2 Site Description

2.1 Site Location and Description

The site is located at 1A Morton Street, Parramatta and consists of Lot 8, DP1097934 having an area of approximately 2.25ha (Figure 1 in Attachment A). The site is currently used for day to day council depot functions including:

- Storage and maintenance of vehicles;
- Storage and maintenance of equipment;
- Stockpiling of various waste (collected from off-site): building material, green waste, metal waste and general household waste;
- Stockpiling of organic material; and
- Temporary housing of animals (pound).

The majority of the middle and northern areas of the site are paved (asphalt / concrete) or roofed, with minor areas of landscaping distributed around buildings. The southern portion of the site is unsealed (gravel covered).

Site infrastructure includes:

- Office and storage building;
- Amenities building;
- Mechanic's workshop;
- Carpenter's workshop;
- Vehicle wash bay and sump;
- Concrete waste and recycling bays;
- LPG gas storage; and
- 6 underground petrol storage tanks (decommissioned).

Surrounding land use is mixed residential and business. The nearest sensitive environmental receptor to the site is the Parramatta River which is located approximately 50 meters from the site's southern boundary.

2.2 Topography and Drainage

The site drains to the south with an average slope of approximately 5%. There is a relatively flat area (<2%) in the southern section of the site adjacent to the Parramatta River. A site plan with 2m contours is provided in Attachment A (provided by of PCC, 2012).

2.3 Lithology and Soil Landscapes

The Penrith 1:100,000 Geological Sheet 9029 (NSW Dept. Mineral Resources, 1983) indicates that the site is underlain by Wianamatta group shales and Hawkesbury Sandstone.

Sub-surface investigation revealed the site is underlain by shale in the middle and northern portions. Bedrock was not encountered in the southern portion of the site (limit of investigation was 4m at BH111 and BH112 and 7m at BH113).

The majority of the site's upper sub-strata was comprised of fill of unknown origin.

Detailed borehole logs are available as Attachment B

3 Geotechnical Assessment

3.1 Sub-surface Materials

Sub-surface investigation revealed variable fill overlying residual clays and weathered shales. Table 1 provides a summary of site fill extents. Four primary sub-surface units were observed:

- Unit 1: Granular Fill – Variable thickness and variably consolidated.
- Unit 2: Clay Fill – Variable thickness and variably consolidated.
- Unit 3: Residual Clays – vary from soft / firm in shallow areas to stiff / very stiff in deeper holes.
- Unit 4: Shale – Very weak to weak shale, typically extremely to moderately weathered. Depth to fresh shale is unknown.

Table 1: Summary of site fill.

Borehole ID	Depth Range	Fill Description
BH101, BH102, BH103, BH104, BH105, BH106, BH107, BH108, BH109, BH110, BH111, BH113, BH115	0.0 - 0.6	Road base: sand and gravels
BH101, BH103, BH104, BH105, BH106, BH107, BH108, BH110, BH111, BH113, BH114	0.15 - 2.2	Clays: dark grey, orange and red with minor gravels and sands
BH101, BH103, BH106, BH107, BH108, BH110, BH111, BH112, BH113	0.25 - 1.2	Sands: light brown, brown – orang; some clay and silt present

Boreholes excavated in the site's north revealed fill to an approximate depth range of 0.2 - 0.5 m whilst bore holes in the southern section of the site revealed fill to a depth range of 1.2 - 2.2 m. DCP tests conducted reveal varying degrees of fill consolidation, indicating that compaction of fill was generally not under engineering control. Deeper clay fill in the southern section of the site has a stiff to very stiff consistency whilst shallower clay fill in the northern section has a soft to firm consistency.

3.2 Engineering Properties

Engineering properties are estimated as follows:

Table 2: Engineering properties for site soil units.

Unit [1]	γ [2] (kN/m)	Cu [3] (kPa)	ϕ' [4]
1 – Granular fill	18	-	27 - 30
2 – Clay fill	15	30 - 60	-
3 – Residual clays	16	50 - 100	
4 – Very weak to weak shale	22	-	32

Notes:.
[1]Unit refers to sub-surface material type.
[2] *In-situ* unit weight.
[3] Undrained shear strength
[4] Effective internal angle of friction ± 2° (estimate for rocks where rock coring has not been undertaken)

3.3 Groundwater

Groundwater observations were made during sub-surface investigations and are summarised in Table 3 below.

Table 3: Ground water inflow observed during drilling.

BH ID	Depth to observed ground water (mBGL)
BH102	3.5
BH108	4.0
BH112	4.0
BH113	6.0

Two groundwater monitoring wells were installed as part of the contamination assessment at BH102 and BH108.

Standing water levels (SWL) from each well following installation, purging and recovery was recorded (Table 4).

The difference in levels from ground water inflow observed during drilling and SWL in monitoring wells suggest that groundwater underlying the site may be semi-confined.

Table 4: Ground water monitoring well SWLs.

Well ID/Location	Standing water level[1](mBGL)	Date
MW1/BH108	1.2	04/04/2012
MW2/BH102	0.3	04/04/2012

Notes:
[1] Meters below ground level.

3.4 Design Advice

The following preliminary design advice is offered. Once further loads and other structural requirements are known, these parameters may be revised.

Table 5: Preliminary design advice.

Unit [1]	ABC (KPa)[2]	SF [3] (kPa)	Ka[4]	Kp[5]
1 – Granular fill	-	-	-	-
2 – Clay fill	40 - 80	-	0.45	2.2
3 – Residual clays	100 - 200	30	0.40	2.5
4 – Very weak to weak shale	600	40	0.30	3.2

Notes:.
[1]Unit refers to sub-surface material type..
[2] Allowable end bearing pressure estimate assuming square footing with $D_f/B < 0.5$
[3] Allowable skin friction
[4] Active earth pressure
[5] Passive earth pressures

3.5 Atterberg Limits and Linear Shrinkage Testing

Atterberg Limits data is given in Table 6 with laboratory results in Attachment E.

Table 6: Laboratory results for Atterberg Limits and linear shrinkage testing

Sample	LL (%) [1]	PL (%) [2]	PI (%) [3]	LS (%) [4]	USCS [5]	Plasticity
3374/115/0.5	50	20	30	10.5	CH	High
3374/105/0.7	42	22	20	8.0	CL	Intermediate
3374/105/1.5	72	28	44	15.0	CH	Very high
3374/110/1.5	66	21	45	17.5	CH	High

Notes:
[1] Liquid limit.
[2] Plastic Limit.
[3] Plasticity Index.
[4] Linear Shrinkage.
[5] Unified Soil Classification Scheme.

3.6 Salinity and Acid Sulfate Soils

A preliminary (desktop) salinity and acid sulfate assessment was undertaken as part of the Stage 1 Preliminary Environmental Site Assessment (PESA) and can be found in Martens and Associates document P11203374JR01V01. Laboratory testing for salinity and acid sulfate was not part of the scope of work.

3.7 General Recommendations

We note that these recommendations are general in nature and do not refer to any specific future site development. Where future site use involves construction of permanent structures, excavation or filling, geotechnical advice specific to those construction plans should be sought.

3.7.1 Excavations

The following general comments are made regarding future site excavations:

- Fill material, *in-situ* soil and very weak to weak extremely weathered shale shall generally be readily excavated using conventional earthmoving equipment; and
- Medium strong to strong shale should be rippable using a ripping tyne (or similar) although progress may be slow in deeper stronger shale.

All excavation work should be completed with reference to the Code of Practice 'Excavation Work', Cat. No. 312. (Workcover 2000).

3.7.2 Batters

The following comments are provided in relation to excavation batters:

Soils

Any temporary or permanent excavations into soil exceeding 0.75 m depth should be supported by suitably designed and installed retaining or shoring structures or, alternatively, using batter slopes. A temporary excavations batter range between 1V:1H to 1V1.5H can be used for clay fill and natural clay depending on embankment properties, amount of time excavation is left open and surface and groundwater flows. It is recommended that unsupported soil excavations deeper than 1.0 m should be assessed by a geotechnical engineer for slope instability risk.

Rock

Limited site information is available relating to rock properties. It is expected that excavation into medium strong or greater shale can generally maintain grades between vertical and 6V:1H. In order for any excavation face to be vertical, the excavation should be advanced at 1m increments. At the completion of each increment a geotechnical engineer should be consulted to determine the requirement, if any, of rock face shoring or other treatment. Where significant rock excavation (>1m) is proposed, supplementary rock coring in those areas and further advice relating to rock batter treatment is required.

3.7.3 Footing and Foundations

Foundations of any future proposed buildings are to be designed by a suitably qualified and experienced structural or geotechnical engineer. Preliminary sub-surface soil and rock engineering and design properties are provided in Sections 3.2 and 3.4 which may allow for preliminary footing design. Shallow footings including stiffened raft / strip footing for lighter structures, or bored piers taken to weathered shale for heavier pads may be appropriate.

4 Environmental Site Assessment and Preliminary Soil Sampling

4.1 Review of PESA

A stage 1 preliminary environmental site assessment (PESA) was completed by Martens and Associates with reported findings available in report P1203374JR01V01. A brief summary is present below:

- Aerial photography shows the site remained undeveloped until sometime after 1970. Information supplied by PCC indicated that the land was purchased in 1958 from The King's School.

- Review of the NSW EPA/DECC contaminated land record shows no record of site regulation by the EPA in regards to contaminated land on the site or on neighboring sites.

- A NSW WorkCover Dangerous Goods search revealed that all onsite tanks (6 in total) have been decommissioned in accordance with Australian Institute of Petroleum CP22/114 and Australian Standards AS1862.

- According to the PCC LEP (2011), the site is zoned R4 (high density residential), B4 (mixed use business) and RE1 (public open space). A Planning Proposal is being considered by the Department of Planning , as an amendment to PLEP 2011, that seeks to rezone the whole of the land to R4 (high density residential).

- Areas of Environmental Concern(AEC) and Chemicals of Concern (COC) were identified and are summarised in Table 6. A site plan highlighting AECs is available in Attachment A.

Table 6: AECs and CoCs.

AEC	Use	Potential for contamination	CoC[1]	Likelihood for contamination
(A) Northern and north-western site boundary	Use of fill from unknown origin,	Potential contamination in fill and potential ACM (Fibro fragments).	Heavy metals, TRH, BTEX, PAH, Asbestos	High
(B)Amenities building and car park	Car park used to park vehicles, amenities building used by site staff.	Bitumen cracking and oil staining noted on pavement.	Heavy metals, TRH, BTEX, PAH	Low
(C) Washbay	Degreasing agents and sump observed during walkover, storage of oil and paint observed near northern site boundary.	Potential contamination: degreasing and other cleaning agents, no evidence of where sump drains. Oil and paint storage showed signs of ageing and rust.	Heavy metals, TRH, BTEX, PAH	Low
(D) Workshop area	Maintenance of machinery and vehicles.	Potential contamination from hoist pit and waste oil storage line and tank.	Heavy metals, TRH, BTEX, PAH, Phenols	Medium-High
(E) Tank farm 1	Underground distillate tanks and bowsers, no longer in use and have been decommission *in-situ* using Benefil Hardfoam. Area predominantly used as vehicle parking.	Potential contamination from tank or fuel line leaks and pesticide spraying vehicles parked in the area.	Heavy metals, TRH, BTEX, PAH, OPP/OCP	Medium - High
(F) Tank farm 2	Underground unleaded tanks and bowsers, now decommissioned and predominantly used as vehicle parking.	Potential contamination from tank or fuel line leaks.	Heavy metals, TRH, BTEX, PAH, OPP/OCP	Medium - High

AEC	Use	Potential for contamination	CoC[1]	Likelihood for contamination
(G) Stores building / car park	Paint staining observed on the ground directly outside stores building, storage of potentially hazardous materials.	Potential contamination from storage of hazardous materials. Potential leaching of heavy metals into the soil profile from paint spills. Possible ACM found in car park adjacent to building.	Heavy metals, TRH, BTEX, PAH, Asbestos, OPP/OCP	Low-Medium
(H) Southern Vehicle parking	Car park used to park vehicles and equipment.	Bitumen cracking and oil staining noted on pavement, possible past filling used in area.	Heavy metals, TRH, BTEX, PAH, OPP/OCP	Low-Medium
(I) Waste storage area	Waste storage bins used to store general waste, green waste, metal waste; likely use of fill of unknown quality used to establish area grade.	Potential contamination from waste storage and use of fill.	Heavy metals, TRH, BTEX, PAH, OPP/OCP	Low

Notes: [1] Heavy Metals – Arsenic, cadmium, chromium, copper, nickel, lead, zinc, mercury;
TPH - Total Petroleum Hydrocarbons;
BTEX - Benzene, Toluene, Ethyl benzene, total Xylene;
PAH - Polycyclic Aromatic Hydrocarbons;
OCP/OPP - Organochlorine Pesticides / Organophosphorus Pesticides

4.2 Preliminary Soil and Groundwater Sampling

4.2.1 Field Investigation

Soil sampling was undertaken on March 28 & 29, 2012 and water sampling conducted on April 4, 2012. Samples were collected from 15 boreholes; 2 ground water monitoring wells; and from the surface where material samples were considered to be potential asbestos contain material.

