.2	0.7	1	1	1	0.9	5.5
BH102E2	BH102E2	0.3-0.4	16/05/2018	192022	Natural	-	-	-	-	-	-	-	-	-	-	1.25	0.273	-	-	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.7
BH102E5	BH102E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.65	0.66	-	-	<0.1	0.1	<0.1	0.1	0.8	0.5	0.2	0.1	0.1	<0.1	0.4	<0.1	<0.1	0.2	0.7	0.7	0.7	0.6	3.1
BH102N2	BH102N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.15	0.27	-	-	<0.1	<0.1	<0.1	<0.1	0.3	0.2	0.2	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.2	<0.5	<0.5	<0.5	0.3	1.4
BH102N2	BH102N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	2.65	0.497	-	-	<0.1	<0.1	<0.1	0.2	0.4	0.4	0.3	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	0.5	0.6	0.6	3.8
BH102N5	BH102N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH102S2	BH102S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	5.3	1.239	-	-	<0.1	0.1	<0.1	0.8	1	0.88	0.9	0.2	1	<0.1	0.6	<0.1	0.5	1.6	1.3	1.3	1.3	1	8.7
BH102S2	BH102S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	0.6	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2
BH102S5	BH102S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.15	0.164	-	-	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1
BH102W2	BH102W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	1.2	0.285	-	-	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2	<0.1	0.2	<0.1	0.2	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	0.4	1.8
BH102W2	BH102W2	0.3-0.4	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	2.45	0.395	-	-	<0.1	<0.1	<0.1	0.2	0.3	0.3	0.2	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	<0.5	0.5	0.5	3.6
BH103E2	BH103E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	270	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103E5	BH103E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	160	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103N2	BH103N2	0.2-0.3	16/05/2018	192022	Filling	-	-	-	1400	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103S2	BH103S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	380	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103S5	BH103S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	290	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103W2	BH103W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	290	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH103W5	BH103W5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	67	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E2	BH10E2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	28	26	<0.1	55	52	55	-	-	0.8	0.0865	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.4
BH10E2	BH10E2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	17	1200	<0.1	5	10	210	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10E5	BH10E5	0.1-0.2	16/05/2018	192022	Filling	5	<0.4	21	190	<0.1	9	15	120	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10N2	BH10N2	0.1-0.2	16/05/2018	192022	Filling	4	<0.4	27	79	0.1	50	52	64	-	-	5.5	0.812	-	-	<0.1	<0.1	0.1	0.5	0.6	0.66	0.6	<0.1	1.5	<0.1	0.4	<0.1	1.1	1.4	0.9	0.9	1	1	8.1
BH10N2	BH10N2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	22	820	0.6	8	14	440	-	-	0.8	0.151	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.09	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4
BH10N5	BH10N5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	29	31	<0.1	61	62	52	-	-	1.25	0.274	-	-	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.2	<0.1	0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.3	1.8
BH10S2	BH10S2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	32	66	<0.1	51	50	58	-	-	3.65	0.791	-	-	<0.1	<0.1	<0.1	0.5	0.6	0.59	0.5	0.1	1	<0.1	0.4	<0.1	0.4	0.9	0.9	0.9	0.9	1	6.2
BH10S2	BH10S2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	11	48	<0.1	7	12	58	-	-	1.35	0.268	-	-	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.6
BD2/20180516	BH10S2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	5	15	<0.1	6	10	11	-	-	0.85	0.131	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.55
BH10S5	BH10S5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	28	80	<0.1	42	40	59	-	-	0.7	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.3
BH10S5	BH10S5	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	23	85	<0.1	28	31	77	-	-	3.4	0.528	-	-	<0.1	<0.1	0.1	0.4	0.4	0.4	0.4	<0.1	0.9	<0.1	0.3	<0.1	0.6	0.8	0.6	0.6	0.7	0.8	5
BD1/20180516	BH10S5	0-4-0.5	16/05/2018	ES1814627	Filling	<5	<1	22	172	0.1	31	32	174	-	-					<0.5	<0.5	<0.5	0.6	0.6	0.7	0.6	<0.5	1	<0.5	<0.5	<0.5	0.9	1	0.9	1.2	1.5	-	6.3
BH10W2	BH10W2	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	20	22	<0.1	38	41	39	-	-	3.7	0.801	-	-	<0.1	0.1	<0.1	0.5	0.6	0.65	0.5	<0.1	1	<0.1	0.4	<0.1	0.4	0.9	0.9	0.9	1	1	6.3
BH10W2	BH10W2	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	5	22	<0.1	6	10	33	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BH10W5	BH10W5	0.1-0.2	16/05/2018	192022	Filling	<4	<0.4	24	57	<0.1	37	40	59	-	-	1.45	0.285	-	-	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2	<0.1	0.3	<0.1	0.2	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.4	2
Stockpile																																						
SP1	SP1		14/05/2018	191743-A		<4	<0.4	46	14	<0.1	52	33	58	-	-	0.75	<0.172	130	8.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.5	<0.5	<0.5	<0.2	0.3
SP2	SP2		14/05/2018	191743-A		<4	<0.4	28	19	<0.1	24	13	31	-	-	1.35	0.272	130	8.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	0.1	<0.1	0.4	<0.1	0.1	<0.1	0.1	0.4	<0.5	<0.5	<0.5	0.3	1.9
SP3	SP3		14/05/2018	191743-A		<4	<0.4	34	76	<0.1	22	20	74	-	-	0.6	0.121	210	8.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.3
SP4	SP4		14/05/2018	191743-A		<4	<0.4	56	35	<0.1	45	13	60	-	-	<1	<0.172	330	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
Test Pits																																						
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	18	130	<0.1	7	11	83	-	-	4.65	0.669	87	7.4	<0.1	<0.1	<0.1	0.4	0.5	0.53	0.4	<0.1	1.4	<0.1	0.4	<0.1	0.8	1.3	0.7	0.8	0.8	0.9	6.6
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	11	13	<0.1	4	9	20	-	-	<1	<0.172	36	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	6	12	<0.1	4	10	18	-	-	<1	<0.172	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	26	0.9	61	170	<0.1	41	20	150	-	-	1.35	0.274	130	7.8	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.3	<0.1	0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.3	1.8
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	8	<0.4	56	390	0.2	18	17	160	-	-	1.15	0.162	54	7.8	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.1	0.3	<0.5	<0.5	<0.5	0.2	1.2
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	6	0.9	98	1100	0.5	15	23	560	-	-	2.55	0.396	57	7.9	<0.1	<0.1	<0.1	0.2	0.3	0.3	0.3	<0.1	0.7	<0.1	0.2	<0.1	0.3	0.7	<0.5	<0.5	0.5	0.6	3.7
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	22	250	0.2	6	12	230	-	-	<1	<0.172	38	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	5	<0.4	8	18	<0.1	9	7	51	-	-	<1	<0.172	57	7.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	13	400	3.3	6	11	200	-	-	1.25	0.162	74	7.7	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	0.3	<0.1	<0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.4
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	37	16	<0.1	78	73	54	-	-	0.65	<0.172	100	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	31	280	0.4	35	39	170	-	-	3.55	0.518	92	8.4	<0.1	<0.1	<0.1	0.3	0.4	0.4	0.4	<0.1	1	<0.1	0.3	<0.1	0.5	1	0.5	0.6	0.6	0.6	4.9
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	16	<0.4	34	48	<0.1	75	59	120	-	-	1.15	0.163	69	8.6	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	0.2	0.2	<0.5	<0.5	<0.5	0.2	1.1
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	4	<0.4	29	39	<0.1	13	16	99	-	-	<1	<0.172	99	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	6	<0.4	17	35	<0.1	22	8	82	-	-	<1	<0.172	130	8.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	38	88	0.2	42	14	280	-	-	0.8	0.131	78	8.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.4
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	<4	<0.4	20	110	0.2	10	15	140	-	-	1.35	0.173	130	7.3	<0.1	<0.1	<0.1	0.1	0.2	0.1	0.1	<0.1	0.3	<0.1	0.1	<0.1	0.2	0.3	<0.5	<0.5	<0.5	0.2	1.7
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	46	60	<0.1	73	17	150	-	-	1.4	0.274	90	7.4	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.2	<0.1	0.4	<0.1	0.1	<0.1	<0.1	0.3	<0.5	<0.5	<0.5	0.4	1.9
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	7	<0.4	8	37	<0.1	8	7	51	-	-	<1	<0.172	41	7.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	5	<0.4	43	270	0.1	7	12	170	-	-	0.6	<0.172	40	7.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	16	170	<0.1	24	30	64	-	-	<1	<0.172	86	8.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	12	52	<0.1	14	15	45	-	-	<1	<0.172	240	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	<4	0.4	16	260	<0.1	12	15	120	-	-	<1	<0.172	260	8.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	<4	<0.4	20	160	0.2	7	11	400	-	-	1.55	0.273	61	8.3	<0.1	<0.1	<0.1	0.1	0.2	0.2	0.1	<0.1	0.4	<0.1	0.1	<0.1	0.2	0.4	<0.5	<0.5	<0.5	0.3	1.9
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	<4	<0.4	5	19	<0.1	6	5	39	-	-	<1	<0.172	46	8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	4	2	12	110	<0.1	8	7	160	-	-	<1	<0.172	74	8.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	8	1	37	190	0.4	34	24	290	-	-	0.85	0.1315	68	8.2	<0.1	<0.1	<0.1	<0.1	0.1	0.07	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.5	<0.5	<0.5	<0.2	0.51
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	<4	<0.4	9	60	<0.1	8	11	67	-	-	<1	<0.172	37	6.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	84	1	64	370	2.1	31	38	310	-	-	7.1	1.175	61	7.7	<0.1	<0.1	0.1	0.8	0.8	0.97	0.7	<0.1	2.2	<0.1	0.6	<0.1	0.9	2.2	1.3	1.3	1.4	2	11
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	0	1430	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	120	0.2	8	11	75	-	-	0.55	0.1415	100	6.5	<0.1	<0.1	<0.1	<0.1	0.1	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.2
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	<4	<0.4	7	16	<0.1	5	10	18	-	-	<1	<0.172	40	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	7	<0.4	13	72	<0.1	8	9	56	-	-	<1	0.111	170	6.9	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	0.05
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	4	<0.4	13	340	0.3	6	10	29	-	-	<1	<0.172	130	7.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.2	<0.05
Material Identification																																						
WC18-1	WC18		16/05/2018	192022	Material									Chrysotile & Amosite asbestos detected																								