Site sampling locations are presented in Attachment A.

Soil sampling was performed by hydraulic augering. Where possible, soils were sampled from the end of the auger immediately beneath the ground surface and at soil horizon changes. Each sample was placed into a laboratory-supplied, acid-rinsed 250mL glass jar, labelled with a unique identification number and placed in an ice-chilled cooler box.

Groundwater samples were taken from the 2 monitoring wells and placed on ice until delivery to the laboratory. Samples were taken approximately 1 week after the construction and purging of the groundwater wells.

Samples were transported for laboratory analysis to Envirolab Pty Ltd, a National Association of Testing Authorities (NATA) accredited laboratory, under chain of custody conditions.

4.2.2 Quality Assurance/ Quality Control

A review of QA/QC procedure has been completed and is presented in the Data Validation Report in Attachment G. The report considers that data is generally suitable for the purpose of the assessment.

4.2.3 Laboratory Analysis

The suite of analyses was selected to provide an acceptable coverage of possible site contaminates. Soil and groundwater samples were selected for analysis on the basis of observations made during soil sampling and results of PID screening.

Table 7: Summary of soil laboratory analyses.

COC	Number of soil samples analysed	Number of groundwater samples analysed	Number of material samples analysed
Heavy Metals [1]	16	2	-
PAH [2]	15	2	-
TRH C_6-C_{36} [3]	20	2	-
TPH Speciation (Aromatics and Aliphatics) [4]	3	-	-
BTEX [5]	20	2	-
OC/OP pesticides [6]	15	-	-
Asbestos	4	-	4

Notes:
[1] 8 Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
[2] Polycyclic Aromatic Hydrocarbons;
[3] Total Recoverable Hydrocarbons
[4] Total Petroleum Hydrocarbons;
[5] Benzene, Toluene, Ethyl benzene, Total Xylene;
[6] Organochlorine and Organophosphorous pesticides

4.3 Chemical Assessment of Soils

4.3.1 Soil Investigation Criteria

The results of chemical analyses on soil samples have been compared to investigation levels for residential use according to the sites' proposed future land use. Investigation levels for soil were established based on the following references:

- NSW DEC (2006) Guidelines for the NSW Auditor Scheme (Second Edition);
- NSW EPA (1994) Guidelines for Assessing Service Station Sites; and
- NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM).

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme and the NEPM present health based investigation levels for different land-uses (e.g. industrial / commercial, residential, recreational etc).

Human health based soil investigation levels (HILs) for residentail land use, provided in Column 1 of Appendix II (NSW DEC, 2006) have been adopted as the soil investigation levels.

4.3.2 *Assessing Petroleum Hydrocarbon Investigation Criteria*

NSW DEC (2006) Guidelines do not provide threshold levels for volatile petroleum hydrocarbon compounds. NSW EPA (1994) Guidelines for Assessing Service Station Sites provide an indication of acceptable cleanup levels for petroleum hydrocarbons compounds at service station sites to be reused for sensitive land-uses. The DECCW has advised that these guidelines should also be used for less sensitive land-uses.

Semi-volatile petroleum hydrocarbons (TPH C_{16} – C_{35}) investigation levels provided in the NSW DEC (2006) guidelines are based on the NEPM health-based criteria and require the laboratory analysis to differentiate aromatic and aliphatic compounds. If this is not done, the TPH C_{10} – C_{40} criteria in the service station guidelines is applied.

For this investigation, we have adopted the service station guidelines for all petroleum hydrocarbon fractions, except where aromatic and aliphatic compounds have been analysed, then NSW DEC (2006) guidelines are used.

4.3.3 *Ground water Investigation Criteria*

In assessing contaminant concentrations within groundwater at the subject site, level of protection trigger values for the protection of 95 % of species as outlined in ANZECC (2000) is applied. 95 % level of protection trigger values were adopted as a conservative value as receiving waters of the nearest sensitive environmental receptor, Parramatta river, are considered to be moderately disturbed.

In consideration of trigger values for TPH, ANZECC (2000) states that there is currently insufficient data to derive a high reliability trigger value for TPH but propose a low reliability trigger value of 7µg/L. This guideline is generally considered by industry to be overly conservative and is also well below the TPH detection limit, which most laboratories can achieve. DEC (2006) states an acceptable approach is to use the Limit of Reporting (LOR) for the various TPH fractions as a groundwater investigation level. This is adopted as the investigation level for TPH at this site.

Investigation levels for BTEX have been adopted from NSW EPA (1994) Guidelines for Assessing Service Station Sites - Fresh water threshold values in Table 4.

4.3.4 *Assessing Asbestos Investigation Criteria*

There are currently no national or DECC-endorsed guidelines relating to human health with regards to material containing asbestos. NSW DEC (2006) advise that until such guidelines become available, auditors must exercise their professional judgement when assessing if a site is suitable for a specific use in the light of evidence that asbestos may be a contaminant of concern. NSW DEC (2006) states that NSW Health will provide advice to auditors on a case-by-case basis where appropriate.

The NSW DEC previously provided interim advice that "no asbestos in the soil at the surface is permitted". Enhealth (2005) 'Guidelines for Asbestos in the Non-Occupational Environment', provides some guidance on assessing and managing asbestos in soil although does not provide a threshold concentration or investigation level for asbestos.

4.4 Soil Results

4.4.1 *Comparison of Soil Analytical Results with Soil Investigation Criteria*

Results from the investigations have been compared to the relevant soil investigation levels, discussed in the previous section, and are summarised below. Detailed laboratory results are available in Attachment D and a tabulated summary of soil laboratory data is available as Attachment F:

- Heavy metals concentrations in most samples across the site are at levels below adopted HILs and consisting with natural background levels. Sample **3374/112/0.2** has **lead 350 mg/kg** exceeding adopted investigation criteria.

- TRH C_6- C_9 was detected in sample **3374/106/1.6 (36 mg/kg)** above LOR but below the adopted investigation level. All other samples reported levels below laboratory limit of reporting (LOR) and subsequently below HIL.

- TRH C_{10}-C_{36} was detected in samples **3374/101/0.5 (1,840 mg/kg), 3374/105/0.1 (1,520 mg/kg) and 3374/106/1.6 (1,480 mg/kg)** at a level above the adopted investigation level. Further analysis has been completed on these samples and reported in Section 4.4.2. All other samples had concentrations below adopted investigation levels or below laboratory detections levels.

- Benzo(a)pyrene and Total PAH were detected in samples at concentrations below adopted investigation levels or below laboratory detection levels.

- OC/OP pesticides and total phenols were reported at concentrations below LOR.

- positive asbestos identification was confirmed in 4 material samples (**3374/ASB1, 3374ASB2, 3374/ASB3, and 3374/ASB4**). 4 soil surface samples collected adjacent to the material samples and analysed for asbestos in soil. **3374/SS2** returned a positive identification for asbestos in soil.

4.4.2 Additional Soil Analysis

In light of guideline exceedences, additional laboratory analysis of TRH, BTEX (BH 105, and BH108) and heavy metals (BH112) was completed for samples deeper in the profile. A deeper profile sample from BH101(3374/101/1.0) was analysed with the initial set of laboratory testing and returned TRH levels below adopted HILs. We note that a deeper sample from BH106 was not taken due to borehole termination on a possible floater or buried concrete slab. BH108 was selected for a deeper profile samples as it is adjacent to BH106.

TRH speciation (aliphatic and aromatic) was completed for 3374/101/0.5, 3374/105/0.1 and 3374/106/1.6.

Results from additional investigation are summarised below:

- All samples reported concentration of TPH C_{16}-C_{35} aromatic at concentrations **above** adopted HIL.

- C_{16}-C_{35} aliphatic and >C_{35} aliphatic was reported at concentration below adopted HIL.

- 3374/112/0.5 returned heavy metal concentrations below adopted HILs.

4.5 Ground Water Results

Comparison of groundwater samples with relevant groundwater investigation levels indicated:

- TRH C_6-C_9 was detected in **3374/MW1 (140 µg/L)** and **3374/MW2 (460 µg/L)** at levels above the adopted investigation level ;
- TRH C_{10}-C_{14} was detected in **3374/MW2 (180 µg/L)** at levels above the adopted investigation level;
- Heavy metals were detected in **3374/MW1 (cadmium 0.6 µg/L), copper (2 µg/L), lead (26 µg/L) and zinc (17 µg/L)** as well as **3374/MW2 zinc (14 µg/L);** and
- Toluene was detected in **3374/MW2 (300 µg/L)** which is the adopted investigation level and is therefore acceptable.
- PAH, OC/OP and phenols returned values below LOR or below adopted investigation levels.

4.6 Discussion

Preliminary laboratory results indicate that hydrocarbon contamination is evident in site soils and groundwater. Based on the location of the contaminated samples and site historical use, the likely source of this contamination is underground fuel tanks. The limited extent of site testing approved by the client makes it difficult to comment on the degree and extent of this contamination. To allow future residential site use the 6 underground fuel tanks and associated contaminated soils shall need to be removed from site. A more thorough assessment of site contamination will be required. This will allow for a detailed assessment of the extent and degree of contamination and be used to draft remediation and validation plans for the site.

Ground water sampling returned some minor hydrocarbon impact and elevated heavy metal levels. With minimal sampling locations (2 wells) and no previous long term data it is not possible to make comment on ground water contamination trends or likely sources. A ground water monitoring program with multiple onsite well and a fixed sampling regime would be required to properly assess groundwater contamination status and any likely impact on future site use.

Asbestos containing material (ACM) fragments were present at the soil surface in AEC A and AEC G (Table 6). Asbestos fibres were identified in soil sampled from behind the retaining wall along the northern boundary. These areas (AEC A and AEC G) will require remediation and validation via the removal of soil and material as special asbestos waste and further soil and material sampling and analysis.

5 Limitations

The site contamination assessment undertaken and documented in this report is preliminary in nature and has been undertaken in accordance with the requests of the client. Sub-surface sampling and testing was conducted at 15 locations. NSW EPA (1995) sampling design guidelines recommend 30 for a 2.25 ha property and NSW EPA (1994) recommends a high sample density where fuel storages have been located. The report and laboratory comparative analysis has been conducted in light of NSW EPA (2006) guidelines.

Sub-surface conditions between and below the completed boreholes / test pits / other tests may be found to be different (or may be interpreted to be different) from those expected. This is particularly the case where past site filling has occurred which is applicable to this site. Variation can also occur with groundwater conditions, especially after significant rainfall even. If such differences appear to exist, we recommend that you immediately contact Martens & Associates.

No site sampling strategy can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of contamination. Therefore, this report should not be read as a guarantee that no contamination will be present within site materials. Given the limited nature of the completed assessment, we recommend future site testing before a final development proposal is developed for the site. Should material be exposed during site works which was not encountered during the investigations undertaken, the newly discovered material should be specifically assessed by Martens & Associates.

6 References

ANZECC (2000) 95% Freshwater trigger values.

Australian Standard (1997) 1289 6.3.2 *Determination of the Penetration Resistance of a Soil using the 9 kg Dynamic Cone Penetrometer.*

Australian Standard 1796 (1993) *Geotechnical Site Investigations.*

Australian Standard 2159 (2005) *Pliling – Design and Installation.*

Australian Standard 2870 (1996) *Residential Slabs and Footings.*

Australian Standard 2870 Supplement 1 (1996) *Residential Slabs and Footings – Construction – Commentary.*

Das, B.M., (1995) *Principles of Foundation Engineering.*

Hazelton P.A *et.al* (2007) *What Do All the Numbers Mean?*

NSW EPA (1995) *Contaminated Sites: Sampling Design Guidelines.*

NSW DEC (2006) Guidelines for the NSW Auditor Scheme (Second Edition);

NSW EPA (1994) Guidelines for Assessing Service Station Sites; and

NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM).