Table E3: Summary of Soil Results

						PCB								ENM (FM)		TRH								BTEX									
						Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Polychlorinated Biphenyls (PCBs)	Foreign Material	Sample Mass Tested	TRH >C10 - C16 less Naphthalene (F2)	Total +ve TRH (>C10-C40)	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	Benzene	Ethylbenzene	Naphthalene	o-Xylene	Toluene	Xylene isomers	vTPH C6 - C10 less BTEX (F1)	m+p-xylene	TRH C6 - C9	TPH C6-C10
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	g	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL						0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05		50	50	50	100	100	50	100	100	0.2	1	1	1	0.5	1	25	2	25	25
NEPM 2013 Table 1A(1) HILs Res B Soil													1																				
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																110								0.5	55	3		160	40	45			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil, 0-2m																		120	300	2800				50	70			85	105				180
NEPM EILs, Urban residential and public open space, Soil																										170							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil																		1000	3500	10000													800
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date**	**Lab_Report_Number**	**Matrix_Description**																												
Borehole Delineation																																	
BH102E2	BH102E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	360	<50	210	150	<50	120	160	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102E2	BH102E2	0.3-0.4	16/05/2018	192022	Natural	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102E5	BH102E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N2	BH102N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	240	<50	100	130	<50	<100	120	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N2	BH102N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102N5	BH102N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	420	<50	310	110	<50	200	180	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S2	BH102S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	290	<50	160	130	<50	<100	120	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S2	BH102S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102S5	BH102S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102W2	BH102W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH102W2	BH102W2	0.3-0.4	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103E2	BH103E2	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	-	-	<50	3300	<50	2300	960	<50	1300	1600	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103E5	BH103E5	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103N2	BH103N2	0.2-0.3	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	-	-	<50	4000	<50	3000	980	<50	1600	2000	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103S2	BH103S2	0.1-0.2	16/05/2018	192022	Filling	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	<50	1800	<50	1300	490	<50	600	890	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103S5	BH103S5	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	1.2	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103W2	BH103W2	0.1-0.2	16/05/2018	192022	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	-	-	52	2400	52	1600	760	<50	850	1100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH103W5	BH103W5	0.1-0.2	16/05/2018	192022	Filling	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	<50	1900	<50	1100	790	<50	470	970	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BH10E2	BH10E2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E2	BH10E2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10E5	BH10E5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N2	BH10N2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N2	BH10N2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10N5	BH10N5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S2	BH10S2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S2	BH10S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD2/20180516	BH10S2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S5	BH10S5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10S5	BH10S5	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1/20180516	BH10S5	0-4-0.5	16/05/2018	ES1814627	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W2	BH10W2	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W2	BH10W2	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH10W5	BH10W5	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stockpile																																	
SP1	SP1		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	7800	<50	110	<50	110	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP2	SP2		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	6500	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP3	SP3		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	8300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
SP4	SP4		14/05/2018	191743-A		-	-	-	-	-	-	-	-	<0.05	8200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Test Pits																																	
WC1	WC1	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC1	WC1	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
BD1/20180514	WC1	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	5900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC2	WC2	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC3	WC3	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC4	WC4	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC5	WC5	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC6	WC6	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC7	WC7	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC8	WC8	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC9	WC9	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6900	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC10	WC10	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC11	WC11	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC12	WC12	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC13	WC13	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6700	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC14	WC14	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	5600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC15	WC15	0.3-0.4	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	8800	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.4-0.5	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7300	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC16	WC16	0.5-0.6	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	7000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC17	WC17	0.1-0.2	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	<0.05	6400	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC18	WC18	0-0.1	14/05/2018	191743	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WC19	WC19	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6000	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC19	WC19	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6200	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.1-0.2	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	6600	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
WC20	WC20	0.4-0.5	16/05/2018	192022	Filling	-	-	-	-	-	-	-	-	<0.05	5100	<50	<50	<50	<100	<100	<50	<100	<100	<0.2	<1	<1	<1	<0.5	<1	<25	<2	<25	<25
Material Identification																																	
WC18-1	WC18		16/05/2018	192022	Material	-	-	-	-	-	-	-	-																				

Attachment F

NATA Laboratory Certificates, Chain of Custody Documentation

Sample Receipt Advice

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 191743

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.05, Proposed Mixed Use Develpomen t**
Number of Samples	31 Soil
Date samples received	16/05/2018
Date completed instructions received	16/05/2018

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	23/05/2018
Date of Issue	23/05/2018

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Asbestos Approved By
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Authorised by Asbestos Approved Signatory: Lucy Zhu

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Jacinta Hurst, Laboratory Manager

ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	81	80	83	83	79

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	74	80	77	79	78

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	76	88	86	85	79

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	87	88	83	83

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	68	87	76	83

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		191743-26	191743-27	191743-29	191743-30	191743-31
Your Reference	UNITS	WC16	WC17	BD1/20180514	Trip Spike	Trip Blank
Depth		0.5-0.6	0.1-0.2	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	[NA]	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	100%	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	99%	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	99%	<1
m+p-xylene	mg/kg	<2	<2	<2	100%	<2
o-Xylene	mg/kg	<1	<1	<1	99%	<1
naphthalene	mg/kg	<1	<1	<1	[NA]	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	[NT]	<1
Surrogate aaa-Trifluorotoluene	%	81	82	85	73	89

svTRH (C10-C40) in Soil						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	20/05/2018	20/05/2018	20/05/2018	20/05/2018	20/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH $>C_{10}$ -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH $>C_{10}$ - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH $>C_{16}$ -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH $>C_{34}$ -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	100	98	100	100	97

svTRH (C10-C40) in Soil						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	20/05/2018	20/05/2018	20/05/2018	20/05/2018	20/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH $>C_{10}$ -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH $>C_{10}$ - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH $>C_{16}$ -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH $>C_{34}$ -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	97	97	101	99	97

svTRH (C10-C40) in Soil						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	20/05/2018	20/05/2018	20/05/2018	20/05/2018	20/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	98	97	98	98	96

svTRH (C10-C40) in Soil						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	20/05/2018	20/05/2018	20/05/2018	21/05/2018	21/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	100	98	96	96	96

svTRH (C10-C40) in Soil						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	96	93	96	97	102

svTRH (C10-C40) in Soil				
Our Reference		191743-26	191743-27	191743-29
Your Reference	UNITS	WC16	WC17	BD1/20180514
Depth		0.5-0.6	0.1-0.2	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	95	97	96

PAHs in Soil						
Our Reference	UNITS	191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference		WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.8	<0.1	0.1	0.1	0.3
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.4	<0.1	0.3	0.3	0.7
Pyrene	mg/kg	1.3	<0.1	0.3	0.3	0.7
Benzo(a)anthracene	mg/kg	0.4	<0.1	0.1	<0.1	0.2
Chrysene	mg/kg	0.4	<0.1	0.2	0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	0.9	<0.2	0.3	0.2	0.6
Benzo(a)pyrene	mg/kg	0.53	<0.05	0.2	0.1	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<0.1	0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.5	<0.1	0.2	0.1	0.3
Total +ve PAH's	mg/kg	6.6	<0.05	1.8	1.2	3.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	<0.5	<0.5	<0.5	0.5
Surrogate p-Terphenyl-d14	%	89	88	88	87	82

PAHs in Soil						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.2	0.2	0.5
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	0.3	<0.1	1.0
Pyrene	mg/kg	<0.1	<0.1	0.3	<0.1	1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Chrysene	mg/kg	<0.1	<0.1	0.1	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	0.2	<0.2	0.6
Benzo(a)pyrene	mg/kg	<0.05	<0.05	0.1	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	0.1	<0.1	0.4
Total +ve PAH's	mg/kg	<0.05	<0.05	1.4	0.2	4.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Surrogate p-Terphenyl-d14	%	88	84	86	85	88

PAHs in Soil						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	0.2	0.3
Pyrene	mg/kg	0.2	<0.1	<0.1	0.2	0.3
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2	<0.2	<0.2	0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	<0.05	0.07	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
Total +ve PAH's	mg/kg	1.1	<0.05	<0.05	0.4	1.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	84	86	89	88	84

PAHs in Soil						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.4	<0.1	0.1	<0.1	<0.1
Pyrene	mg/kg	0.3	<0.1	0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.4	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.2	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	1.9	<0.05	0.2	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	87	87	86	89	87

PAHs in Soil						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	<0.1	<0.1	0.2
Pyrene	mg/kg	<0.1	0.4	<0.1	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.3	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.2	<0.05	<0.05	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	<0.05	1.9	<0.05	<0.05	0.51
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	86	89	88	88	88

PAHs in Soil					
Our Reference		191743-26	191743-27	191743-29	191743-33
Your Reference	UNITS	WC16	WC17	BD1/20180514	WC17 - [TRIPLICATE]
Depth		0.5-0.6	0.1-0.2	-	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.9	<0.1	0.8
Anthracene	mg/kg	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	2.2	<0.1	1.9
Pyrene	mg/kg	<0.1	2.2	<0.1	1.9
Benzo(a)anthracene	mg/kg	<0.1	0.8	<0.1	0.6
Chrysene	mg/kg	<0.1	0.7	<0.1	0.7
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2	<0.2	1
Benzo(a)pyrene	mg/kg	<0.05	0.97	<0.05	0.86
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.6	<0.1	0.5
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.8	<0.1	0.8
Total +ve PAH's	mg/kg	<0.05	11	<0.05	9.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	1.3	<0.5	1.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	1.3	<0.5	1.2
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	1.4	<0.5	1.2
Surrogate p-Terphenyl-d14	%	91	97	84	90

Acid Extractable metals in soil						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	<4	26	8	6
Cadmium	mg/kg	<0.4	<0.4	0.9	<0.4	0.9
Chromium	mg/kg	11	9	20	17	23
Copper	mg/kg	18	11	61	56	98
Lead	mg/kg	130	13	170	390	1,100
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	0.5
Nickel	mg/kg	7	4	41	18	15
Zinc	mg/kg	83	20	150	160	560

Acid Extractable metals in soil						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	5	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	7	11	73	39
Copper	mg/kg	22	8	13	37	31
Lead	mg/kg	250	18	400	16	280
Mercury	mg/kg	0.2	<0.1	3.3	<0.1	0.4
Nickel	mg/kg	6	9	6	78	35
Zinc	mg/kg	230	51	200	54	170

Acid Extractable metals in soil						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	16	4	6	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	59	16	8	14	15
Copper	mg/kg	34	29	17	38	20
Lead	mg/kg	48	39	35	88	110
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	0.2
Nickel	mg/kg	75	13	22	42	10
Zinc	mg/kg	120	99	82	280	140

Acid Extractable metals in soil						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	7	5	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	17	7	12	30	15
Copper	mg/kg	46	8	43	16	12
Lead	mg/kg	60	37	270	170	52
Mercury	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	73	8	7	24	14
Zinc	mg/kg	150	51	170	64	45

Acid Extractable metals in soil						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	<4	<4	4	8
Cadmium	mg/kg	0.4	<0.4	<0.4	2	1
Chromium	mg/kg	15	11	5	7	24
Copper	mg/kg	16	20	5	12	37
Lead	mg/kg	260	160	19	110	190
Mercury	mg/kg	<0.1	0.2	<0.1	<0.1	0.4
Nickel	mg/kg	12	7	6	8	34
Zinc	mg/kg	120	400	39	160	290

Acid Extractable metals in soil					
Our Reference		191743-26	191743-27	191743-29	191743-32
Your Reference	UNITS	WC16	WC17	BD1/20180514	WC6 - [TRIPLICATE]
Depth		0.5-0.6	0.1-0.2	-	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	84	<4	10
Cadmium	mg/kg	<0.4	1	<0.4	<0.4
Chromium	mg/kg	11	38	10	58
Copper	mg/kg	9	64	6	29
Lead	mg/kg	60	370	12	26
Mercury	mg/kg	<0.1	2.1	<0.1	<0.1
Nickel	mg/kg	8	31	4	71
Zinc	mg/kg	67	310	18	56

Misc Inorg - Soil						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	7.4	8.0	7.8	7.8	7.9
Electrical Conductivity 1:5 soil:water	µS/cm	87	36	130	54	57

Misc Inorg - Soil						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	8.0	7.3	7.7	8.6	8.4
Electrical Conductivity 1:5 soil:water	µS/cm	38	57	74	100	92

Misc Inorg - Soil						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	8.6	8.8	8.6	8.3	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	69	99	130	78	130

Misc Inorg - Soil						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	7.4	7.9	7.8	8.7	8.8
Electrical Conductivity 1:5 soil:water	µS/cm	90	41	40	86	240

Misc Inorg - Soil						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	8.8	8.3	8.0	8.1	8.2
Electrical Conductivity 1:5 soil:water	µS/cm	260	61	46	74	68

Misc Inorg - Soil			
Our Reference		191743-26	191743-27
Your Reference	UNITS	WC16	WC17
Depth		0.5-0.6	0.1-0.2
Date Sampled		14/05/2018	14/05/2018
Type of sample		Soil	Soil
Date prepared	-	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	6.7	7.7
Electrical Conductivity 1:5 soil:water	µS/cm	37	61

Moisture						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	5.3	4.0	6.6	6.1	12

Moisture						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	8.5	7.6	9.4	6.8	6.8

Moisture						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	5.4	4.3	2.9	3.7	8.1

Moisture						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	4.0	2.4	4.1	3.6	3.2

Moisture						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	7.2	8.0	4.0	5.1	2.9

Moisture				
Our Reference		191743-26	191743-27	191743-29
Your Reference	UNITS	WC16	WC17	BD1/20180514
Depth		0.5-0.6	0.1-0.2	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018
Moisture	%	3.8	4.5	4.6

RTA276 ENM* Foreign Material						
Our Reference		191743-1	191743-2	191743-3	191743-4	191743-5
Your Reference	UNITS	WC1	WC1	WC2	WC2	WC3
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Sample Mass Tested	g	7,100	7,700	5,900	7,100	6,000
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material						
Our Reference		191743-6	191743-7	191743-8	191743-9	191743-10
Your Reference	UNITS	WC3	WC4	WC4	WC5	WC5
Depth		0.3-0.4	0.1-0.2	0.4-0.5	0.1-0.2	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Sample Mass Tested	g	8,100	7,000	6,600	7,400	6,000
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material						
Our Reference		191743-11	191743-12	191743-13	191743-14	191743-15
Your Reference	UNITS	WC6	WC7	WC8	WC8	WC9
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.3-0.4	0.3-0.4
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Sample Mass Tested	g	7,700	8,700	6,900	6,000	6,900
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material						
Our Reference		191743-16	191743-17	191743-18	191743-19	191743-20
Your Reference	UNITS	WC10	WC11	WC11	WC12	WC13
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Sample Mass Tested	g	7,100	8,400	6,400	7,800	7,700
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material						
Our Reference		191743-21	191743-22	191743-23	191743-24	191743-25
Your Reference	UNITS	WC13	WC14	WC15	WC15	WC16
Depth		0.3-0.4	0.4-0.5	0.1-0.2	0.3-0.4	0.4-0.5
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Sample Mass Tested	g	6,700	5,600	8,800	8,800	7,300
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material			
Our Reference		191743-26	191743-27
Your Reference	UNITS	WC16	WC17
Depth		0.5-0.6	0.1-0.2
Date Sampled		14/05/2018	14/05/2018
Type of sample		Soil	Soil
Date prepared	-	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018
Sample Mass Tested	g	7,000	6,400
Foreign Material	%	<0.05	<0.05

Asbestos ID - soils NEPM		
Our Reference		191743-28
Your Reference	UNITS	WC18
Depth		0-0.1
Date Sampled		14/05/2018
Type of sample		Soil
Date analysed	-	18/05/2018
Sample mass tested	g	1,429.86
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected
Total Asbestos#1	g/kg	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected
ACM >7mm Estimation*	g	–
FA and AF Estimation*	g	–
FA and AF Estimation*#2	%(w/w)	<0.001

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-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-080 ENM	This method is based on RTA T276 and as per NSW DECC Resource Recovery Exemption Guidelines and correspondence. It includes rubber, plastic, bitumen, paper, cloth, paint and wood (Note wood is construction timber only, naturally occuring wood/twigs/roots are excluded). RTA T276 requires at least 6kg of sample for this test.
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.

Method ID	Methodology Summary
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).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. ‘EQ PQL’values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. ‘EQ zero’values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. ‘EQ half PQL’values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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.
RTA276	RTA 276 - Modified to Environmental Operations (Waste) - 2005 General Exemption under Part 6, Clause 51A.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	191743-2
Date extracted	-			17/05/2018	1	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			21/05/2018	1	21/05/2018	21/05/2018		21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	106	97
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	106	97
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	104	95
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	105	96
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	103	95
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	108	100
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	113	105
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	86	1	81	74	9	87	83

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	191743-22
Date extracted	-			[NT]	11	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			[NT]	11	21/05/2018	21/05/2018		21/05/2018	21/05/2018
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	11	<25	<25	0	108	91
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	11	<25	<25	0	108	91
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	106	88
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	108	90
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	105	89
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	110	93
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	114	95
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	76	86	12	90	76

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]	21	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	21	21/05/2018	21/05/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	21	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	21	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	21	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	21	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	21	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	21	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	21	83	84	1	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	191743-2
Date extracted	-			21/05/2018	1	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			22/05/2018	1	20/05/2018	20/05/2018		20/05/2018	20/05/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	109	108
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	91	92
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	84
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	109	108
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	91	92
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	84
Surrogate o-Terphenyl	%		Org-003	108	1	100	97	3	108	98

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	191743-22
Date extracted	-			[NT]	11	17/05/2018	17/05/2018		17/07/2018	17/05/2018
Date analysed	-			[NT]	11	20/05/2018	20/05/2018		21/05/2018	21/05/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	107	104
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	91	90
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	92	75
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	107	104
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	91	90
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	92	75
Surrogate o-Terphenyl	%		Org-003	[NT]	11	98	97	1	104	93

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	21	21/05/2018	21/05/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	21	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH $>C_{10}$ -C_{16}	mg/kg	50	Org-003	[NT]	21	<50	<50	0	[NT]	[NT]
TRH $>C_{16}$ -C_{34}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
TRH $>C_{34}$ -C_{40}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	21	96	96	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	191743-2
Date extracted	-			17/05/2018	1	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			18/05/2018	1	18/05/2018	18/05/2018		18/05/2018	18/05/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	90	91
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	87	87
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.8	0.8	0	94	96
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	1.4	1.6	13	91	90
Pyrene	mg/kg	0.1	Org-012	<0.1	1	1.3	1.5	14	87	86
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.4	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.5	22	90	91
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.9	0.9	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.53	0.56	6	93	91
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.4	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.5	0.6	18	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	87	1	89	92	3	108	106

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	191743-22
Date extracted	-			[NT]	11	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			[NT]	11	21/05/2018	21/05/2018		18/05/2018	21/05/2018
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	92	96
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	88	92
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	98	99
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.1	67	91	94
Pyrene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.1	67	88	91
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	0.2	<0.1	67	91	95
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	0.1	0.06	50	95	95
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	84	88	5	[NT]	114

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	21	21/05/2018	21/05/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	21	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	21	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	21	86	87	1	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	27	21/05/2018	21/05/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	27	<0.1	0.2	67	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	27	<0.1	0.2	67	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	27	<0.1	0.2	67	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	27	<0.1	0.3	100	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	27	0.9	5.6	145	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	27	0.1	0.7	150	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	27	2.2	7.6	110	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	27	2.2	7.3	107	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	27	0.8	2.2	93	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	27	0.7	2.2	103	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	27	2	4.4	75	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	27	0.97	3.0	102	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	27	0.6	1.8	100	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	27	<0.1	0.3	100	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	27	0.8	2.6	106	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	27	97	91	6	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	191743-2
Date prepared	-			17/05/2018	1	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			17/05/2018	1	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Arsenic	mg/kg	4	Metals-020	<4	1	<4	4	0	98	95
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	94	101
Chromium	mg/kg	1	Metals-020	<1	1	11	12	9	98	101
Copper	mg/kg	1	Metals-020	<1	1	18	18	0	99	101
Lead	mg/kg	1	Metals-020	<1	1	130	190	38	96	98
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	116	116
Nickel	mg/kg	1	Metals-020	<1	1	7	7	0	98	104
Zinc	mg/kg	1	Metals-020	<1	1	83	82	1	95	89

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	191743-22
Date prepared	-			[NT]	11	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Date analysed	-			[NT]	11	17/05/2018	17/05/2018		17/05/2018	17/05/2018
Arsenic	mg/kg	4	Metals-020	[NT]	11	16	15	6	114	94
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	106	95
Chromium	mg/kg	1	Metals-020	[NT]	11	59	73	21	113	100
Copper	mg/kg	1	Metals-020	[NT]	11	34	35	3	114	121
Lead	mg/kg	1	Metals-020	[NT]	11	48	28	53	110	#
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	<0.1	0	110	124
Nickel	mg/kg	1	Metals-020	[NT]	11	75	80	6	111	99
Zinc	mg/kg	1	Metals-020	[NT]	11	120	62	64	107	##

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	21	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	21	17/05/2018	17/05/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	21	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	21	0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	21	15	11	31	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	21	16	12	29	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	21	260	190	31	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	21	12	8	40	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	21	120	110	9	[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]	27	17/05/2018	17/05/2018		[NT]	[NT]
Date analysed	-			[NT]	27	17/05/2018	17/05/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	27	84	87	4	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	27	1	1	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	27	38	26	38	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	27	64	87	30	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	27	370	430	15	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	27	2.1	3.1	38	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	27	31	24	25	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	27	310	230	30	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-5	[NT]
Date prepared	-			18/05/2018	1	18/05/2018	18/05/2018		18/05/2018	[NT]
Date analysed	-			18/05/2018	1	18/05/2018	18/05/2018		18/05/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	7.4	7.9	7	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	87	89	2	95	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date prepared	-			[NT]	11	18/05/2018	18/05/2018		18/05/2018	[NT]
Date analysed	-			[NT]	11	18/05/2018	18/05/2018		18/05/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	11	8.6	8.6	0	103	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	11	69	65	6	97	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	22	18/05/2018	18/05/2018		[NT]	[NT]
Date analysed	-			[NT]	22	18/05/2018	18/05/2018		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	22	8.3	8.1	2	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	22	61	54	12	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

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.

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

Acid Extractable metals in soil - ## 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.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 191743-11 for Pb, Zn. Therefore a triplicate result has been issued as laboratory sample number 191743-32.