7 Attachment A – Site Plans and Figures

8 Attachment B – Borehole Logs

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	**REF**	**BH101**
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 2.0m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.03				ASPHALT PAVEMENT.			A	0.15	3374/101/0.15
V	Nil	Y	M W	0.6			XX	ROAD BASE GRAVEL FILL - Grey.		L-MD	A	0.5	Perch water at 0.3-0.6m. Hydrocarbon odour and sheen on water. 3374/101/0.5
V	Nil	N	D	1.0 1.2			XX	FILL - Sandy clay/clayey sand, orange, brown, dry.	F-St		A	1.0	3374/101/1.0
V	Nil	N	D	2.0			VW-W	VERY WEAK TO WEAK SHALE (CLAY LIKE PROPERTIES) - Brown, dry.			A A	1.5 2.0	3374/101/1.5 3374/101/2.0
								V-bit refusal at 2.0m, on weak shale.					Note: PID broken at the commencement of BH1.

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

martens

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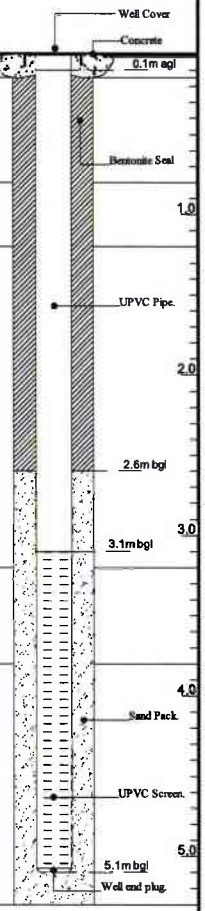
Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	REF	BH102
PROJECT	Geotechnical & Contamination Assessment	LOGGED	JF/BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 5.3m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS
V	Nil	N	D	0.025				ASPHALT PAVEMENT.			A	0.1	3374/102/ 0.1 PID (0.1) - 0ppm
V	Nil	N	D	0.15			XX	ROAD BASE GRAVEL FILL - Grey.					
V	Nil	N	M	0.8			CL	CLAY - Orange/brown, grading to grey/red mottled.	F-St		A	0.5	3374/102/ 0.5 PID (0.5) - 0ppm
V	Nil	N	D	1.0 1.2			VW-W	VERY WEAK TO WEAK SHALE - Brown.			A	1.0	Hydrocarbon odour at 1.0m. 3374/102/ 1.0 PID (1.0) - 12.3ppm
V	Nil	N	D	2.0			W	WEAK SHALE - Light grey, dry.			A	1.5	3374/102/ 1.5 PID (1.5) - 6.2ppm
											A	2.0	3374/102/ 2.0 PID (2.0) - 1.7ppm
TC											A	2.5	3374/102/ 2.5 PID (2.5) - 1.1ppm
TC	Nil	N ▽ 3.5	D	3.0 3.2 3.8			W-MS	WEAK TO MEDIUM STRONG SHALE - Grey.					Ground water inflow at approx 3.5m.
TC	Nil	N	D	4.0 5.0 5.3			MS	MEDIUM STRONG SHALE - Grey.					
				6.0 7.0 8.0 9.0				Borehole terminated at 5.3m, on medium strong shale.					



EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
▽ Water level
◁ Water outflow
▷ Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	**REF**	**BH103**
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 3.2m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE L M H R	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.025		XXXX	XX	ASPHALT PAVEMENT.		L-MD	A	0.1	3374/103/ 0.1 PID (0.1) - 0.0ppm
V	Nil	N	D	0.1			SP	ROAD BASE GRAVEL FILL - Grey.		L			
V	Nil	N	M	0.175			CL	SAND (FILL) - Yellow.	F		A	0.3	3374/103/ 0.3 PID (0.3) - 0.0ppm
V	Nil	N	M	0.5			CL	CLAY (FILL) - Dark grey, orange/grey mottles, minor gravels.	F-St				
V	Nil	N	M	0.7				CLAY - Grey.					
V	Nil	N	D	1.0			VW-W	VERY WEAK TO WEAK SHALE - Light grey, clay properties, some highly weathered bands, grading brown, then dark grey.			A	1.0	3374/103/ 1.0 PID (1.0) - 0.0ppm
				2.0							A	1.5	3374/103/ 1.5 PID (1.5) - 0.0ppm
				2.8							A	2.5	3374/103/ 2.5 PID (2.0) - 0.0ppm
V	Nil	N	D	3.0			W	WEAK SHALE - Grey.					
				3.2				Borehole terminated at 3.2m on weak shale (V-bit refusal).					
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	**REF**	**BH104**
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.5m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.025			XX	ASPHALT					
V	Nil	N	D	0.25			XX	ROAD BASE GRAVEL FILL - Grey.		L-MD	A	0.1	3374/104/ 0.1 PID (0.1) - 0ppm
V	Nil	N	M	0.7			CL	CLAY FILL - Dark grey, minor gravels, mulch/timber.	F		A	0.5	3374/104/ 0.5 PID (0.5) - 5.3ppm Organic/mulch smell from 0.3 to 1.0m
V	Nil	N	M	1.0 1.2			CL	CLAY - Grey, with minor red mottles, moist.	F-St		A	1.0	3374/104/ 1.0 PID (1.0) - 3.0ppm
V	Nil	N	D	2.0 2.8			VW-W	VERY WEAK TO WEAK SHALE (CLAY PROPERTIES) - Grey/orange mottled.			A A Bag	1.5 2.0 2.5	3374/104/ 1.5 PID (1.5) - 0.2ppm 3374/104/ 2.0 PID (2.0) - 0.7ppm 3374/104/ 2.5 V-bit refusal @ 2.8
TC	Nil	N	D	3.0 4.0 4.3			W	WEAK SHALE - Grey brown.					
TC	Nil	N	D	4.5			W-MS	WEAK TO MEDIUM STRONG SHALE - Dark grey.					Hard drilling
				5.0 6.0 7.0 8.0 9.0				Borehole terminated at 4.5m on weak to medium strong shale.					

EQUIPMENT / METHOD: N Natural exposure; X Existing excavation; BH Backhoe bucket; HA Hand auger; A Auger; CC Concrete Corer; V V-Bit; TC Tungsten Carbide Bit; PT Push tube

SUPPORT: SH Shoring; SC Shotcrete; RB Rock Bolts; Nil No support

WATER: N None observed; X Not measured; Water level; Water outflow; Water inflow

MOISTURE: D Dry; M Moist; W Wet; Wp Plastic limit; Wl Liquid limit

PENETRATION: L Low; M Moderate; H High; R Refusal

CONSISTENCY: VS Very Soft; S Soft; F Firm; St Stiff; VSt Very Stiff; H Hard; F Friable

DENSITY: VL Very Loose; L Loose; MD Medium Dense; D Dense; VD Very Dense

SAMPLING & TESTING: A Auger sample; B Bulk sample; U Undisturbed sample; D Disturbed sample; M Moisture content; Ux Tube sample (x mm); pp Pocket penetrometer; S Standard penetration test; VS Vane shear; DCP Dynamic cone penetrometer; FD Field density; WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION: Y USCS; N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	**REF**	**BH105**
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.0m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.025			XX	ASPHALT		L-MD	A	0.1	3374/105/ 0.1 + DUP1 PID (0.1) - 85.7ppm Hydrocarbon odour.
V	Nil	N	D	0.2			XX	ROAD BASE GRAVEL FILL - Blue.					
V	Nil	N	M	0.6			XX CL	CLAY FILL - Brown, gravels, moist.	F		A	0.5	3374/105/ 0.5 PID (0.5) - 1.1ppm
V	Nil	N	M	1.0 1.1			CL	SILTY CLAY - Dark brown, moist.	F		B A	0.7 1.0	3374/105/ 0.7 3374/105/ 1.0 PID (1.0) - 0.8ppm 1.0
V	Nil	N	D	1.8			CL	CLAY - Orange with grey mottles, moist, firm.	F		A B	1.5 1.5	3374/105/ 1.5 3374/105/ 1.5 PID (1.5) - 0.0ppm
TC	Nil	N	D	2.0 2.1			VW-W	VERY WEAK TO WEAK SHALE - Grey, clay properties, grades to weak shale - brown.			A	2.0	3374/105/ 2.0 PID (2.0) - 0.0ppm 2.0
TC	Nil	N	D	3.0			W	WEAK SHALE			B	2.5	3374/105/ 2.5 PID (2.5) - 0.0ppm 3.0
				4.0									PID (4.0) - 0.0ppm 4.0
								Borehole terminated at 4.0m on weak shale.					
				5.0									5.0
				6.0									6.0
				7.0									7.0
				8.0									8.0
				9.0									9.0

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	28.03.12	COMPLETED	28.03.12	REF	BH106
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 1.6m depth	NORTHING	NA	ASPECT	South	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.025			XX	ASPHALT		L-MD	A	0.1	3374/106/ 0.1 PID (0.1) - 0.6ppm
V	Nil	N	D	0.15				ROAD BASE GRAVEL FILL - Grey.					
V	Nil	N	M	0.9			XX CL	CLAY FILL - Brown/grey, dark grey mottles, soft, moist, then brown, firm.	S-F		A	0.5	3374/106/ 0.5 PID (0.5) - 0.0ppm
											A	0.8	3374/106/ 0.8 + DUP2 PID (0.8) - 0.0ppm
V	Nil	N	M	1.0			SP	SAND - Orange, moist, then wet at 1.5m.			A	1.2	3374/106/ 1.2 PID (1.2) - 0.0ppm
		Y	W	1.6				Refusal at 1.6m on unknown - possibly concrete slab? (borehole conducted twice) .			A	1.6	3374/106/ 1.6 PID (1.6) - 360ppm
				2.0									Hard drilling from 3.8-4.0m
				3.0									
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	**COMMENCED**	28.03.12	**COMPLETED**	28.03.12	**REF**	**BH107**
PROJECT	Geotechnical & Contamination Assessment	**LOGGED**	BR	**CHECKED**	JF	**Sheet**	1 of 1
SITE	PCC Depot, Morton St, Parramatta	**GEOLOGY**	Shale	**VEGETATION**	NA - Asphalt	**PROJECT NO.**	P1203374
EQUIPMENT	Hydraulic Auger	**EASTING**	NA	**RL SURFACE**	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.1m depth	**NORTHING**	NA	**ASPECT**	South	**SLOPE**	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.05			XX	ASPHALT		L-MD			
V	Nil	N	D	0.2			XX	ROAD BASE GRAVEL FILL - Grey.					
V	Nil	N	M	0.8			CL XX	CLAY FILL - Brown/dark grey, moist.	F-St		A	0.5	3374/107/ 0.5 PID (0.5) - 0.2ppm
V	Nil	N	M	1.0 1.4			CL	CLAY - Orange brown, moist, firm.	VSt		A	1.0	3374/107/ 1.0 PID (1.0) - 0.0ppm
V	Nil	N	M	2.0 2.3			VW-W	VERY WEAK TO WEAK SHALE - Grey, clay like properties.			A	1.5	3374/107/ 1.5 PID (1.5) - 0.1ppm
V													PID (2.5) - 0.0ppm
TC	Nil	N	D	3.0 3.7			W	WEAK SHALE - Brown/grey, dry.					
TC	Nil	N	D	4.0 4.1			W-MS	WEAK TO MEDIUM STRONG SHALE - Grey, dry.					Hard drilling from 3.7-4.1m PID (4.0) - 0.0ppm
				5.0				TC bit refusal at 4.1m in weak to medium strong shale.					
				6.0									
				7.0									
				8.0									
				9.0									

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
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EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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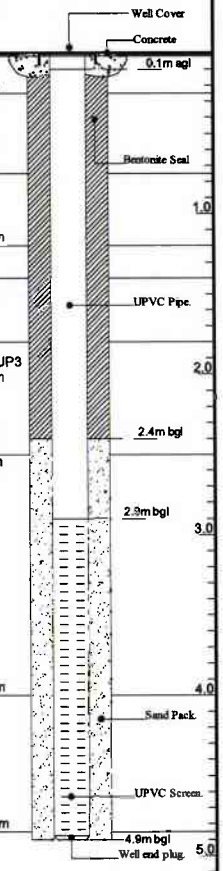
Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	29.03.12	COMPLETED	29.03.12	REF	BH108
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.85m depth	NORTHING	NA	ASPECT	NA	SLOPE	<2%