PAHs in Soil - The laboratory RPD acceptance criteria has been exceeded for 191743-27. Therefore a triplicate result has been issued as laboratory sample number 191743-33.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.05
Suburb: Penrith
To: Lab name
Project Name: Proposed Mixed Use Development
Order Number
Project Manager: Paul Gormon
Sampler: NW
Attn:
Emails: Paul.Gorman@douglaspartners.com.au; Nicola.warton@douglaspartners.com.au
Phone:
Date Required: Standard ☐
Email:
Prior Storage: ☐ Fridge / shelf
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes ENM Suite	Combo 3								Notes/preservation
WC1/ 0.1-0.2	1	14/05/18	S	G/P	X									
WC1/0.3-0.4	2	14/05/18	S	G/P	X									
WC2/ 0.1-0.2	3	14/05/18	S	G/P	X									
WC2/0.3-0.4	4	14/05/18	S	G/P	X									
WC3/ 0.1-0.2	5	14/05/18	S	G/P	X									
WC3/0.3-0.4	6	14/05/18	S	G/P	X									
WC4/ 0.1-0.2	7	14/05/18	S	G/P	X									
WC4/0.4-0.5	8	14/05/18	S	G/P	X									
WC5/ 0.1-0.2	9	14/05/18	S	G/P	X									
WC5/0.3-0.4	10	14/05/18	S	G/P	X									
WC6/0.1-0.2	11	14/05/18	S	G/P	X									
WC7/0.1-0.2	12	14/05/18	S	G/P	X									
WC8/ 0.1-0.2	13	14/05/18	S	G/P	X									
WC8/0.3-0.4	14	14/05/18	S	G/P	X									
WC9/0.3-0.4	15	14/05/18	S	G/P	X									
PQL (S) mg/kg														

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 191743
Date Received: 16.05.18
Time Received: 09:30
Received by: JE
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

ANZECC PQLs req'd for all water analytes ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Metals to Analyse: 8HM unless specified here:
Lab Report/Reference No: 191743
Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NW
Received by: ELS JE
Date & Time: 16.05.18 09:30

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.05
Suburb: Penrith
To: Lab name
Project Name: Proposed Mixed Use Development
Order Number
Project Manager: Paul Gormon
Sampler: NW
Attn:
Emails: Paul.Gorman@douglaspartners.com.au; Nicola.warton@douglaspartners.com.au
Phone:
Date Required: Standard ☐
Email:
Prior Storage: ☐ Fridge / shelf
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Sampling Date	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes ENM Suite	Combo 3	BTEX	TRH	Asbestos (500ml)					Notes/preservation
WC10/ 0.1-0.2	16	14/05/18	S	G/P	X									
WC11/ 0.1-0.2	17	14/05/18	S	G/P	X									
WC11/0.4-0.5	18	14/05/18	S	G/P	X									
WC12/ 0.1-0.2	19	14/05/18	S	G/P	X									
WC13/ 0.1-0.2	20	14/05/18	S	G/P	X									
WC13/0.3-0.4	21	14/05/18	S	G/P	X									
WC14/0.4-0.5	22	14/05/18	S	G/P	X									
WC15/ 0.1-0.2	23	14/05/18	S	G/P	X									
WC15/0.3-0.4	24	14/05/18	S	G/P	X									
WC16/ 0.4-0.5	25	14/05/18	S	G/P	X									
WC16/0.5-0.6	26	14/05/18	S	G/P	X									
WC17/0.1-0.2	27	14/05/18	S	G/P	X									
WC18/0-0.1	28	14/5/18	S	P					X					
BD2/20180514	-	14/05/18	S	G		X								Inter lab
BD1/20180514	29	14/05/18	S	G		X								Intra lab
PQL (S) mg/kg												ANZECC PQLs req'd for all water analytes ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Lab Report/Reference No: 191743
Metals to Analyse: 8HM unless specified here:
Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NW
Received by: ELJ JE
Date & Time: 16/5/18 09:30

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85867.05	**Suburb:**	Penrith	**To:**	Lab name
Project Name:	Proposed Mixed Use Development	**Order Number**			
Project Manager:	Paul Gormon	**Sampler:**	NW	**Attn:**	
Emails:	Paul.Gorman@douglaspartners.com.au; Nicola.warton@douglaspartners.com.au			**Phone:**	
Date Required:	Standard ☐			**Email:**	

Prior Storage: ☐ Fridge / shelf Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	ENM Suite	Combo 3	BTEX	TRH	Asbestos (500ml)					
Trip Spike	30		S				X	X						
Trip Blank	31		S				X	X						
SP1	32		S	G/P	X									
SP2	33		S		X									
SP3	34		S		X									
SP4	35		S		X									
PQL (S) mg/kg												**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Lab Report/Reference No: 191743

Metals to Analyse: 8HM unless specified here:

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: NW **Received by:** ELS JE **Date & Time:** 16/5/18 09:30

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 191743-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.05, Proposed Mixed Use Develpoment**
Number of Samples	4 soils
Date samples received	16/05/2018
Date completed instructions received	16/05/2018

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	29/05/2018
Date of Issue	29/05/2018

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Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	28/05/2018	28/05/2018	28/05/2018	28/05/2018
Date analysed	-	29/05/2018	29/05/2018	29/05/2018	29/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	121	129	98	118

Client Reference: 85867.05, Proposed Mixed Use Develpoment

svTRH (C10-C40) in Soil					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	28/05/2018	28/05/2018	28/05/2018	28/05/2018
Date analysed	-	29/05/2018	29/05/2018	29/05/2018	29/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
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	110	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	110	<50	<50	<50
Surrogate o-Terphenyl	%	103	105	103	102

PAHs in Soil					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	28/05/2018	28/05/2018	28/05/2018	28/05/2018
Date analysed	-	28/05/2018	28/05/2018	28/05/2018	28/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.3	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	0.1	<0.1
Pyrene	mg/kg	<0.1	0.4	0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.3	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.2	0.06	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.3	1.9	0.3	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	107	105	104	106

Acid Extractable metals in soil					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	33	13	20	13
Copper	mg/kg	46	28	34	56
Lead	mg/kg	14	19	76	35
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	52	24	22	45
Zinc	mg/kg	58	31	74	60

Misc Inorg - Soil					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018
pH 1:5 soil:water	pH Units	8.4	8.1	8.2	8.3
Electrical Conductivity 1:5 soil:water	µS/cm	130	130	210	330

Moisture					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	17/05/2018	17/05/2018	17/05/2018	17/05/2018
Date analysed	-	18/05/2018	18/05/2018	18/05/2018	18/05/2018
Moisture	%	5.2	4.7	7.6	5.4

Client Reference: 85867.05, Proposed Mixed Use Develpoment

RTA276 ENM* Foreign Material					
Our Reference		191743-A-32	191743-A-33	191743-A-34	191743-A-35
Your Reference	UNITS	SP1	SP2	SP3	SP4
Depth		-	-	-	-
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Sample Mass Tested	g	7,800	6,500	8,300	8,200
Foreign Material	%	<0.05	<0.05	<0.05	<0.05

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-080 ENM	This method is based on RTA T276 and as per NSW DECC Resource Recovery Exemption Guidelines and correspondence. It includes rubber, plastic, bitumen, paper, cloth, paint and wood (Note wood is construction timber only, naturally occuring wood/twigs/roots are excluded). RTA T276 requires at least 6kg of sample for this test.
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).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.

Method ID	Methodology Summary
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.
RTA276	RTA 276 - Modified to Environmental Operations (Waste) - 2005 General Exemption under Part 6, Clause 51A.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			28/05/2018	[NT]	[NT]	[NT]	[NT]	28/05/2018	[NT]
Date analysed	-			29/05/2018	[NT]	[NT]	[NT]	[NT]	29/05/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	112	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	113	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	116	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	120	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	128	[NT]	[NT]	[NT]	[NT]	121	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date extracted	-			28/05/2018	[NT]	[NT]	[NT]	[NT]	28/05/2018	[NT]
Date analysed	-			29/05/2018	[NT]	[NT]	[NT]	[NT]	29/05/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	112	[NT]	[NT]	[NT]	[NT]	116	[NT]

Client Reference: 85867.05, Proposed Mixed Use Develpoment

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			28/05/2018	[NT]	[NT]	[NT]	[NT]	28/05/2018	[NT]
Date analysed	-			28/05/2018	[NT]	[NT]	[NT]	[NT]	28/05/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	107	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	107	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			17/05/2018	32	17/05/2018	17/05/2018		17/05/2018	[NT]
Date analysed	-			17/05/2018	32	17/05/2018	17/05/2018		17/05/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	32	<4	<4	0	114	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	32	<0.4	<0.4	0	106	[NT]
Chromium	mg/kg	1	Metals-020	<1	32	33	51	43	113	[NT]
Copper	mg/kg	1	Metals-020	<1	32	46	28	49	117	[NT]
Lead	mg/kg	1	Metals-020	<1	32	14	9	43	110	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	32	<0.1	<0.1	0	116	[NT]
Nickel	mg/kg	1	Metals-020	<1	32	52	63	19	111	[NT]
Zinc	mg/kg	1	Metals-020	<1	32	58	47	21	107	[NT]

Client Reference: 85867.05, Proposed Mixed Use Develpoment

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			18/05/2018	35	18/05/2018	18/05/2018		18/05/2018	[NT]
Date analysed	-			18/05/2018	35	18/05/2018	18/05/2018		18/05/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	35	8.3	8.4	1	103	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	35	330	330	0	97	[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.	

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.05
Suburb: Penrith
To: Lab name
Project Name: Proposed Mixed Use Development
Order Number
Project Manager: Paul Gormon
Sampler: NW
Attn:
Emails: Paul.Gorman@douglaspartners.com.au; Nicola.warton@douglaspartners.com.au
Phone:
Date Required: Standard ☐
Email:
Prior Storage: ☐ Fridge / shelf
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	ENM Suite	Combo 3								
SP1			S	G/P	X									191743 A
SP2			S	G/P	X									
SP3			S	G/P	X									
SP4			S	G/P	X									
														17/5/18
PQL (S) mg/kg										ANZECC PQLs req'd for all water analytes ☐				

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Lab Report/Reference No:
##
Total number of samples in container:
Relinquished by: NW
Transported to laboratory by: Courier
Send Results to: Douglas Partners
Address West Ryde
Phone:
Fax:
Signed: NW
Received by:
Date & Time:

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 191743-B

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.05, Proposed Mixed Use Develpoment**
Number of Samples	Additional Testing on 5 Soils
Date samples received	16/05/2018
Date completed instructions received	23/05/2018

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	28/05/2018
Date of Issue	28/05/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu
Results Approved By
Ken Nguyen, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

ACCREDITED FOR TECHNICAL COMPETENCE

Metals in TCLP USEPA1311						
Our Reference	UNITS	191743-B-5	191743-B-8	191743-B-11	191743-B-16	191743-B-27
Your Reference		WC3	WC4	WC6	WC10	WC17
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		14/05/2018	14/05/2018	14/05/2018	14/05/2018	14/05/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2018	25/05/2018	25/05/2018	25/05/2018	25/05/2018
Date analysed	-	25/05/2018	25/05/2018	25/05/2018	25/05/2018	25/05/2018
pH of soil for fluid# determ.	pH units	8.6	7.0	7.1	6.9	7.1
pH of soil TCLP (after HCl)	pH units	1.6	1.6	1.6	1.6	1.6
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.4	5.0	5.5	5.1	5.4
Lead in TCLP	mg/L	0.04	<0.03	[NA]	[NA]	<0.03
Nickel in TCLP	mg/L	[NA]	[NA]	0.02	<0.02	[NA]

PAHs in TCLP (USEPA 1311)		
Our Reference		191743-B-27
Your Reference	UNITS	WC17
Depth		0.1-0.2
Date Sampled		14/05/2018
Type of sample		Soil
Date extracted	-	27/05/2018
Date analysed	-	27/05/2018
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	73

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.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

Client Reference: 85867.05, Proposed Mixed Use Develpoment

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/05/2018	5	25/05/2018	25/05/2018		25/05/2018	[NT]
Date analysed	-			25/05/2018	5	25/05/2018	25/05/2018		25/05/2018	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	5	0.04	0.03	29	101	[NT]
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			27/05/2018	[NT]	[NT]	[NT]	[NT]	27/05/2018	[NT]
Date analysed	-			27/05/2018	[NT]	[NT]	[NT]	[NT]	27/05/2018	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	78	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	87	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	86	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	87	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	84	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	96	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	100	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	119	[NT]	[NT]	[NT]	[NT]	108	[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

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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.