PCC Depot, Morton St, Parramatta

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS
V	Nil	N	D	0.03			XX	ASPHALT PAVEMENT.		L-MD	A	0.2	3374/108/ 0.2 PID (0.2) - 0.0ppm
V	Nil	N	D	0.25				ROAD BASE GRAVEL FILL - Grey.					
V	Nil	N	M	0.75			CL	CLAY(fill)- dark brown/red brown.	F		A	0.5	3374/108/ 0.5 PID (0.5) - 5.1ppm Hydrocarbon odour at 0.5m.
V	Nil	N	M	1.0 1.2			CL	SANDY CLAY (fill)-dark and light brown.	VSt		A	1.0	Hydrocarbon odour at 1.0m. 3374/108/ 1.0 PID (1.0) - 10.8ppm
V	Nil	N	M	1.4			CL	CLAY (fill) - dark/red brown	VSt				
V	Nil	N	M	1.8			CL	CLAY - Orange/brown, grading to grey/red mottled.	VSt		A	1.5	3374/108/ 1.5 PID (1.5) - 3.0ppm
V	Nil	N	D	2.0 2.5			VW-W	VERY WEAK TO WEAK SHALE - Grey.			A	2.0	3374/108/ 2.0 + DUP3 PID (2.0) - 165ppm Hydrocarbon odour at 2.0-2.5m.
											A	2.5	3374/108/ 2.5 PID (2.5) - 421ppm
TC	Nil	N	D	3.0 4.0			W	WEAK SHALE - Grey.			A	4.0	Hydrocarbon odour at 4.0m. 3374/108/ 4.0 PID (4.0) - 101ppm
TC	Nil	N 4.0-4.85	D/W	4.85			W-MS	WEAK TO MEDIUM STRONG SHALE- grey.			A	4.85	3374/108/ 4.85 PID (4.85) - 7.6ppm
				5.0				Borehole terminated at 4.85m, on weak to medium strong shale.					
				6.0									
				7.0									
				8.0									
				9.0									



EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	**COMMENCED**	28.03.12	**COMPLETED**	28.03.12	**REF**	**BH109**
PROJECT	Geotechnical & Contamination Assessment	**LOGGED**	BR	**CHECKED**	JF	**Sheet**	1 of 1
SITE	PCC Depot, Morton St, Parramatta	**GEOLOGY**	Shale	**VEGETATION**	NA - Asphalt	**PROJECT NO.**	P1203374
EQUIPMENT	Hydraulic Auger	**EASTING**	NA	**RL SURFACE**	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 2.7m depth	**NORTHING**	NA	**ASPECT**	South	**SLOPE**	5%

PCC Depot, Morton St, Parramatta

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE L M H R	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.05			XX	ASPHALT		L-MD	A	0.1	3374/105/ 0.1 PID (0.1) - 0.0ppm
V	Nil	N	D	0.2				ROAD BASE					
V	Nil	N	D	0.5			CL	CLAY - Grey, dry, firm.	F		A	0.5	3374/109/ 0.5 PID (0.5) - 0.0ppm
V	Nil	N	M	1.0			VW-W	VERY WEAK TO WEAK SHALE - Grey/orange.			A	1.0	PID (1.0) - 0.0ppm
				1.3									
V	Nil	N	D	2.0			W	WEAK SHALE - Grey.			A	1.5	3374/109/ 1.5 PID (1.5) - 0.0ppm
				2.6									PID (2.5) - 0.0ppm
V	Nil	N	D	2.7			W-MS	WEAK TO MEDIUM STRONG SHALE - Grey.					
				3.0				V-bit refusal at 2.7m on weak to medium strong shale.					
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	**COMMENCED**	29.03.12	**COMPLETED**	29.03.12	**REF**	**BH110**
PROJECT	Geotechnical & Contamination Assessment	**LOGGED**	BR	**CHECKED**	JF	**Sheet**	1 of 1
SITE	PCC Depot, Morton St, Parramatta	**GEOLOGY**	Shale	**VEGETATION**	NA - Asphalt	**PROJECT NO.**	P1203374
EQUIPMENT	Hydraulic Auger	**EASTING**	NA	**RL SURFACE**	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.0m depth	**NORTHING**	NA	**ASPECT**	South	**SLOPE**	5-10%

EXCAVATION DATA						MATERIAL DATA					SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS	
V	Nil	N	D	0.03				ASPHALT PAVEMENT.						
V	Nil	N	D	0.3			XX	SANDY CLAY (FILL) - Red brown and cream, possibly crushed sandstone.	F		A	0.2	3374/110/ 0.2 PID (0.2) - 0.0ppm	
V	Nil	N	D	0.7			CL	CLAY (FILL) - Dark brown, red brown, grey.	F		A	0.5	3374/110/ 0.5 PID (0.5) - 0.0ppm	
V	Nil	N	M	1.0 1.2			CL	CLAY (FILL?) - Dark brown.	St		A Bag	1.0 1.0	PID (1.0) - 0.0ppm 3374/110/ 1.0 3374/110/ 1.0	1.0
V	Nil	N	D	2.0 2.1			CL	CLAY - Red brown with grey mottles.	St-VSt		Bag A A	1.5 1.5 2.0	3374/110/ 1.5 3374/110/ 1.5 PID (1.5) - 0.0ppm 3374/110/ 2.0 PID (2.0) - 0.0ppm	2.0
V TC	Nil	N	D	3.0 3.5			CL	CLAY - Grey and light brown, minor fine sand.	VSt		A	2.5	3374/110/ 2.5 PID (2.5) - 0.0ppm	3.0
TC	Nil	N	D	4.0			W	WEAK SHALE - Grey.			A	4.0	3374/110/ 4.0	4.0
								Borehole terminated at 4.0m on weak shale.						
				5.0										5.0
				6.0										6.0
				7.0										7.0
				8.0										8.0
				9.0										9.0

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

Quality Sheet No. 4

CLIENT	Parramatta City Council(PCC)	**COMMENCED**	29.03.12	**COMPLETED**	29.03.12	**REF**	**BH111**
PROJECT	Geotechnical & Contamination Assessment	**LOGGED**	BR	**CHECKED**	JF	**Sheet**	1 of 1
SITE	PCC Depot, Morton St, Parramatta	**GEOLOGY**	Shale/Sandstone	**VEGETATION**	NA - Asphalt	**PROJECT NO.**	P1203374
EQUIPMENT	Hydraulic Auger	**EASTING**	NA	**RL SURFACE**	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.0m depth	**NORTHING**	NA	**ASPECT**	South	**SLOPE**	5-10%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.03				ASPHALT PAVEMENT.					
V	Nil	N	M	0.35			XX	ROAD BASE GRAVEL FILL - Grey.		L-MD	A	0.2	3374/111/0.2 PID (0.2) - 0.0ppm
V	Nil	N	M	1.0			CL	CLAY (FILL) - Grey and brown, gravels (5-15mm, 20%).	St		A	0.5	3374/111/0.5 PID (0.5) - 0.0ppm
				1.2							A	1.0	3374/111/1.0 PID (1.0) - 0.0ppm 1.0
V	Nil	N	D	1.3				RIPPED SHALE? (FILL) - Grey.					
V	Nil	N	M	2.0 2.1			CL	CLAY - Light brown, grades to light brown/grey fine grained sandy clay prior to 1.5m.	VSt		A	1.5	3374/111/1.5 PID (1.5) - 0.0ppm
											A	2.0	3374/111/2.0 PID (2.0) - 0.0ppm 2.0
V				3.0				CLAYEY SAND - Orange brown, grading to orange brown grey mottled sandy clay after approximately 3.0m?.		L?	A	2.5	3374/111/2.5 PID (2.5) - 0.0ppm 3.0
TC	Nil	N	M	4.0			SC				A	4.0	3374/111/4.0 PID (4.0) - 0.0ppm 4.0
								Borehole terminated at 4.0m on sandy clay.					
				5.0									5.0
				6.0									6.0
				7.0									7.0
				8.0									8.0
				9.0									9.0

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

Quality Sheet No. 4

CLIENT	Parramatta City Council (PCC)	COMMENCED	29.03.12	COMPLETED	29.03.12	**REF**	**BH112**
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale / Sandstone	VEGETATION	NA - Soil only	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 4.0m depth	NORTHING	NA	ASPECT	South East	SLOPE	5%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.05			SM	SILTY SAND (FILL) - Dark brown.		VL	A	0.2	3374/112/ 0.2 PID (0.2) - 0.0ppm
V	Nil	N	M	0.25			SP	SAND (FILL) - Brown, some clay/clayey sand.		VL			
											A	0.5	3374/112/ 0.5 PID (0.5) - 0.0ppm
											Bag	1.0	3374/112/ 1.0
				1.0							A	1.0	3374/112/ 1.0 PID (1.0) - 0.0ppm
V	Nil	N	M				CL	SANDY CLAY (FILL? To 0.75m base on DCP counts) - Light red brown, low clay content, grading to red brown with grey mottles silty clay.	F				1.0
											A	1.5	3374/112/ 1.5 PID (1.5) - 0.0ppm
									F-St				
				2.0							A	2.0	3374/112/ 2.0 PID (2.0) - 0.0ppm
				2.2									2.0
V													
											A	2.5	3374/112/ 2.5 PID (2.5) - 0.0ppm
TC	Nil	Y	M/W	3.0			CL	SANDY CLAY - Red brown and grey mottled.	VSt				3.0
													Note: Water in borehole at hole completion but 4.0m sample may generally dry with very minor wet pieces.
											A	4.0	3374/112/ 4.0 PID (4.0) - 0.0ppm
				4.0									4.0
								Borehole terminated at 4.0m in sandy clay.					
				5.0									5.0
				6.0									6.0
				7.0									7.0
				8.0									8.0
				9.0									9.0

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

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Engineering Log - Borehole

Quality Sheet No. 4

CLIENT		**COMMENCED**	29.03.12	**COMPLETED**	29.03.12	**REF**	**BH113**
PROJECT	**Geotechnical & Contamination Assessment**	**LOGGED**	BR	**CHECKED**	JF	**Sheet**	1 of 1
SITE	**PCC Depot, Morton St, Parramatta**	**GEOLOGY**	Shale / Sandstone	**VEGETATION**	NA - Asphalt	**PROJECT NO.**	P1203374
EQUIPMENT	Hydraulic Auger	**EASTING**	NA	**RL SURFACE**	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 7.0m depth	**NORTHING**	NA	**ASPECT**	South East	**SLOPE**	<2%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (LOW / MED / HIGH)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.03				ASPHALT PAVEMENT.					
V	Nil	N	M	0.5			XX	ROAD BASE GRAVEL FILL - Grey.		L-MD	A	0.2	3374/113/0.2 PID (0.2) - 0.0ppm
											A	0.5	3374/113/0.5
V	Nil	N	M	1.0 1.1			GM	SILTY GRAVEL (FILL) - Dark brown, gravels (10-15mm, 20%).			A	1.0	3374/113/1.0
V	Nil	N	D	1.7			OH	ORGANIC SILT (FILL) - Dark brown.	F		A	1.5	3374/113/1.5
V	Nil	N	M	2.0 2.1			CL	CLAY (FILL?) - Medium brown with light brown mottling.	F		A	2.0	3374/113/2.0
V											A	2.5	3374/113/2.5
TC	Nil	N	M	3.0 4.0 5.0 6.0			CL	CLAY - Light grey with light brown and red brown mottling.	St		A	4.0	3374/113/4.0 Ground water inflow occurred some where after approximately 6.0m.
TC	Nil	Y	M/W	6.5			CH	CLAY - Grey.	F-St				
TC	Nil	Y	W	7.0			CL	SANDY CLAY - Brown.	F-St				
				8.0 9.0				Borehole terminated at 7.0m in sandy clay.					