Laboratory Acceptance Criteria

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

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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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.

Report Comments

PAHs in TCLP (USEPA 1311) - Analysed outside of recommended holding time.

Aileen Hie

From: Ken Nguyen
Sent: Wednesday, 23 May 2018 3:30 PM
To: Aileen Hie
Subject: FW: Results for Registration 191743 85867.05, Proposed Mixed Use Develpoment

Regards,

Ken Nguyen | Chemist | Envirolab Services Pty Ltd
(Monday to Friday 1pm to 9pm)

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201
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Please note that all samples submitted to the Envirolab Group laboratories will be analysed under the Envirolab Group Terms and Conditions. The Terms and Conditions are accessible by clicking this link

---

From: Paul Gorman [mailto:Paul.Gorman@douglaspartners.com.au]
Sent: Wednesday, 23 May 2018 3:10 PM
To: Ken Nguyen <KNguyen@envirolab.com.au>; Nicola Warton <Nicola.Warton@douglaspartners.com.au>
Subject: RE: Results for Registration 191743 85867.05, Proposed Mixed Use Develpoment

Thanks Ken,

Can we please schedule the following TCLP testing on a 3 day turnaround:

5	WC3/0.1-0.2	lead
8	WC4/0.4-0.5	lead
11	WC6/0.1-0.2	nickel
16	WC10/0.1-0.2	nickel
21	WC17/0.1-0.2	lead, PAH

Envirolab Ref: 191743 B
Due: 28/5/18
3day T/A.

Thanks

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 192022

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.05, Penrith**
Number of Samples	38 soil, 1 Material
Date samples received	18/05/2018
Date completed instructions received	18/05/2018

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	25/05/2018
Date of Issue	25/05/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Jeremy Faircloth, Organics Supervisor
Lucy Zhu, Asbsestos Analyst
Nick Sarlamis, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192022-15	192022-16	192022-17	192022-18	192022-19
Your Reference	UNITS	BH102S2	BH102S2	BH102S5	BH102N2	BH102N2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	118	109	113	113	113

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192022-20	192022-21	192022-22	192022-23	192022-24
Your Reference	UNITS	BH102N5	BH102W2	BH102W2	BH102E2	BH102E2
Depth		0.1-0.2	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	113	109	115	114	114

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192022-25	192022-26	192022-27	192022-28	192022-29
Your Reference	UNITS	BH102E5	BH103W5	BH103W2	BH103N2	BH103E2
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	112	109	109	113

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		192022-30	192022-31	192022-32	192022-33	192022-34
Your Reference	UNITS	BH103E5	BH103S2	BH103S5	WC19	WC19
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	115	114	115	119	114

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		192022-35	192022-36	192022-37	192022-38
Your Reference	UNITS	WC20	WC20	TRIP SPIKE	TRIP BLANK
Depth		0.1-0.2	0.4-0.5	-	-
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	<25	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	99%	<0.2
Toluene	mg/kg	<0.5	<0.5	98%	<0.5
Ethylbenzene	mg/kg	<1	<1	99%	<1
m+p-xylene	mg/kg	<2	<2	99%	<2
o-Xylene	mg/kg	<1	<1	99%	<1
naphthalene	mg/kg	<1	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<1	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	116	115	110	111

svTRH (C10-C40) in Soil						
Our Reference		192022-15	192022-16	192022-17	192022-18	192022-19
Your Reference	UNITS	BH102S2	BH102S2	BH102S5	BH102N2	BH102N2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	120	<100	<100	120	<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	160	<100	<100	100	<100
TRH >C_{34} -C_{40}	mg/kg	130	<100	<100	130	<100
Total +ve TRH (>C10-C40)	mg/kg	290	<50	<50	240	<50
Surrogate o-Terphenyl	%	115	109	113	121	101

svTRH (C10-C40) in Soil						
Our Reference		192022-20	192022-21	192022-22	192022-23	192022-24
Your Reference	UNITS	BH102N5	BH102W2	BH102W2	BH102E2	BH102E2
Depth		0.1-0.2	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	200	<100	<100	120	<100
TRH C_{29} - C_{36}	mg/kg	180	<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	310	<100	<100	210	<100
TRH >C_{34} -C_{40}	mg/kg	110	<100	<100	150	<100
Total +ve TRH (>C10-C40)	mg/kg	420	<50	<50	360	<50
Surrogate o-Terphenyl	%	118	104	112	115	110

svTRH (C10-C40) in Soil						
Our Reference	UNITS	192022-25	192022-26	192022-27	192022-28	192022-29
Your Reference		BH102E5	BH103W5	BH103W2	BH103N2	BH103E2
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	470	850	1,600	1,300
TRH C_{29} - C_{36}	mg/kg	<100	970	1,100	2,000	1,600
TRH >C_{10} -C_{16}	mg/kg	<50	<50	52	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	52	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	1,100	1,600	3,000	2,300
TRH >C_{34} -C_{40}	mg/kg	<100	790	760	980	960
Total +ve TRH (>C10-C40)	mg/kg	<50	1,900	2,400	4,000	3,300
Surrogate o-Terphenyl	%	110	120	129	#	#

svTRH (C10-C40) in Soil						
Our Reference	UNITS	192022-30	192022-31	192022-32	192022-33	192022-34
Your Reference		BH103E5	BH103S2	BH103S5	WC19	WC19
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	600	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	890	<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	<100	1,300	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	490	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	1,800	<50	<50	<50
Surrogate o-Terphenyl	%	96	121	90	106	109

svTRH (C10-C40) in Soil			
Our Reference		192022-35	192022-36
Your Reference	UNITS	WC20	WC20
Depth		0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018
Type of sample		soil	soil
Date extracted	-	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	107	108

PAHs in Soil						
Our Reference		192022-1	192022-2	192022-3	192022-4	192022-5
Your Reference	UNITS	BH10S2	BH10S2	BD2/20180515	BH10S5	BH10S5
Depth		0.1-0.2	0.4-0.5	-	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.4	0.2	0.1	0.1	0.6
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Fluoranthene	mg/kg	1.0	0.3	0.2	<0.1	0.9
Pyrene	mg/kg	0.9	0.3	0.2	<0.1	0.8
Benzo(a)anthracene	mg/kg	0.5	<0.1	<0.1	<0.1	0.4
Chrysene	mg/kg	0.5	0.1	<0.1	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	1	0.2	<0.2	<0.2	0.8
Benzo(a)pyrene	mg/kg	0.59	0.2	0.07	<0.05	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	0.1	<0.1	<0.1	0.3
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.6	0.2	<0.1	<0.1	0.4
Total +ve PAH's	mg/kg	6.2	1.6	0.55	0.3	5.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.9	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.9	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.9	<0.5	<0.5	<0.5	0.7
Surrogate p-Terphenyl-d14	%	90	85	87	89	88

PAHs in Soil						
Our Reference		192022-6	192022-7	192022-8	192022-9	192022-10
Your Reference	UNITS	BH10N2	BH10N2	BH10N5	BH10E5	BH10W2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	1.1	<0.1	0.2	<0.1	0.4
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.5	0.2	0.2	<0.1	1
Pyrene	mg/kg	1.4	0.2	0.2	<0.1	0.9
Benzo(a)anthracene	mg/kg	0.5	<0.1	0.1	<0.1	0.5
Chrysene	mg/kg	0.6	<0.1	0.2	<0.1	0.5
Benzo(b,j+k)fluoranthene	mg/kg	1	<0.2	0.3	<0.2	1
Benzo(a)pyrene	mg/kg	0.66	0.09	0.2	<0.05	0.65
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<0.1	0.1	<0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.6	<0.1	0.2	<0.1	0.6
Total +ve PAH's	mg/kg	8.1	0.4	1.8	<0.05	6.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.9	<0.5	<0.5	<0.5	0.9
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.9	<0.5	<0.5	<0.5	0.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1	<0.5	<0.5	<0.5	1
Surrogate p-Terphenyl-d14	%	89	86	89	88	89

PAHs in Soil						
Our Reference		192022-11	192022-12	192022-13	192022-14	192022-15
Your Reference	UNITS	BH10W2	BH10W5	BH10E2	BH10E2	BH102S2
Depth		0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	0.3	<0.1	0.5
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.3	<0.1	<0.1	1
Pyrene	mg/kg	<0.1	0.3	<0.1	<0.1	1.6
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1	<0.1	0.8
Chrysene	mg/kg	<0.1	0.2	0.1	<0.1	0.9
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.4	<0.2	<0.2	1
Benzo(a)pyrene	mg/kg	<0.05	0.2	<0.05	<0.05	0.88
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.2	<0.1	<0.1	0.6
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	<0.1	0.3	<0.1	<0.1	1
Total +ve PAH's	mg/kg	<0.05	2.0	0.4	<0.05	8.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.3
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.3
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.3
Surrogate p-Terphenyl-d14	%	87	86	88	88	89

PAHs in Soil						
Our Reference		192022-16	192022-17	192022-18	192022-19	192022-20
Your Reference	UNITS	BH102S2	BH102S5	BH102N2	BH102N2	BH102N5
Depth		0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	0.1	0.3	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	0.1	0.1	0.7	<0.1
Pyrene	mg/kg	0.1	0.2	0.2	0.7	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Chrysene	mg/kg	<0.1	0.2	0.2	0.3	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.2	0.3	0.6	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.1	0.2	0.4	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	0.1	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	0.3	0.4	<0.1
Total +ve PAH's	mg/kg	0.2	1.1	1.4	3.8	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	0.6	<0.5
Surrogate p-Terphenyl-d14	%	83	89	92	86	86

PAHs in Soil						
Our Reference	UNITS	192022-21	192022-22	192022-23	192022-24	192022-25
Your Reference		BH102W2	BH102W2	BH102E2	BH102E2	BH102E5
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.2	<0.1	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.3	0.2	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	0.7	0.4	0.3	0.1
Pyrene	mg/kg	0.2	0.7	0.7	0.3	0.2
Benzo(a)anthracene	mg/kg	0.1	0.2	0.4	0.1	0.1
Chrysene	mg/kg	0.2	0.2	0.5	0.1	0.2
Benzo(b,j+k)fluoranthene	mg/kg	0.4	0.5	0.9	0.3	0.6
Benzo(a)pyrene	mg/kg	0.2	0.3	0.71	0.2	0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	0.2	0.5	0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.1	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	0.3	0.3	0.9	0.2	0.8
Total +ve PAH's	mg/kg	1.8	3.6	5.5	1.7	3.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	1.0	<0.5	0.7
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	1.0	<0.5	0.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.5	1.0	<0.5	0.7
Surrogate p-Terphenyl-d14	%	90	87	89	89	94

PAHs in Soil					
Our Reference		192022-33	192022-34	192022-35	192022-36
Your Reference	UNITS	WC19	WC19	WC20	WC20
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	<0.05	0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.2	<0.05	0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	100	89	90	90

PCBs in Soil						
Our Reference		192022-26	192022-27	192022-28	192022-29	192022-30
Your Reference	UNITS	BH103W5	BH103W2	BH103N2	BH103E2	BH103E5
Depth		0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	24/05/2018	24/05/2018	24/05/2018	24/05/2018	24/05/2018
Aroclor 1016	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.2	<0.1	<0.1	0.1	<0.1
Aroclor 1260	mg/kg	<0.2	0.1	1.4	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.2	0.1	1.4	0.1	<0.1
Surrogate TCLMX	%	114	109	97	104	100

PCBs in Soil			
Our Reference		192022-31	192022-32
Your Reference	UNITS	BH103S2	BH103S5
Depth		0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018
Type of sample		soil	soil
Date extracted	-	21/05/2018	21/05/2018
Date analysed	-	24/05/2018	24/05/2018
Aroclor 1016	mg/kg	<0.3	<0.1
Aroclor 1221	mg/kg	<0.3	<0.1
Aroclor 1232	mg/kg	<0.3	<0.1
Aroclor 1242	mg/kg	<0.3	<0.1
Aroclor 1248	mg/kg	<0.3	<0.1
Aroclor 1254	mg/kg	<0.3	<0.1
Aroclor 1260	mg/kg	<0.3	1.2
Total +ve PCBs (1016-1260)	mg/kg	<0.3	1.2
Surrogate TCLMX	%	103	99

Acid Extractable metals in soil						
Our Reference		192022-1	192022-2	192022-3	192022-4	192022-5
Your Reference	UNITS	BH10S2	BH10S2	BD2/20180515	BH10S5	BH10S5
Depth		0.1-0.2	0.4-0.5	-	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	50	12	10	40	31
Copper	mg/kg	32	11	5	28	23
Lead	mg/kg	66	48	15	80	85
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	51	7	6	42	28
Zinc	mg/kg	58	58	11	59	77

Acid Extractable metals in soil						
Our Reference		192022-6	192022-7	192022-8	192022-9	192022-10
Your Reference	UNITS	BH10N2	BH10N2	BH10N5	BH10E5	BH10W2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Arsenic	mg/kg	4	<4	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	52	14	62	15	41
Copper	mg/kg	27	22	29	21	20
Lead	mg/kg	79	820	31	190	22
Mercury	mg/kg	0.1	0.6	<0.1	<0.1	<0.1
Nickel	mg/kg	50	8	61	9	38
Zinc	mg/kg	64	440	52	120	39

Acid Extractable metals in soil						
Our Reference		192022-11	192022-12	192022-13	192022-14	192022-26
Your Reference	UNITS	BH10W2	BH10W5	BH10E2	BH10E2	BH103W5
Depth		0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Arsenic	mg/kg	<4	<4	<4	<4	[NA]
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	[NA]
Chromium	mg/kg	10	40	52	10	[NA]
Copper	mg/kg	5	24	28	17	[NA]
Lead	mg/kg	22	57	26	1,200	67
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	[NA]
Nickel	mg/kg	6	37	55	5	[NA]
Zinc	mg/kg	33	59	55	210	[NA]

Acid Extractable metals in soil						
Our Reference		192022-27	192022-28	192022-29	192022-30	192022-31
Your Reference	UNITS	BH103W2	BH103N2	BH103E2	BH103E5	BH103S2
Depth		0.1-0.2	0.2-0.3	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Lead	mg/kg	290	1,400	270	160	380

Acid Extractable metals in soil						
Our Reference		192022-32	192022-33	192022-34	192022-35	192022-36
Your Reference	UNITS	BH103S5	WC19	WC19	WC20	WC20
Depth		0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Arsenic	mg/kg	[NA]	7	<4	7	4
Cadmium	mg/kg	[NA]	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	[NA]	11	10	9	10
Copper	mg/kg	[NA]	13	7	13	13
Lead	mg/kg	290	120	16	72	340
Mercury	mg/kg	[NA]	0.2	<0.1	<0.1	0.3
Nickel	mg/kg	[NA]	8	5	8	6
Zinc	mg/kg	[NA]	75	18	56	29

Acid Extractable metals in soil			
Our Reference		192022-40	192022-41
Your Reference	UNITS	BH10S2 - [TRIPLICATE]	BH10W2 - [TRIPLICATE]
Depth		0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018
Type of sample		soil	soil
Date prepared	-	21/05/2018	21/05/2018
Date analysed	-	21/05/2018	21/05/2018
Arsenic	mg/kg	<4	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	57	10
Copper	mg/kg	29	6
Lead	mg/kg	50	38
Mercury	mg/kg	<0.1	0.1
Nickel	mg/kg	50	7
Zinc	mg/kg	53	50

Misc Inorg - Soil					
Our Reference		192022-33	192022-34	192022-35	192022-36
Your Reference	UNITS	WC19	WC19	WC20	WC20
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil
Date prepared	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018
Date analysed	-	23/05/2018	23/05/2018	23/05/2018	23/05/2018
pH 1:5 soil:water	pH Units	6.5	6.9	6.9	7.2
Electrical Conductivity 1:5 soil:water	µS/cm	100	40	170	130

Moisture						
Our Reference		192022-1	192022-2	192022-3	192022-4	192022-5
Your Reference	UNITS	BH10S2	BH10S2	BD2/20180515	BH10S5	BH10S5
Depth		0.1-0.2	0.4-0.5	-	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	7.0	3.9	9.8	5.8	8.4

Moisture						
Our Reference		192022-6	192022-7	192022-8	192022-9	192022-10
Your Reference	UNITS	BH10N2	BH10N2	BH10N5	BH10E5	BH10W2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	7.4	11	5.9	9.4	6.9

Moisture						
Our Reference		192022-11	192022-12	192022-13	192022-14	192022-15
Your Reference	UNITS	BH10W2	BH10W5	BH10E2	BH10E2	BH102S2
Depth		0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	10	5.2	7.6	9.6	4.6

Moisture						
Our Reference		192022-16	192022-17	192022-18	192022-19	192022-20
Your Reference	UNITS	BH102S2	BH102S5	BH102N2	BH102N2	BH102N5
Depth		0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	9.7	4.9	4.6	5.9	4.2

Moisture						
Our Reference		192022-21	192022-22	192022-23	192022-24	192022-25
Your Reference	UNITS	BH102W2	BH102W2	BH102E2	BH102E2	BH102E5
Depth		0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	7.7	6.6	4.4	6.0	3.2

Moisture						
Our Reference		192022-26	192022-27	192022-28	192022-29	192022-30
Your Reference	UNITS	BH103W5	BH103W2	BH103N2	BH103E2	BH103E5
Depth		0.1-0.2	0.1-0.2	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	2.6	8.2	11	4.8	3.0

Moisture						
Our Reference		192022-31	192022-32	192022-33	192022-34	192022-35
Your Reference	UNITS	BH103S2	BH103S5	WC19	WC19	WC20
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.4-0.5	0.1-0.2
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	21/05/2018	21/05/2018	21/05/2018	21/05/2018	21/05/2018
Date analysed	-	22/05/2018	22/05/2018	22/05/2018	22/05/2018	22/05/2018
Moisture	%	4.3	5.7	4.9	6.0	4.9

Moisture		
Our Reference		192022-36
Your Reference	UNITS	WC20
Depth		0.4-0.5
Date Sampled		16/05/2018
Type of sample		soil
Date prepared	-	21/05/2018
Date analysed	-	22/05/2018
Moisture	%	7.2

RTA276 ENM* Foreign Material					
Our Reference		192022-33	192022-34	192022-35	192022-36
Your Reference	UNITS	WC19	WC19	WC20	WC20
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil
Date prepared	-	24/05/2018	24/05/2018	24/05/2018	24/05/2018
Date analysed	-	24/05/2018	24/05/2018	24/05/2018	24/05/2018
Sample Mass Tested	g	6,000	6,200	6,600	5,100
Foreign Material	%	<0.05	<0.05	<0.05	<0.05

Asbestos ID - materials		
Our Reference		192022-39
Your Reference	UNITS	WC18-1
Depth		-
Date Sampled		16/05/2018
Type of sample		Material
Date analysed	-	21/05/2018
Mass / Dimension of Sample	-	45x42x5mm
Sample Description	-	Grey compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected

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.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-080 ENM	This method is based on RTA T276 and as per NSW DECC Resource Recovery Exemption Guidelines and correspondence. It includes rubber, plastic, bitumen, paper, cloth, paint and wood (Note wood is construction timber only, naturally occuring wood/twigs/roots are excluded). RTA T276 requires at least 6kg of sample for this test.
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).
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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.
RTA276	RTA 276 - Modified to Environmental Operations (Waste) - 2005 General Exemption under Part 6, Clause 51A.

Client Reference: 85867.05, Penrith

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	192022-22
Date extracted	-			21/05/2018	31	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Date analysed	-			23/05/2018	31	23/05/2018	23/05/2018		23/05/2018	23/05/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	31	<25	<25	0	114	113
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	31	<25	<25	0	114	113
Benzene	mg/kg	0.2	Org-016	<0.2	31	<0.2	<0.2	0	110	109
Toluene	mg/kg	0.5	Org-016	<0.5	31	<0.5	<0.5	0	115	114
Ethylbenzene	mg/kg	1	Org-016	<1	31	<1	<1	0	114	113
m+p-xylene	mg/kg	2	Org-016	<2	31	<2	<2	0	116	114
o-Xylene	mg/kg	1	Org-016	<1	31	<1	<1	0	120	119
naphthalene	mg/kg	1	Org-014	<1	31	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	113	31	114	113	1	115	112

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date extracted	-			[NT]	21	21/05/2018	21/05/2018		21/05/2018	[NT]
Date analysed	-			[NT]	21	23/05/2018	23/05/2018		23/05/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	21	<25	<25	0	101	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	21	<25	<25	0	101	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	21	<0.2	<0.2	0	110	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	21	<0.5	<0.5	0	105	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	89	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	21	<2	<2	0	101	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	21	<1	<1	0	94	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	21	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	21	109	109	0	117	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	192022-22
Date extracted	-			21/05/2018	31	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Date analysed	-			22/05/2018	31	22/05/2018	22/05/2018		22/05/2018	22/05/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	31	<50	<50	0	101	107
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	31	600	820	31	78	88
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	31	890	1100	21	108	118
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	31	<50	<50	0	101	107
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	31	1300	1800	32	78	88
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	31	490	720	38	108	118
Surrogate o-Terphenyl	%		Org-003	123	31	121	133	9	115	112

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date extracted	-			[NT]	21	21/05/2018	21/05/2018		21/05/2018	[NT]
Date analysed	-			[NT]	21	22/05/2018	22/05/2018		22/05/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	21	<50	<50	0	112	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	88	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	91	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	21	<50	<50	0	112	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	88	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	21	<100	<100	0	91	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	21	104	112	7	115	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	192022-2
Date extracted	-			21/05/2018	1	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Date analysed	-			23/05/2018	1	23/05/2018	23/05/2018		23/05/2018	23/05/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	93	92
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	95	91
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.2	67	95	97
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	1.0	0.5	67	92	93
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.9	0.5	57	87	89
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.5	0.3	50	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.5	0.3	50	92	93
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	1	0.7	35	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.59	0.4	38	93	92
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.3	29	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.6	0.4	40	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	97	1	90	88	2	111	88

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	192022-22
Date extracted	-			[NT]	11	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Date analysed	-			[NT]	11	23/05/2018	23/05/2018		23/05/2018	23/05/2018
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	94	92
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	94	94
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	96	108
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	89	122
Pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	85	117
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	92	100
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	<0.05	<0.05	0	100	111
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	87	87	0	108	113