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	29.03.12	COMPLETED	29.03.12	REF	BH114
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Gravel car park	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 2.5m depth	NORTHING	NA	ASPECT	South	SLOPE	<2%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE (L M H R)	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.02				ROAD BASE					
V	Nil	N	D	0.3			CL	CLAY (FILL) - Variable colours: grey, red brown, brown.	St		A	0.2	3374/114/0.2
V	Nil	N	M	1.0			CL	CLAY (FILL) - Variable colours: grey, red brown, brown, content decrease and gravels (5-20mm, 10%).	F		A A	0.5 1.0	3374/114/0.5 3374/114/1.0
V	Nil	N	M	2.0			CL	CLAY (FILL) - Dark brown, aggregate gravels (10-20mm, 25%).	St		A A	1.5 2.0	3374/114/1.5 3374/114/2.0
V	Nil	N	M	2.5			OH		F		A	2.5	3374/114/2.5
				3.0				Borehole terminated at 2.5m in organic silt.					
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)
pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

MARTENS & ASSOCIATES PTY LTD
6/37 Leighton Place
Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999 Fax: (02) 9476 8767
mail@martens.com.au WEB: http://www.martens.com.au

Engineering Log - Borehole

CLIENT	Parramatta City Council (PCC)	COMMENCED	29.03.12	COMPLETED	29.03.12	REF	BH115
PROJECT	Geotechnical & Contamination Assessment	LOGGED	BR	CHECKED	JF	Sheet	1 of 1
SITE	PCC Depot, Morton St, Parramatta	GEOLOGY	Shale	VEGETATION	NA - Asphalt	PROJECT NO.	P1203374
EQUIPMENT	Hydraulic Auger	EASTING	NA	RL SURFACE	NA		
EXCAVATION DIMENSIONS	Ø0.1m X 2.5m depth	NORTHING	NA	ASPECT	South	SLOPE	5-10%

EXCAVATION DATA						MATERIAL DATA				SAMPLING & TESTING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE L M H R	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
V	Nil	N	D	0.03				ASPHALT PAVEMENT.					
V	Nil	N	M	0.3			XX	ROAD BASE GRAVEL FILL - Grey.		L-MD	A	0.2	3374/115/ 0.2 PID (0.2) - 0.0ppm
V	Nil	N	M	0.6			CL	CLAY - Light brown and grey mottled, plasticity increasing with depth.	F		Bag A	0.5 0.5	3374/115/ 0.5 3374/115/ 0.5 PID (0.5) - 0.0ppm
V	Nil	N	D	0.7			EW	EXTREMELY WEAK SHALE - Brown.					
V	Nil	N	M	1.0 1.1			CL	CLAY - Light brown and grey mottled.	F-St		A	1.0	3374/115/ 1.0 PID (1.0)- 0.0ppm
V	Nil	N	D	2.0 2.5			VW	VERY WEAK SHALE - Brown, grades to weak shale after approximately 1.75m. ORGANIC SILT - Dark brown, very moist.			A A A	1.5 2.0 2.5	3374/115/ 1.5 PID (1.5) - 0.0ppm 3374/115/ 2.0 PID (2.0) - 0.0ppm 3374/115/ 2.5 PID (2.5) - 0.0ppm
								Borehole terminated at 2.5m in weak shale.					

EQUIPMENT / METHOD
N Natural exposure
X Existing excavation
BH Backhoe bucket
HA Hand auger
A Auger
CC Concrete Corer
V V-Bit
TC Tungsten Carbide Bit
PT Push tube

SUPPORT
SH Shoring
SC Shotcrete
RB Rock Bolts
Nil No support

WATER
N None observed
X Not measured
Water level
Water outflow
Water inflow

MOISTURE
D Dry
M Moist
W Wet
Wp Plastic limit
Wl Liquid limit

PENETRATION
L Low
M Moderate
H High
R Refusal

CONSISTENCY
VS Very Soft
S Soft
F Firm
St Stiff
VSt Very Stiff
H Hard
F Friable

DENSITY
VL Very Loose
L Loose
MD Medium Dense
D Dense
VD Very Dense

SAMPLING & TESTING
A Auger sample
B Bulk sample
U Undisturbed sample
D Disturbed sample
M Moisture content
Ux Tube sample (x mm)

pp Pocket penetrometer
S Standard penetration test
VS Vane shear
DCP Dynamic cone penetrometer
FD Field density
WS Water sample

CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
Y USCS
N Agricultural

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

Quality Sheet No. 4

martens

MARTENS & ASSOCIATES PTY LTD
6/37 Leighton Place
Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999 Fax: (02) 9476 8767
mail@martens.com.au WEB: http://www.martens.com.au

Engineering Log - Borehole

9 Attachment C –DCP Sheet

Dynamic Cone Penetrometer Test Log Summary

martens
consulting engineers since 1989

6 / 37 Leighton Place, Hornsby, NSW 2159, Ph: (02) 9476 9999 Fax: (02) 9476 8767, mail@martens.com.au, www.martens.com.au

Site	PCC Depot- Mortion St Parramatta	**DCP Group Reference**	**3374**
Client	PCC	**Log Date**	28.3.2012
Logged by	BR/GT/JF		
Checked by	JF		
Comments			

TEST DATA

Depth Interval (m)	DCP102	DCP 104	DCP 107	DCP109	DCP 108	DCP 115	DCP110	DCP 111	DCP112	Design
0.15	14	–	–	–	–	–	–	–	2	**14**
0.30	12	20	–	–	–	–	15	–	9	**12**
0.45	4	5	17	16	–	4	4	16	3	**4**
0.60	5	4	8	32	5	10	4	9	3	**4**
0.75	18	8	9	18	5	48	5	6	3	**5**
0.90	40	9	11	12	15		15	12	7	**9**
1.05		7	15	19	30		17	13	6	**7**
1.20		11	17	14	18		17	40	6	**11**
1.35		15	18		20		18	25	9	**15**
1.50		25	23	Refusal @1.25	20		24	27	11	**20**
1.65		40	27		23		29	35	11	**23**
1.80			30		22				15	**22**
1.95					23				17	**23**
2.10									20	**20**
2.25					Bounce @ 1.86				29	**29**
2.40									26	**26**
2.55									24	**24**
2.70									35	**35**

10 Attachment D –Laboratory Analytical Certificates

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

CERTIFICATE OF ANALYSIS 71198

Client:
Martens & Associates Pty Ltd
6/37 Leighton Place
Hornsby
NSW 2077

Attention: Jeff Fulton

Sample log in details:

Your Reference:	**P1203374, Paramatta CC Depot**
No. of samples:	93 soils
Date samples received / completed instructions received	30/03/12 / 30/03/12, 02/04/12

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:	11/04/12 / 10/04/12
Date of Preliminary Report:	Not issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Giovanni Agosti
Technical Manager

Kim Femia
Approved Signatory

Jeremy Faircloth
Chemist

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH & BTEX in Soil						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	05/04/2012	05/04/2012	05/04/2012	05/04/2012	05/04/2012
vTRH C_6 - C_9	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
Surrogate aaa-Trifluorotoluene	%	88	94	101	99	93

vTRH & BTEX in Soil						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	05/04/2012	05/04/2012	05/04/2012	05/04/2012	05/04/2012
vTRH C_6 - C_9	mg/kg	<25	36	<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
Surrogate aaa-Trifluorotoluene	%	95	98	96	94	103

vTRH & BTEX in Soil						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	05/04/2012	05/04/2012	05/04/2012	05/04/2012	05/04/2012
vTRH C_6 - C_9	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
Surrogate aaa-Trifluorotoluene	%	96	97	100	100	98

vTRH & BTEX in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-85 3374/Dup1 - 28/03/2012 soil	71198-87 3374/Dup3 - 28/03/2012 soil	71198-88 Spike - 28/03/2012 soil	71198-89 Spike - 28/03/2012 soil	71198-90 Blank - 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	05/04/2012	05/04/2012	05/04/2012	05/04/2012	05/04/2012
vTRH C_6 - C_9	mg/kg	<25	<25	[NA]	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	90%	107%	<0.2
Toluene	mg/kg	<0.5	<0.5	94%	106%	<0.5
Ethylbenzene	mg/kg	<1	<1	105%	103%	<1
m+p-xylene	mg/kg	<2	<2	108%	103%	<2
o-Xylene	mg/kg	<1	<1	103%	109%	<1
Surrogate aaa-Trifluorotoluene	%	102	103	92	104	109

vTRH & BTEX in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-91 Blank - 28/03/2012 soil
Date extracted	-	03/04/2012
Date analysed	-	05/04/2012
vTRH C_6 - C_9	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	82

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
TRHC10 - C14	mg/kg	440	<50	80	<50	<50
TRHC15 - C28	mg/kg	1,300	130	220	<100	160
TRHC29 - C36	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	#	115	#	103	114

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
TRHC10 - C14	mg/kg	320	260	<50	<50	<50
TRHC15 - C28	mg/kg	1,100	1,100	<100	<100	<100
TRHC29 - C36	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	#	#	97	99	102

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
TRHC10 - C14	mg/kg	<50	<50	<50	<50	<50
TRHC15 - C28	mg/kg	<100	<100	<100	<100	<100
TRHC29 - C36	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	99	98	99	98	98

sTRH in Soil (C10-C36)			
Our Reference:	UNITS	71198-85	71198-87
Your Reference	----------	3374/Dup1	3374/Dup3
Depth	----------	-	-
Date Sampled		28/03/2012	28/03/2012
Type of sample		soil	soil
Date extracted	-	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012
TRHC10 - C14	mg/kg	320	<50
TRHC15 - C28	mg/kg	1,000	<100
TRHC29 - C36	mg/kg	<100	<100
Surrogate o-Terphenyl	%	#	102

PAHs in Soil						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Naphthalene	mg/kg	0.9	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.9	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	1.3	0.1	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.5
Pyrene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.5
Benzo(a)anthracene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.3
Chrysene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.3
Benzo(b+k)fluoranthene	mg/kg	<0.4	<0.2	<0.2	<0.2	0.6
Benzo(a)pyrene	mg/kg	<0.1	<0.05	<0.05	<0.05	0.39
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.2	<0.1	<0.1	<0.1	0.2
Surrogate p-Terphenyl-d14	%	111	112	109	103	109

PAHs in Soil						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Naphthalene	mg/kg	<0.2	<0.2	<0.1	1.2	<0.1
Acenaphthylene	mg/kg	<0.2	<0.2	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.2	<0.2	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.4	0.6	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.9	0.9	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.2	<0.2	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.2	<0.2	0.2	<0.1	<0.1
Pyrene	mg/kg	<0.2	0.2	0.2	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.2	<0.2	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.2	<0.2	0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.4	<0.4	0.3	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.1	<0.1	0.17	<0.05	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.2	<0.2	0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.2	<0.2	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.2	<0.2	0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	112	109	107	103	104

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-46 3374/110 0.5 28/03/2012 soil	71198-53 3374/111 0.5 28/03/2012 soil	71198-59 3374/112 0.2 28/03/2012 soil	71198-69 3374/113 1.5 28/03/2012 soil	71198-73 3374/114 0.2 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
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	0.2	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Phenanthrene	mg/kg	0.3	<0.1	0.1	1.5	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Fluoranthene	mg/kg	0.5	<0.1	0.4	2.0	0.2
Pyrene	mg/kg	0.5	<0.1	0.3	1.8	0.2
Benzo(a)anthracene	mg/kg	0.2	<0.1	0.2	0.8	0.1
Chrysene	mg/kg	0.2	<0.1	0.2	0.8	0.1
Benzo(b+k)fluoranthene	mg/kg	0.3	<0.2	0.4	1.3	0.3
Benzo(a)pyrene	mg/kg	0.21	<0.05	0.25	0.97	0.16
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.2	0.6	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	0.2	0.4	0.1
Surrogate p-Terphenyl-d14	%	100	107	99	103	96

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-85 3374/Dup1 - 28/03/2012 soil	71198-87 3374/Dup3 - 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012
Naphthalene	mg/kg	<0.2	<0.1
Acenaphthylene	mg/kg	<0.2	<0.1
Acenaphthene	mg/kg	<0.2	<0.1
Fluorene	mg/kg	0.4	<0.1
Phenanthrene	mg/kg	0.8	<0.1
Anthracene	mg/kg	<0.2	<0.1
Fluoranthene	mg/kg	<0.2	<0.1
Pyrene	mg/kg	<0.2	<0.1
Benzo(a)anthracene	mg/kg	<0.2	<0.1
Chrysene	mg/kg	<0.2	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.4	<0.2
Benzo(a)pyrene	mg/kg	<0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.2	<0.1
Surrogate p-Terphenyl-d14	%	110	102

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
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
Surrogate TCLMX	%	97	105	100	101	108

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
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
Surrogate TCLMX	%	98	97	106	102	103

Organochlorine Pesticides in soil						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
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
Surrogate TCLMX	%	105	99	100	103	103

Organophosphorus Pesticides						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Diazinon	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
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	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
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	105	100	101	108

Organophosphorus Pesticides						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Diazinon	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
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	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
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	98	97	106	102	103

Organophosphorus Pesticides						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Diazinon	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
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	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
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	105	99	100	103	103

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-2 3374/101 0.5 28/03/2012 soil	71198-3 3374/101 1. 28/03/2012 soil	71198-8 3374/102 1.0 28/03/2012 soil	71198-10 3374/102 2.0 28/03/2012 soil	71198-18 3374/104 0.5 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	105	100	101	108

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-21 3374/105 0.1 28/03/2012 soil	71198-30 3374/106 1.6 28/03/2012 soil	71198-36 3374/108 1.0 28/03/2012 soil	71198-39 3374/108 2.5 28/03/2012 soil	71198-40 3374/108 4.0 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	98	97	106	102	103