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	21	21/05/2018	21/05/2018		[NT]	[NT]
Date analysed	-			[NT]	21	23/05/2018	23/05/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	21	<0.1	0.4	120	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	21	0.2	0.4	67	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	21	0.2	0.5	86	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	21	0.1	0.2	67	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	21	0.2	0.3	40	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	21	0.4	0.6	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	21	0.2	0.3	40	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	21	0.2	0.2	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	21	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	21	0.3	0.4	29	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	21	90	90	0	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date extracted	-			21/05/2018	31	21/05/2018	21/05/2018		21/05/2018	[NT]
Date analysed	-			24/05/2018	31	24/05/2018	24/05/2018		24/05/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	103	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	31	<0.3	<0.3	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	97	31	103	106	3	97	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	192022-2
Date prepared	-			21/05/2018	1	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Date analysed	-			21/05/2018	1	21/05/2018	21/05/2018		21/05/2018	21/05/2018
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	109	94
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	102	93
Chromium	mg/kg	1	Metals-020	<1	1	50	52	4	107	97
Copper	mg/kg	1	Metals-020	<1	1	32	25	25	112	112
Lead	mg/kg	1	Metals-020	<1	1	66	39	51	107	79
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	103	101
Nickel	mg/kg	1	Metals-020	<1	1	51	49	4	102	95
Zinc	mg/kg	1	Metals-020	<1	1	58	49	17	102	73

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date prepared	-			[NT]	11	21/05/2018	21/05/2018		21/05/2018	[NT]
Date analysed	-			[NT]	11	21/05/2018	21/05/2018		21/05/2018	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	110	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	102	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	10	10	0	106	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	5	5	0	114	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	22	38	53	107	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	0.1	0	129	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	6	6	0	102	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	33	43	26	101	[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]	31	21/05/2018	21/05/2018		[NT]	[NT]
Date analysed	-			[NT]	31	21/05/2018	21/05/2018		[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	31	380	260	38	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			23/05/2018	[NT]	[NT]	[NT]	[NT]	23/05/2018	[NT]
Date analysed	-			23/05/2018	[NT]	[NT]	[NT]	[NT]	23/05/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	103	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	97	[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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Report Comments

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 192022-1 for Pb. Therefore a triplicate result has been issued as laboratory sample number 192022-40.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 192022-11 for Pb. Therefore a triplicate result has been issued as laboratory sample number 192022-41.

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

PCBs in Soil (smaple 26,31,31d) - PQL has been raised due to interference from analytes(other than those being tested) in the sample/s.

svTRH (C10-C40) in Soil - # Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.05
Suburb: PENRITH
To: Envirolab
Project Name: Additional Contamination Investigation
Order Number
Project Manager: PG
Sampler: NW/JJH
Attn:
Emails: paul.gorman@douglaspartners.com.au; nicola.warton@douglaspartners.com.au
Phone:
Date Required: Standard ☐
Email:
Prior Storage: ☐ Fridge
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	Combo 1m	PCB	Heavy Metals	PAH	TRH and BTEX	ENM Suite				
BH10S2/0.1-0.2	1	16/05/18	S	G			X	X						
BH10S2/0.4-0.5	2	16/05/18	S	G			X	X						
BD2/20180516	3	16/05/18	S	G			X	X						Intra lab
BH10S5/0.1-0.2	4	16/05/18	S	G			X	X						
BH10S5/0.4-0.5	5	16/05/18	S	G			X	X						
BD1/20180516	—	16/05/18	S	G			X	X						Inter lab
BH10N2/0.1-0.2	6	16/05/18	S	G			X	X						
BH10N2/0.4-0.5	7	16/05/18	S	G			X	X						
BH10N5/0.1-0.2	8	16/05/18	S	G			X	X						
BH10E5/ 0.1-0.2	9	16/05/18	S	G			X	X						
BH10W2/0.1-0.2	10	16/05/18	S	G			X	X						
BH10W2/0.4-0.5	11	16/05/18	S	G			X	X						
BH10W5/0.1-0.2	12	16/05/18	S	G			X	X						
BH10E2/0.1-0.2	13	16/05/18	S	G			X	X						
BH10E2/0.4-0.5	14	16/05/18	S	G			X	X						
PQL (S) mg/kg														

ENVIROLAB
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 192022
Date Received: 18/5/18
Time Received: 13:30
Received By: JZ
15.7°C
Temp: [✓ Cool]/Ambient
Cooling: Ice/[✓ Icepack]
Security: [✓ Intact]/Broken/None

ANZECC PQLs req'd for all water analytes ☐

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Lab Report/Reference No:

Metals to Analyse: 8HM unless specified here:

Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NW
Received by: ELS JE
Date & Time: 18/5/18 13:30

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85867.05	**Suburb:**	PENRITH	**To:**	Envirolab
Project Name:	Additional Contamination Investigation	**Order Number**			
Project Manager:	PG	**Sampler:**	NW/JJH	**Attn:**	
Emails:	paul.gorman@douglaspartners.com.au; nicola.warton@douglaspartners.com.au			**Phone:**	
Date Required:	Standard ☐			**Email:**	

Prior Storage: ☐ Fridge Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Sampling Date	Sample Type	Container Type	Analytes									Notes/preservation
			S - soil W - water	G - glass P - plastic	Combo 1m	PCB	Heavy Metals	PAH	TRH and BTEX	ENM Suite				
BH102S2/0.1-0.2	15	16/05/18	S	G				X	X					
BH102S2/0.4-0.5	16	16/05/18	S	G				X	X					
BH102S5/0.1-0.2	17	16/05/18	S	G				X	X					
BH102N2/0.1-0.2	18	16/05/18	S	G				X	X					
BH102N2/0.4-0.5	19	16/05/18	S	G				X	X					
BH102N5/0.1-0.2	20	16/05/18	S	G				X	X					
BH102W2/0.1-0.2	21	16/05/18	S	G				X	X					
BH102W2/0.3-0.4	22	16/05/18	S	G				X	X					
BH102E2/0.1-0.2	23	16/05/18	S	G				X	X					
BH102E2/0.3-0.4	24	16/05/18	S	G				X	X					
BH102E5/0.1-0.2	25	16/05/18	S	G				X	X					
BH103W5/0.1-0.2	26	16/05/18	S	G	X	X								
BH103W2/0.1-0.2	27	16/05/18	S	G	X	X								
BH103N2/0.2-0.3	28	16/05/18	S	G	X	X								
BH103E2/0.1-0.2	29	16/05/18	S	G	X	X								
PQL (S) mg/kg												**ANZECC PQLs req'd for all water analytes** ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 192022

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: NW **Received by:** JG **Date & Time:** 18/5 13:30

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85867.05	**Suburb:**	PENRITH	**To:**	Envirolab
Project Name:	Additional Contamination Investigation	**Order Number**			
Project Manager:	PG	**Sampler:**	NW/JJH	**Attn:**	
Emails:	paul.gorman@douglaspartners.com.au; nicola.warton@douglaspartners.com.au			**Phone:**	
Date Required:	Standard ☐			**Email:**	

Prior Storage: ☐ Fridge Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Sampling Date	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes Combo 1m	PCB	Heavy Metals	PAH	TRH and BTEX	ENM Suite	Fibre ID			Notes/preservation
BH103E5/0.1-0.2	30	16/05/18	S	G	X	X								
BH103S2/0.1-0.2	31	16/05/18	S	G	X	X								
BH103S5/0.1-0.2	32	16/05/18	S	G	X	X								
WC19/0.1-0.2	33	16/05/18	S	G/P						X				
WC19/0.4-0.5	34	16/05/18	S	G/P						X				
WC20/0.1-0.2	35	16/05/18	S	G/P						X				
WC20/0.4-0.5	36	16/05/18	S	G/P						X				
Trip Spike	37		S						X					
Trip Blank	38		S						X					
WC18-1	39	16/5/18	material								X			
PQL (S) mg/kg												ANZECC PQLs req'd for all water analytes ☐		

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 192022

Total number of samples in container: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: NW **Received by:** JC **Date & Time:** 18/5 13:37

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	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton

Sample Login Details

Your reference	85867.05, Penrith
Envirolab Reference	192022
Date Sample Received	18/05/2018
Date Instructions Received	18/05/2018
Date Results Expected to be Reported	25/05/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	38 soil, 1 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15.7
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:

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	PCBsin Soil	Acid Extractable metalsin soil	pH1:5 soil:water	Electrical Conductivity1:5 soil:water	RTA276 ENM*Foreign Material	Asbestos ID - materials
BH10S2-0.1-0.2			✓		✓				
BH10S2-0.4-0.5			✓		✓				
BD2/20180515			✓		✓				
BH10S5-0.1-0.2			✓		✓				
BH10S5-0.4-0.5			✓		✓				
BH10N2-0.1-0.2			✓		✓				
BH10N2-0.4-0.5			✓		✓				
BH10N5-0.1-0.2			✓		✓				
BH10E5-0.1-0.2			✓		✓				
BH10W2-0.1-0.2			✓		✓				
BH10W2-0.4-0.5			✓		✓				
BH10W5-0.1-0.2			✓		✓				
BH10E2-0.1-0.2			✓		✓				
BH10E2-0.4-0.5			✓		✓				
BH102S2-0.1-0.2	✓	✓	✓						
BH102S2-0.4-0.5	✓	✓	✓						
BH102S5-0.1-0.2	✓	✓	✓						
BH102N2-0.1-0.2	✓	✓	✓						
BH102N2-0.4-0.5	✓	✓	✓						
BH102N5-0.1-0.2	✓	✓	✓						
BH102W2-0.1-0.2	✓	✓	✓						
BH102W2-0.3-0.4	✓	✓	✓						
BH102E2-0.1-0.2	✓	✓	✓						
BH102E2-0.3-0.4	✓	✓	✓						
BH102E5-0.1-0.2	✓	✓	✓						
BH103W5-0.1-0.2	✓	✓		✓	✓				
BH103W2-0.1-0.2	✓	✓		✓	✓				
BH103N2-0.2-0.3	✓	✓		✓	✓				
BH103E2-0.1-0.2	✓	✓		✓	✓				
BH103E5-0.1-0.2	✓	✓		✓	✓				
BH103S2-0.1-0.2	✓	✓		✓	✓				
BH103S5-0.1-0.2	✓	✓		✓	✓				

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	PCBsin Soil	Acid Extractable metalsin soil	pH1:5 soil:water	Electrical Conductivity1:5 soil:water	RTA276 ENM*Foreign Material	Asbestos ID - materials
WC19-0.1-0.2	✓	✓	✓		✓	✓	✓	✓	
WC19-0.4-0.5	✓	✓	✓		✓	✓	✓	✓	
WC20-0.1-0.2	✓	✓	✓		✓	✓	✓	✓	
WC20-0.4-0.5	✓	✓	✓		✓	✓	✓	✓	
TRIP SPIKE	✓								
TRIP BLANK	✓								
WC18-1									✓

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

Additional Info

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

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

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CERTIFICATE OF ANALYSIS 192022-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85867.05, Penrith**
Number of Samples	38 soil, 1 Material
Date samples received	18/05/2018
Date completed instructions received	28/05/2018

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	31/05/2018
Date of Issue	30/05/2018