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	71198-46 3374/110 0.5 28/03/2012 soil	71198-53 3374/111 0.5 28/03/2012 soil	71198-59 3374/112 0.2 28/03/2012 soil	71198-69 3374/113 1.5 28/03/2012 soil	71198-73 3374/114 0.2 28/03/2012 soil
Date extracted	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	105	99	100	103	103

Total Phenolics in Soil						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Total Phenolics in Soil						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Date analysed	-	04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Acid Extractable metals in soil						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date digested	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	8	7	5	7	14
Copper	mg/kg	44	35	32	42	57
Lead	mg/kg	7	28	20	19	14
Mercury	mg/kg	<0.1	<0.1	0.1	0.1	<0.1
Nickel	mg/kg	33	8	6	9	32
Zinc	mg/kg	33	46	28	43	40

Acid Extractable metals in soil						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date digested	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Arsenic	mg/kg	<4	<4	<4	9	9
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	9	23	15	11	11
Copper	mg/kg	64	10	9	37	32
Lead	mg/kg	4	7	15	31	20
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	47	12	5	15	18
Zinc	mg/kg	44	23	17	74	100

Acid Extractable metals in soil						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date digested	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012	03/04/2012	03/04/2012	03/04/2012
Arsenic	mg/kg	9	5	<4	6	9
Cadmium	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	16	13	33	14	14
Copper	mg/kg	36	42	34	10	33
Lead	mg/kg	42	31	350	25	34
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	10	17	26	5	13
Zinc	mg/kg	40	51	190	23	65

Acid Extractable metals in soil			
Our Reference:	UNITS	71198-85	71198-87
Your Reference	----------	3374/Dup1	3374/Dup3
Depth	----------	-	-
Date Sampled		28/03/2012	28/03/2012
Type of sample		soil	soil
Date digested	-	03/04/2012	03/04/2012
Date analysed	-	03/04/2012	03/04/2012
Arsenic	mg/kg	<4	9
Cadmium	mg/kg	<0.5	<0.5
Chromium	mg/kg	8	12
Copper	mg/kg	61	43
Lead	mg/kg	4	23
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	45	29
Zinc	mg/kg	39	90

Moisture						
Our Reference:	UNITS	71198-2	71198-3	71198-8	71198-10	71198-18
Your Reference	----------	3374/101	3374/101	3374/102	3374/102	3374/104
Depth	----------	0.5	1.	1.0	2.0	0.5
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	03/04/12	03/04/12	03/04/12	03/04/12	03/04/12
Date analysed	-	04/04/12	04/04/12	04/04/12	04/04/12	04/04/12
Moisture	%	17	13	10	12	20

Moisture						
Our Reference:	UNITS	71198-21	71198-30	71198-36	71198-39	71198-40
Your Reference	----------	3374/105	3374/106	3374/108	3374/108	3374/108
Depth	----------	0.1	1.6	1.0	2.5	4.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	03/04/12	03/04/12	03/04/12	03/04/12	03/04/12
Date analysed	-	04/04/12	04/04/12	04/04/12	04/04/12	04/04/12
Moisture	%	4.7	13	11	11	5.8

Moisture						
Our Reference:	UNITS	71198-46	71198-53	71198-59	71198-69	71198-73
Your Reference	----------	3374/110	3374/111	3374/112	3374/113	3374/114
Depth	----------	0.5	0.5	0.2	1.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	03/04/12	03/04/12	03/04/12	03/04/12	03/04/12
Date analysed	-	04/04/12	04/04/12	04/04/12	04/04/12	04/04/12
Moisture	%	19	15	8.6	16	17

Moisture					
Our Reference:	UNITS	71198-85	71198-87	71198-90	71198-91
Your Reference	----------	3374/Dup1	3374/Dup3	Blank	Blank
Depth	----------	-	-	-	-
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil
Date prepared	-	03/04/12	03/04/12	03/04/12	03/04/12
Date analysed	-	04/04/12	04/04/12	04/04/12	04/04/12
Moisture	%	3.9	11	4.3	4.2

Asbestos ID - soils						
Our Reference:	UNITS	71198-2	71198-3	71198-18	71198-21	71198-30
Your Reference	----------	3374/101	3374/101	3374/104	3374/105	3374/106
Depth	----------	0.5	1.	0.5	0.1	1.6
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	5/04/2012	5/04/2012	5/04/2012	5/04/2012	5/04/2012
Sample mass tested	g	Approx 40g	Approx 40g	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	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71198-36	71198-42	71198-46	71198-53	71198-59
Your Reference	----------	3374/108	3374/109	3374/110	3374/111	3374/112
Depth	----------	1.0	0.1	0.5	0.5	0.2
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	5/04/2012	5/04/2012	5/04/2012	5/04/2012	5/04/2012
Sample mass tested	g	Approx 40g	Approx 40g	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	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	71198-69	71198-73	71198-75	71198-76	71198-77
Your Reference	----------	3374/113	3374/114	3374/114	3374/114	3374/114
Depth	----------	1.5	0.2	1.0	1.5	2.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date analysed	-	5/04/2012	5/04/2012	5/04/2012	5/04/2012	5/04/2012
Sample mass tested	g	Approx 40g	Approx 40g	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	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

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.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
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.
Inorg-030	Total Phenolics - determined colorimetrically following disitillation, based upon APHA 21st ED 5530 D.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 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.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			05/04/2012	71198-2	05/04/2012 || 05/04/2012	LCS-3	05/04/2012
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	71198-2	<25 || <25	LCS-3	94%
Benzene	mg/kg	0.2	Org-016	<0.2	71198-2	<0.2 || <0.2	LCS-3	88%
Toluene	mg/kg	0.5	Org-016	<0.5	71198-2	<0.5 || <0.5	LCS-3	90%
Ethylbenzene	mg/kg	1	Org-016	<1	71198-2	<1 || <1	LCS-3	100%
m+p-xylene	mg/kg	2	Org-016	<2	71198-2	<2 || <2	LCS-3	95%
o-Xylene	mg/kg	1	Org-016	<1	71198-2	<1 || <1	LCS-3	106%
Surrogate aaa-Trifluorotoluene	%		Org-016	99	71198-2	88 || 102 || RPD: 15	LCS-3	96%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-3	04/04/2012
TRHC $_{10}$ - C_{14}	mg/kg	50	Org-003	<50	71198-2	440 || 470 || RPD: 7	LCS-3	85%
TRHC $_{15}$ - C_{28}	mg/kg	100	Org-003	<100	71198-2	1300 || 1300 || RPD: 0	LCS-3	106%
TRHC $_{29}$ - C_{36}	mg/kg	100	Org-003	<100	71198-2	<100 || <100	LCS-3	101%
Surrogate o-Terphenyl	%		Org-003	101	71198-2	# || #	LCS-3	98%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	0.9 || 1.1 || RPD: 20	LCS-3	120%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	0.3 || 0.4 || RPD: 29	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	0.9 || 1.0 || RPD: 11	LCS-3	116%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	1.3 || 1.5 || RPD: 14	LCS-3	107%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	LCS-3	107%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	LCS-3	105%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	LCS-3	121%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	71198-2	<0.4 || <0.4	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	71198-2	<0.1 || <0.1	LCS-3	124%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	71198-2	<0.2 || <0.2	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	103	71198-2	111 || 110 || RPD: 1	LCS-3	106%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-3	04/04/2012
HCB	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	115%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	115%
Heptachlor	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	91%
delta-BHC	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	102%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	114%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	114%
Dieldrin	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	121%
Endrin	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	101%
pp-DDD	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	122%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	LCS-3	105%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-005	102	71198-2	97 || 96 || RPD: 1	LCS-3	97%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-3	04/04/2012
Diazinon	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	LCS-3	103%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	LCS-3	112%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	71198-2	<0.1 || <0.1	LCS-3	110%
Surrogate TCLMX	%		Org-008	102	71198-2	97 || 96 || RPD: 1	LCS-3	103%
QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			03/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-3	03/04/2012
Date analysed	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-3	04/04/2012
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	LCS-3	85%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	71198-2	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	102	71198-2	97 || 96 || RPD: 1	LCS-3	94%
QUALITY CONTROL Total Phenolics in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-1	04/03/2012
Date analysed	-			04/04/2012	71198-2	04/04/2012 || 04/04/2012	LCS-1	04/03/2012
Total Phenolics (as Phenol)	mg/kg	5	Inorg-030	<5	71198-2	<5 || <5	LCS-1	95%
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 digested	-			05/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-1	03/04/2012
Date analysed	-			05/04/2012	71198-2	03/04/2012 || 03/04/2012	LCS-1	03/04/2012
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	71198-2	<4 || <4	LCS-1	107%
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	71198-2	<0.5 || <0.5	LCS-1	113%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	71198-2	8 || 8 || RPD: 0	LCS-1	110%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	71198-2	44 || 53 || RPD: 19	LCS-1	109%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	71198-2	7 || 7 || RPD: 0	LCS-1	108%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	71198-2	<0.1 || <0.1	LCS-1	99%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	71198-2	33 || 37 || RPD: 11	LCS-1	110%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	71198-2	33 || 39 || RPD: 17	LCS-1	110%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	05/04/2012 || 05/04/2012	71198-3	05/04/2012
vTRH C_6 - C_9	mg/kg	71198-46	<25 || <25	71198-3	93%
Benzene	mg/kg	71198-46	<0.2 || <0.2	71198-3	92%
Toluene	mg/kg	71198-46	<0.5 || <0.5	71198-3	99%
Ethylbenzene	mg/kg	71198-46	<1 || <1	71198-3	90%
m+p-xylene	mg/kg	71198-46	<2 || <2	71198-3	92%
o-Xylene	mg/kg	71198-46	<1 || <1	71198-3	94%
Surrogate aaa-Trifluorotoluene	%	71198-46	96 || 94 || RPD: 2	71198-3	93%

QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
TRHC $_{10}$ - C_{14}	mg/kg	71198-46	<50 || <50	71198-3	120%
TRHC $_{15}$ - C_{28}	mg/kg	71198-46	<100 || <100	71198-3	127%
TRHC $_{29}$ - C_{36}	mg/kg	71198-46	<100 || <100	71198-3	101%
Surrogate o-Terphenyl	%	71198-46	99 || 98 || RPD: 1	71198-3	104%

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Naphthalene	mg/kg	71198-46	<0.1 || <0.1	71198-3	115%
Acenaphthylene	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	71198-46	<0.1 || <0.1	71198-3	110%
Phenanthrene	mg/kg	71198-46	0.3 || 0.2 || RPD: 40	71198-3	102%
Anthracene	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	71198-46	0.5 || 0.3 || RPD: 50	71198-3	103%
Pyrene	mg/kg	71198-46	0.5 || 0.3 || RPD: 50	71198-3	101%
Benzo(a)anthracene	mg/kg	71198-46	0.2 || 0.1 || RPD: 67	[NR]	[NR]
Chrysene	mg/kg	71198-46	0.2 || 0.2 || RPD: 0	71198-3	115%
Benzo(b+k)fluoranthene	mg/kg	71198-46	0.3 || 0.3 || RPD: 0	[NR]	[NR]
Benzo(a)pyrene	mg/kg	71198-46	0.21 || 0.16 || RPD: 27	71198-3	121%
Indeno(1,2,3-c,d)pyrene	mg/kg	71198-46	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	71198-46	0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%	71198-46	100 || 107 || RPD: 7	71198-3	100%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
HCB	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	71198-46	<0.1 || <0.1	71198-3	115%
gamma-BHC	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	71198-46	<0.1 || <0.1	71198-3	116%
Heptachlor	mg/kg	71198-46	<0.1 || <0.1	71198-3	90%
delta-BHC	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	71198-46	<0.1 || <0.1	71198-3	101%
Heptachlor Epoxide	mg/kg	71198-46	<0.1 || <0.1	71198-3	115%
gamma-Chlordane	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	71198-46	<0.1 || <0.1	71198-3	114%
Dieldrin	mg/kg	71198-46	<0.1 || <0.1	71198-3	122%
Endrin	mg/kg	71198-46	<0.1 || <0.1	71198-3	78%
pp-DDD	mg/kg	71198-46	<0.1 || <0.1	71198-3	92%
Endosulfan II	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Endosulfan Sulphate	mg/kg	71198-46	<0.1 || <0.1	71198-3	104%
Methoxychlor	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71198-46	105 || 107 || RPD: 2	71198-3	94%
QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
Diazinon	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	71198-46	<0.1 || <0.1	71198-3	97%
Fenitrothion	mg/kg	71198-46	<0.1 || <0.1	71198-3	104%
Bromophos-ethyl	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	71198-46	<0.1 || <0.1	71198-3	106%
Surrogate TCLMX	%	71198-46	105 || 107 || RPD: 2	71198-3	95%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	03/04/2012 || 03/04/2012	71198-3	03/04/2012
Date analysed	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
Arochlor 1016	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	71198-46	<0.1 || <0.1	71198-3	105%
Arochlor 1260	mg/kg	71198-46	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	71198-46	105 || 107 || RPD: 2	71198-3	89%
QUALITY CONTROL Total Phenolics in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
Date analysed	-	71198-46	04/04/2012 || 04/04/2012	71198-3	04/04/2012
Total Phenolics (as Phenol)	mg/kg	71198-46	<5 || <5	71198-3	94%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	71198-46	03/04/2012 || 03/04/2012	LCS-2	03/04/2012
Date analysed	-	71198-46	03/04/2012 || 03/04/2012	LCS-2	03/04/2012
Arsenic	mg/kg	71198-46	9 || 7 || RPD: 25	LCS-2	92%
Cadmium	mg/kg	71198-46	<0.5 || <0.5	LCS-2	98%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Chromium	mg/kg	71198-46	16 || 14 || RPD: 13	LCS-2	97%
Copper	mg/kg	71198-46	36 || 40 || RPD: 11	LCS-2	113%
Lead	mg/kg	71198-46	42 || 36 || RPD: 15	LCS-2	97%
Mercury	mg/kg	71198-46	<0.1 || <0.1	LCS-2	99%
Nickel	mg/kg	71198-46	10 || 11 || RPD: 10	LCS-2	97%
Zinc	mg/kg	71198-46	40 || 47 || RPD: 16	LCS-2	103%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	71198-3	03/04/2012
Date analysed	-	[NT]	[NT]	71198-3	03/04/2012
Arsenic	mg/kg	[NT]	[NT]	71198-3	92%
Cadmium	mg/kg	[NT]	[NT]	71198-3	98%
Chromium	mg/kg	[NT]	[NT]	71198-3	97%
Copper	mg/kg	[NT]	[NT]	71198-3	113%
Lead	mg/kg	[NT]	[NT]	71198-3	97%
Mercury	mg/kg	[NT]	[NT]	71198-3	99%
Nickel	mg/kg	[NT]	[NT]	71198-3	97%
Zinc	mg/kg	[NT]	[NT]	71198-3	103%

Report Comments:

Total Recoverable Hydrocarbons in soil (semivol):# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

PAH (in soil)PQL has been raised due to interference from analytes(other than those being tested) in the sample/s.

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.

Asbestos ID was analysed by Approved Identifier:	Alex Tam
Asbestos ID was authorised by Approved Signatory:	Kim Femia

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: 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.

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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 batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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CERTIFICATE OF ANALYSIS 71198-A

Client:
Martens & Associates Pty Ltd
6/37 Leighton Place
Hornsby
NSW 2077

Attention: Jeff Fulton / Ben McGiffin

Sample log in details:

Your Reference:	**P1203374, Paramatta CC Depot**
No. of samples:	Additional Testing on 9 Soils
Date samples received / completed instructions received	30/03/12 / 12/04/12

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:	19/04/12 / 18/04/12
Date of Preliminary Report:	Not issued

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

Results Approved By:

Nancy Zhang
Chemist

Giovanni Agosti
Technical Manager

vTRH & BTEX in Soil						
Our Reference:	UNITS	71198-A-22	71198-A-23	71198-A-35	71198-A-37	71198-A-38
Your Reference	----------	3374/105	3374/105	3374/108	3374/108	3374/108
Depth	----------	0.5	1.0	0.5	1.5	2.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	16/04/2012	16/04/2012	16/04/2012	16/04/2012	16/04/2012
Date analysed	-	16/04/2012	16/04/2012	16/04/2012	16/04/2012	16/04/2012
vTRH C_6 - C_9	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
Surrogate aaa-Trifluorotoluene	%	104	98	102	100	99

sTRH in Soil (C10-C36)						
Our Reference:	UNITS	71198-A-22	71198-A-23	71198-A-35	71198-A-37	71198-A-38
Your Reference	----------	3374/105	3374/105	3374/108	3374/108	3374/108
Depth	----------	0.5	1.0	0.5	1.5	2.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	16/04/2012	16/04/2012	16/04/2012	16/04/2012	16/04/2012
Date analysed	-	16/04/2012	16/04/2012	16/04/2012	16/04/2012	16/04/2012
$TRHC_{10}$ - 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
Surrogate o-Terphenyl	%	91	89	90	90	89

Aromatic & Aliphatic TPH				
Our Reference:	UNITS	71198-A-2	71198-A-21	71198-A-30
Your Reference	----------	3374/101	3374/105	3374/106
Depth	----------	0.5	0.1	1.6
Date Sampled		28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil
Date extracted	-	16/04/2012	16/04/2012	16/04/2012
Date analysed	-	17/04/2012	17/04/2012	17/04/2012
C16-C35 Aliphatic	mg/kg	480	510	500
>C35 Aliphatic	mg/kg	<100	<100	<100
C16-C35 Aromatic	mg/kg	210	190	200
Surrogate 1-chlorooctadecane	%	88	99	96

Acid Extractable metals in soil		
Our Reference:	UNITS	71198-A-60
Your Reference	----------	3374/112
Depth	----------	0.5
Date Sampled		28/03/2012
Type of sample		soil
Date digested	-	16/04/2012
Date analysed	-	16/04/2012
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.5
Chromium	mg/kg	12
Copper	mg/kg	7
Lead	mg/kg	15
Mercury	mg/kg	0.1
Nickel	mg/kg	4
Zinc	mg/kg	11

Moisture						
Our Reference:	UNITS	71198-A-22	71198-A-23	71198-A-35	71198-A-37	71198-A-38
Your Reference	----------	3374/105	3374/105	3374/108	3374/108	3374/108
Depth	----------	0.5	1.0	0.5	1.5	2.0
Date Sampled		28/03/2012	28/03/2012	28/03/2012	28/03/2012	28/03/2012
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	16/04/12	16/04/12	16/04/12	16/04/12	16/04/12
Date analysed	-	17/04/12	17/04/12	17/04/12	17/04/12	17/04/12
Moisture	%	15	20	15	20	13

Moisture		
Our Reference:	UNITS	71198-A-60
Your Reference	----------	3374/112
Depth	----------	0.5
Date Sampled		28/03/2012
Type of sample		soil
Date prepared	-	16/04/12
Date analysed	-	17/04/12
Moisture	%	13

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.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. Fractionation with pentane through a silica gel column for aliphatics and DCM for aromatics.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.

QUALITY CONTROL vTRH & BTEX in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2012	[NT]	[NT]	LCS-2	16/04/2012
Date analysed	-			16/04/2012	[NT]	[NT]	LCS-2	16/04/2012
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-2	97%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-2	83%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-2	90%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	99%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-2	107%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	119%
Surrogate aaa-Trifluorotoluene	%		Org-016	109	[NT]	[NT]	LCS-2	109%
QUALITY CONTROL sTRH in Soil (C10-C36)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2012	[NT]	[NT]	LCS-2	16/04/2012
Date analysed	-			16/04/2012	[NT]	[NT]	LCS-2	16/04/2012
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-2	81%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	90%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	86%
Surrogate o-Terphenyl	%		Org-003	95	[NT]	[NT]	LCS-2	93%
QUALITY CONTROL Aromatic & Aliphatic TPH	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2012	[NT]	[NT]	LCS-1	16/04/2012
Date analysed	-			17/04/2012	[NT]	[NT]	LCS-1	17/04/2012
C16-C35 Aliphatic	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	102%
>C35 Aliphatic	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	98%
C16-C35 Aromatic	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	95%
Surrogate 1-chlorooctadecane	%	0	Org-003	105	[NT]	[NT]	LCS-1	123%
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 digested	-			16/04/2012	[NT]	[NT]	LCS-1	16/04/2012
Date analysed	-			16/04/2012	[NT]	[NT]	LCS-1	16/04/2012
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-1	99%
Cadmium	mg/kg	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	LCS-1	105%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	100%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-1	127%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	102%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

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
NA: 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

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enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 71406

Client:
Martens & Associates Pty Ltd
6/37 Leighton Place
Hornsby
NSW 2077

Attention: Ben McGiffin

Sample log in details:

Your Reference:	**P1203374, Morton St**
No. of samples:	4 soil, 4 materials
Date samples received / completed instructions received	04/04/12 / 04/04/12

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:	13/04/12 / 12/04/12
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Lulu Guo
Approved Signatory

ACCREDITED FOR TECHNICAL COMPETENCE

Asbestos ID - soils Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	71406-1 3374/SS1 04/04/2012 soil	71406-2 3374/SS2 04/04/2012 soil	71406-3 3374/SS3 04/04/2012 soil	71406-4 3374/SS4 04/04/2012 soil
Date analysed	-	12/04/2012	12/04/2012	12/04/2012	12/04/2012
Sample mass tested	g	Approx 120g	62.01g	Approx 120g	A)2.05g B) 119.06g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	A) Fibre cement material B) Brown soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	Chrysotile asbestos detected Crocidolite asbestos detected	No asbestos detected at reporting limit of 0.1g/kg	A)Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected B)No asbestos detected at reporting limit of 0.1g
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - materials					
Our Reference:	UNITS	71406-5	71406-6	71406-7	71406-8
Your Reference	----------	3374/ASB1	3374/ASB2	3374/ASB3	3374/ASB4
Date Sampled	----------	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Type of sample		material	material	material	material
Date analysed	-	12/04/2012	12/04/2012	12/04/2012	12/04/2012
Mass / Dimension of Sample	-	65x55x7mm	112x37x3mm	70x25x5mm	50x33x5mm
Sample Description	-	Grey compressed fibre cement material	Grey compressed fibre cement material	Grey compressed fibre cement material	Grey compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected	Chrysotile asbestos detected	Chrysotile asbestos detected	Chrysotile asbestos detected Crocidolite 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.

Report Comments:

Sample 71406-2; Loose fibre bundle of Chrysotile & crocidolite asbestos identified within the sample and Chrysotile asbestos identified embedded in a fragment of fibre cement (total weight 1.3561g). It is estimated that the total asbestos contains up to 25% asbestos fibres by weight. This calculates to 0.3383g of asbestos fibres, which in 62.01g of soil is 5.47g/kg (i.e. > reporting limit for the method of 0.1g/kg).

Sample 71406-4; The supplied sample was sub-sampled (71406-4A & 71406-4B) in order to accurately report the analytical results representative of the entire sample, as per AS4964-2004.

Sample 71406-4A; Chrysotile, amosite & crocidolite asbestos identified embedded in a fragments of fibre cement.

Asbestos ID was analysed by Approved Identifier: Paul Ching, Alex Tam
Asbestos ID was authorised by Approved Signatory: Lulu Guo

INS: Insufficient sample for this test
NA: 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 batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

11 Attachment E- Atterberg Limits and Linear Shrinkage

Network Geotechnics
Geotechnical Engineering, Consulting & Testing Services

ACN 069 211
Unit 12 9-15 Gundah Road
Mt Kuring-Gai,NSW,,AUSTRALIA
02 8438 0300
02 8438 0310
laboratory@netgeo.com.au

TEST REPORT

Sheet: 1 of 1

Client:	Martens & Associates	Job No:	G09/689
Project:	Lab Testing Project # P1203374	Report No:	4
Location:	N/A	Report Date:	18/04/2012
GTR Number:	#P1203374	Tested By:	Cameron Hunt

Sample Identification

Sample Description :	Sandy CLAY, brown	Sampling Procedure:	Sampled By Client
Sample Number:	3374/115/0.5	Date Sampled:	12/04/2012
Laboratory Number:	G16017	Sample History:	Oven Dried
Client Number:	#P1203374	Preparation Method:	Oven Dry
		Shrinkage Mould Length:	250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L) AS1289 3.1.1	%	50	
Plastic Limit (W_P) AS1289.3.2.1	%	20	
Plasticity Index (I_P) AS1289.3.3.1	%	30	
Linear Shrinkage(L_S) AS1289.3.4.1	%	10.5	
Moisture Content Method: AS1289.2.1.1			

REMARKS:

NATA WORLD RECOGNISED ACCREDITATION

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Mt Kuring-Gai Laboratory 1318

APPROVED SIGNATORY
Josh Tidswell

DATE
18/04/2012

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TEST REPORT

Sheet: 1 of 1

Client:	Martens & Associates	Job No:	G09/689
Project:	Lab Testing Project # P1203374	Report No:	3
Location:	N/A	Report Date:	18/04/2012
GTR Number:	#P1203374	Tested By:	Cameron Hunt