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

Results Approved By
Long Pham, Team Leader, Metals

Authorised By
Jacinta Hurst, Laboratory Manager

Client Reference: 85867.05, Penrith

Metals in TCLP USEPA1311						
Our Reference	UNITS	192022-A-1	192022-A-7	192022-A-8	192022-A-9	192022-A-14
Your Reference		BH10S2	BH10N2	BH10N5	BH10E5	BH10E2
Depth		0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	29/05/2018	29/05/2018	29/05/2018	29/05/2018	29/05/2018
Date analysed	-	29/05/2018	29/05/2018	29/05/2018	29/05/2018	29/05/2018
pH of soil for fluid# determ.	pH units	9.0	7.3	9.4	7.6	7.6
pH of soil TCLP (after HCl)	pH units	1.6	1.5	1.6	1.6	1.6
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.2	5.0	5.4	5.0	5.0
Lead in TCLP	mg/L	[NA]	0.1	[NA]	0.07	3.8
Nickel in TCLP	mg/L	0.04	[NA]	0.04	[NA]	[NA]

Metals in TCLP USEPA1311				
Our Reference	UNITS	192022-A-28	192022-A-31	192022-A-36
Your Reference		BH103N2	BH103S2	WC20
Depth		0.2-0.3	0.1-0.2	0.4-0.5
Date Sampled		16/05/2018	16/05/2018	16/05/2018
Type of sample		soil	soil	soil
Date extracted	-	29/05/2018	29/05/2018	29/05/2018
Date analysed	-	29/05/2018	29/05/2018	29/05/2018
pH of soil for fluid# determ.	pH units	9.1	7.5	7.5
pH of soil TCLP (after HCl)	pH units	1.7	1.6	1.6
Extraction fluid used	-	1	1	1
pH of final Leachate	pH units	5.2	5.1	5.0
Lead in TCLP	mg/L	3.0	0.54	0.04

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.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

Client Reference: 85867.05, Penrith

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	192022-A-7
Date extracted	-			29/05/2018	1	29/05/2018	29/05/2018		29/05/2018	29/05/2018
Date analysed	-			29/05/2018	1	29/05/2018	29/05/2018		29/05/2018	29/05/2018
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	99	116
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	1	0.04	0.04	0	100	119

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.

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was 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.

Andrew Fitzsimons

From: Nancy Zhang
Sent: Monday, 28 May 2018 12:37 PM
To: Paul Gorman; Nicola Warton
Cc: Samplereceipt
Subject: RE: Results for Registration 192022 85867.05, Penrith

ELS: 192022-A
TAT: 3 days
Due: 31/5/18

Hi Paul,

No problem, will do.

Regards,

Nancy Zhang | Assistant Lab Manager | Envirolab Services Pty Ltd

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201
E nzhang@envirolab.com.au | **W** www.envirolab.com.au

Please note that all samples submitted to the Envirolab Group laboratories will be analysed under the Envirolab Group Terms and Conditions. The Terms and Conditions are accessible by clicking this link

---

From: Paul Gorman [mailto:Paul.Gorman@douglaspartners.com.au]
Sent: Monday, 28 May 2018 12:23 PM
To: Nancy Zhang <NZhang@envirolab.com.au>; Nicola Warton <Nicola.Warton@douglaspartners.com.au>
Subject: RE: Results for Registration 192022 85867.05, Penrith

Hi Nancy,

Can you please schedule TCLP testing on a 3 day turnaround for the following:

7	BH10N2/0.4-0.5	lead
9	BH10E5/0.1-0.2	lead
1	BH10S2/0.1-0.2	nickel
8	BH10N5/0.1-0.2	nickel
14	BH10E2/0.4-0.5	lead
28	BH103N2/0.2-0.~~5~~3	lead
31	BH103S2/0.1-0.2	lead
36	WC20/0.4-0.5	lead

Thanks

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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Nicola Warton

Sample Login Details

Your reference	85867.05, Penrith
Envirolab Reference	192022-A
Date Sample Received	18/05/2018
Date Instructions Received	28/05/2018
Date Results Expected to be Reported	31/05/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	38 soil, 1 Material
Turnaround Time Requested	3 days
Temperature on Receipt (°C)	15.7
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:

Sample ID	Metals in TCLP USEPA1311	On Hold
BH10S2-0.1-0.2	✓	
BH10S2-0.4-0.5		✓
BD2/20180515		✓
BH10S5-0.1-0.2		✓
BH10S5-0.4-0.5		✓
BH10N2-0.1-0.2		✓
BH10N2-0.4-0.5	✓	
BH10N5-0.1-0.2	✓	
BH10E5-0.1-0.2	✓	
BH10W2-0.1-0.2		✓
BH10W2-0.4-0.5		✓
BH10W5-0.1-0.2		✓
BH10E2-0.1-0.2		✓
BH10E2-0.4-0.5	✓	
BH102S2-0.1-0.2		✓
BH102S2-0.4-0.5		✓
BH102S5-0.1-0.2		✓
BH102N2-0.1-0.2		✓
BH102N2-0.4-0.5		✓
BH102N5-0.1-0.2		✓
BH102W2-0.1-0.2		✓
BH102W2-0.3-0.4		✓
BH102E2-0.1-0.2		✓
BH102E2-0.3-0.4		✓
BH102E5-0.1-0.2		✓
BH103W5-0.1-0.2		✓
BH103W2-0.1-0.2		✓
BH103N2-0.2-0.3	✓	
BH103E2-0.1-0.2		✓
BH103E5-0.1-0.2		✓
BH103S2-0.1-0.2	✓	
BH103S5-0.1-0.2		✓

Sample ID	Metals in TCLP USEPA1311	On Hold
WC19-0.1-0.2		✓
WC19-0.4-0.5		✓
WC20-0.1-0.2		✓
WC20-0.4-0.5	✓	
TRIP SPIKE		✓
TRIP BLANK		✓
WC18-1		✓
BH10S2 - [TRIPLICATE]-0.1-0.2		✓
BH10W2 - [TRIPLICATE]-0.4-0.5		✓

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.

CERTIFICATE OF ANALYSIS

Work Order	: **ES1814627**	Page	: 1 of 5
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 32378900	Telephone	: +61-3-8549 9630
Project	: 85867.05 Additional Contamination Investigation	Date Samples Received	: 21-May-2018 15:30
Order number	:	Date Analysis Commenced	: 23-May-2018
C-O-C number	: ----	Issue Date	: 28-May-2018 13:13
Sampler	: NW/JJH		
Site	: PENRITH		
Quote number	: EN/222/17		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Client sample ID*	**BD1/20180516**	**----**	**----**	**----**	**----**
			Client sampling date / time	16-May-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1814627-001**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**9.4**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**32**	----	----	----	----
Copper	7440-50-8	5	mg/kg	**22**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**172**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	**31**	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**174**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	**0.1**	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	**0.9**	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	**1.0**	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	**1.0**	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	**0.6**	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	**0.6**	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**0.9**	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**0.7**	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**0.6**	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	**6.3**	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	**0.9**	----	----	----	----
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**1.2**	----	----	----	----
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.5**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**74.4**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			Client sample ID	**BD1/20180516**	----	----	----	----
			Client sampling date / time	16-May-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	**ES1814627-001**	--------	--------	--------	--------
				Result	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates - Continued								
2-Chlorophenol-D4	93951-73-6	0.5	%	**68.0**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**63.8**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**70.3**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**85.0**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**77.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)*	
		Low	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1814627**

Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: paul.gorman@douglaspartners.com.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 07 32378900	Telephone	: +61-3-8549 9630
Facsimile	: +61 07 32378999	Facsimile	: +61-2-8784 8500
Project	: 85867.05 Additional Contamination Investigation	Page	: 1 of 3
Order number	:	Quote number	: EM2017DOUPAR0002 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: PENRITH		
Sampler	: NW/JJH		

Dates

Date Samples Received	: 21-May-2018 15:30	Issue Date	: 22-May-2018
Client Requested Due Date	: 28-May-2018	Scheduled Reporting Date	: **28-May-2018**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 13.2 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA055-103 Moisture Content	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - S-02 8 Metals (incl. Digestion)
ES1814627-001	16-May-2018 00:00	BD1/20180516	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accounts@douglaspartners.com.au

NICOLA WANTON

- *AU Certificate of Analysis - NATA (COA)	Email	nicola.wanton@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	nicola.wanton@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	nicola.wanton@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	nicola.wanton@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	nicola.wanton@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	nicola.wanton@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	nicola.wanton@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	nicola.wanton@douglaspartners.com.au

PAUL GORMAN

- *AU Certificate of Analysis - NATA (COA)	Email	paul.gorman@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	paul.gorman@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	paul.gorman@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	paul.gorman@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	paul.gorman@douglaspartners.com.au

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 85867.05
Project Name: Additional Contamination Investigation
Project Manager: PG
Emails: paul.gorman@douglaspartners.com.au; nicola.warton@douglaspartners.com.au
Date Required: Standard ☐
Prior Storage: ☐ Fridge

Suburb: PENRITH
Order Number
Sampler: NW/JJH

To: Envirolab
Attn:
Phone:
Email:

Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample ID	Lab ID	Date Sampled	Sample Type S - soil W - water	Container Type G - glass P - plastic	Analytes Combo 1m	PCB	Heavy Metals	PAH	TRH and BTEX	ENM Suite				Notes/preservation
BH10S2/0.1-0.2	1	16/05/18	S	G			X	X						
BH10S2/0.4-0.5	2	16/05/18	S	G			X	X						
BD2/20180516	3	16/05/18	S	G			X	X						Intra lab
BH10S5/0.1-0.2	4	16/05/18	S	G			X	X						
BH10S5/0.4-0.5	5	16/05/18	S	G			X	X						
BD1/20180516	—	16/05/18	S	G			X	X						Inter lab
BH10N2/0.1-0.2	6	16/05/18	S	G			X	X						
BH10N2/0.4-0.5	7	16/05/18	S	G			X	X						
BH10N5/0.1-0.2	8	16/05/18	S	G			X	X						
BH10E5/ 0.1-0.2	9	16/05/18	S	G			X	X						
BH10W2/0.1-0.2	10	16/05/18	S	G			X	X						
BH10W2/0.4-0.5	11	16/05/18	S	G			X	X						
BH10W5/0.1-0.2	12	16/05/18	S	G			X	X						
BH10E2/0.1-0.2	13	16/05/18	S	G			X	X						
BH10E2/0.4-0.5	14	16/05/18	S	G			X	X						
PQL (S) mg/kg														ANZECC PQLs req'd for all water analytes ☐

①

ENVIROLAB group
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
Job No: 192022
Date Received: 18/5/18
Time Received: 13:30
Received By: JZ
15.7°C
Temp: (Cool)/Ambient
Cooling: Ice/(Icepack)
Security: (Intact)/Broken/None

Environmental Division
Sydney
Work Order Reference
ES1814627
Telephone : + 61-2-8784 8555

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit
Lab Report/Reference No:
Metals to Analyse: 8HM unless specified here:
Total number of samples in container:
Relinquished by:
Transported to laboratory by:
Send Results to: Douglas Partners Pty Ltd
Address:
Phone:
Fax:
Signed: NW
Received by: ELS JE
Date & Time: 18/5/18 13:30

Relinquished by: Kevin Wy 21/5/18
Rec - Soggy 21/5/18 1530 13.2°C

FPM - ENVID/Form COC 02
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