Sample Identification

Sample Description :	Sandy CLAY, brown	Sampling Procedure:	Sampled By Client
Sample Number:	3374/110/1.5	Date Sampled:	12/04/2012
Laboratory Number:	G16016	Sample History:	Oven Dried
Client Number:	#P1203374	Preparation Method:	Oven Dry
		Shrinkage Mould Length:	250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L) AS1289 3.1.1	%	66	
Plastic Limit (W_P) AS1289.3.2.1	%	21	
Plasticity Index (I_P) AS1289.3.3.1	%	45	
Linear Shrinkage(L_S) AS1289.3.4.1	%	17.5	
Moisture Content Method: AS1289.2.1.1			

REMARKS:

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APPROVED SIGNATORY
Josh Tidswell

DATE
18/04/2012

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laboratory@netgeo.com.au

TEST REPORT

Client:	Martens & Associates	Job No:	G09/689
Project:	Lab Testing Project # P1203374	Report No:	2
Location:	N/A	Report Date:	18/04/2012
GTR Number:	#P1203374	Tested By:	Cameron Hunt

Sample Identification

Sample Description :	Sandy CLAY, brown	Sampling Procedure:	Sampled By Client
Sample Number:	3374/105/1.5	Date Sampled:	12/04/2012
Laboratory Number:	G16015	Sample History:	Oven Dried
Client Number:	#P1203374	Preparation Method:	Oven Dry
		Shrinkage Mould Length:	250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L) AS1289 3.1.1	%	72	
Plastic Limit (W_P) AS1289.3.2.1	%	28	
Plasticity Index (I_P) AS1289.3.3.1	%	44	
Linear Shrinkage(L_S) AS1289.3.4.1	%	15.0	
Moisture Content Method: AS1289.2.1.1			

REMARKS:

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APPROVED SIGNATORY
Josh Tidswell

DATE
18/04/2012

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02 8438 0300
02 8438 0310
laboratory@netgeo.com.au

TEST REPORT

Client: Martens & Associates
Project: Lab Testing Project # P1203374
Location: N/A
GTR Number: #P1203374

Sheet: 1 of 1
Job No: G09/689
Report No: 1
Report Date: 18/04/2012
Tested By: Cameron Hunt

Sample Identification

Sample Description : Sandy CLAY, dark brown
Sampling Procedure: Sampled By Client

Sample Number: 3374/105/0.7
Laboratory Number: G16014
Client Number: #P1203374

Date Sampled: 12/04/2012
Sample History: Oven Dried
Preparation Method: Oven Dry
Shrinkage Mould Length: 250 (mm)

ATTERBERG LIMITS & LINEAR SHRINKAGE

TEST PROCEDURE		TEST RESULTS	SPECIFICATION
Liquid Limit (W_L) AS1289 3.1.1	%	42	
Plastic Limit (W_P) AS1289.3.2.1	%	22	
Plasticity Index (I_P) AS1289.3.3.1	%	20	
Linear Shrinkage(L_S) AS1289.3.4.1	%	8.0	
Moisture Content Method: AS1289.2.1.1			

REMARKS:

NATA WORLD RECOGNISED ACCREDITATION

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Mt Kuring-Gai Laboratory 1318

APPROVED SIGNATORY
Josh Tidswell

DATE
18/04/2012

Atterberg Limits Test Summary

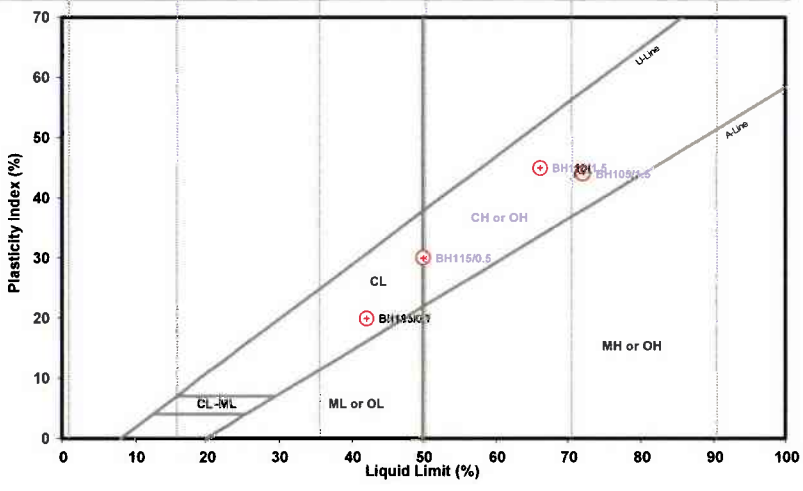
6/37 Leighton Place, Hornsby, NSW 2077, Ph: (02) 9476 9999 Fax: (02) 9476 8767, mail@martens.com.au, www.martens.com.au

PROJECT DETAILS

Project	PPC Depot, Morton St Parramatta			Ref. No.	P0123374
Officer	BM	Reviewed	JF	Date Created	19.04.2012

TEST NUMBER	USCS Class	Liquid Limit (%)	Plasticity Index (%)	Sample ID	Plastic Limit (%)
1	CL	50.0	30.0	BH115/0.5	20.0
2	CL	42.0	20.0	BH105/0.7	22.0
3	CH	72.0	44.0	BH105/1.5	28.0
4	CH	66.0	45.0	BH110/1.5	21.0
5					
6					
7					
8					
9					
10					

Plasticity	Non-plastic	Low	Intermediate	High	V. High	Extreme
Symbol	NP	L	I	H	V	E



12 Attachment F – Tabulated Laboratory Results

Parramatta Council Depot: Morton St, Parramatta (Laboratory Results Table 1)

Chemical of Concern	Adopted Assessment Criteria					Sample Number															
	Soil LOR[1]	NSW EPA (1995)	DEC (2006) Column 4-Residential with accessible soil	ANZECC (2000)-95% Trigger Value	Service Station	3374/101/0.5	3374/101/1.0	3374/102/1.0	3374/102/2.0	3374/104/0.5	3374/105/0.1	3374/106/1.6	3374/108/1.0	3374/108/2.5	3374/108/4.0	3374/110/0.5	3374/111/0.5	3374/112/0.2	3374/113/1.5	3374/114/0.2	3374/105/0.5	3374/105/1.0	3374/108/0.5	3374/10/1.5
BTEX																							
Benzene	<0.2	1	–	–	300	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	<0.5	1.4	–	–	300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<1	3.1	–	–	140	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylene	<3	14	–	–	–	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Recoverable Hydrocarbons																							
TPH C_6 - C_9	<25	65	–	–	–	<25	<25	<25	<25	<25	<25	36	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TPH C_{10} - C_{14}	<50	–	–	–	–	440	<50	80	<50	<50	320	260	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TPH C_{15} - C_{28}	<100	–	–	–	–	1300	130	220	<100	160	1100	1100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TPH C_{29} - C_{36}	<100	–	–	–	–	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Total TPH C_{10} - C_{36}	<250	1000	–	–	–	<1840	<280	<400	<250	<310	<1520	<1460	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
Polyaromatic Hydrocarbons																							
Benzo(a)pyrene	<0.05	–	1	–	–	<1	<0.05	<0.05	<0.05	0.39	<1	<0.1	0.17	<0.05	0.07	0.21	<0.05	0.25	0.97	0.16	–	–	0.79	<0.05
Total PAH	<1.55	–	20	–	3	<5.7	<1.55	<1.55	<1.55	<3.79	<4.0	<4.2	<1.97	<2.65	<1.57	<3.01	<1.55	<2.85	<11.27	<1.96	–	–	<8.48	<1.55
Phenolics																							
Total Phenols	<5	–	–	–	320	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	–	–	–	–	–	–	–	–	–
Heavy Metals																							
Arsenic	<4	–	100	24	–	<4	<4	<4	<4	4	<4	<4	<4	9	9	9	5	<4	6	9	–	–	–	–
Cadmium	<0.5	–	20	0.2	–	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	–	–	–	–
Chromium (IV)	<1	–	100	1	–	8	7	5	7	14	9	23	15	11	11	16	13	33	14	14	–	–	–	–
Copper	<1	–	1000	1.4	–	44	35	32	42	57	64	10	9	37	32	36	42	34	10	33	–	–	–	–
Lead	<1	–	300	3.4	–	7	28	20	19	14	4	7	15	31	20	42	31	350	25	34	–	–	–	–
Mercury	<0.1	–	15	0.6	–	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	–	–	–	–
Nickel	<1	–	600	11	–	33	8	6	9	32	47	12	5	15	18	10	17	26	5	13	–	–	–	–
Zinc	<1	–	7000	8	–	33	46	28	43	40	44	23	17	74	100	40	51	190	23	65	–	–	–	–
C16-C35 Aliphatic	–	–	5,600	–	–	480	–	–	–	–	510	500	–	–	–	–	–	–	–	–	–	–	–	–
>C35 Aliphatic	–	–	56,000	–	–	<100	–	–	–	–	<100	<100	–	–	–	–	–	–	–	–	–	–	–	–
C16-C35 Aromatic	–	–	90	–	–	210	–	–	–	–	190	200	–	–	–	–	–	–	–	–	–	–	–	–

Legend:

Investigation Level Exceeds Assessment Critera

NSW EPA (1994) Service Station Guidelines

NSW DEC (2006) Colum I - Residential with accessible soil

ANZECC (2000)-95% Trigger Value

NSW EPA (1994) Service Station Guidelines - Fresh water threshold values

Note:

[1] Limit of Reporting

All results in mg/kg unless otherwise noted

Parramatta Council Depot: Morton St, Parramatta (RPD)

	LOR[1]	Primary	Intra-laboratory	RPD (%)	Primary	Intra-laboratory	RPD (%)
BTEX		3374/105/0.1	3374/DUP1		3374/108/2.5	3374/Dup3	
Benzene	**<0.2**	<0.2	<0.2	0%	<0.2	<0.2	0%
Toluene	**<0.5**	<0.5	<0.5	0%	<0.5	<0.5	0%
Ethylbenzene	**<1**	<1	<1	0%	<1	<1	0%
Total Xylene	**<3**	<3	<3	0%	<3	<2	0%
Total Recoverable Hydrocarbons							
TPH C_6 - C_9	**<25**	<25	<25	0%	<25	<25	0%
TPH C_{10} - C_{14}	**<50**	320	320	0%	<50	<50	0%
TPH C_{15} - C_{28}	**<100**	1100	1000	10%	<100	<100	0%
TPH C_{29} - C_{36}	**<100**	<100	<100	0%	<100	<100	0%
Total TPH C_{10} - C_{36}	**<250**	1520	1420	7%	<250	<250	0%
Polyaromatic Hydrocarbons							
Benzo(a)pyrene	**<0.05**	<0.1	<0.1	0%	<0.05	<0.55	0%
Total PAH	**<1.55**	4	3.9	3%	<1.55	<1.55	0%
Heavy Metals							
Arsenic	**<4**	<4	<4	0%	9	9	0%
Cadmium	**<0.5**	<0.5	<0.5	0%	<0.5	<0.5	0%
Chromium (III)	**<1**	9	8	12%	11	12	9%
Copper	**<1**	64	61	5%	37	43	15%
Lead	**<1**	4	4	0%	31	23	30%
Mercury	**<0.1**	<0.1	<0.1	0%	<0.1	<0.1	0%
Nickel	**<1**	47	45	4%	15	29	64%
Zinc	**<1**	44	39	12%	74	90	20%

13 Attachment G- Data Validation Report

martens
consulting engineers since 1989

DATA VALIDATION REPORT: 1A Morton St, Parramatta

1. Sample Handling

	Yes	No (Comments below)
a. Were sample holding times met?	✓	
b. Were samples in proper custody between the field and reaching the laboratory?	✓	
c. Were the samples properly and adequately preserved?	✓	
d. Were the samples received by the laboratory in good condition?	✓	

COMMENTS

Sample handling is:

✓ **Satisfactory**

Partially Satisfactory

Unsatisfactory

DATA VALIDATION REPORT: 1A Morton St, Parramatta

2. Precision / Accuracy Statement

	Yes	No (Comments below)
a. Was a NATA registered laboratory used?	✓	
b. Did the laboratory perform the requested tests?	✓	
c. Were laboratory methods adopted NATA endorsed?	✓	
d. Were appropriate test procedures followed?	✓	
e. Were reporting limits satisfactory?	✓	
f. Was the NATA Seal on the reports?	✓	
g. Were reports signed by an authorised person?	✓	

COMMENTS

Precision / Accuracy of the Laboratory Report:	✓	**Satisfactory**
		Partially Satisfactory
		Unsatisfactory

DATA VALIDATION REPORT: 1A Morton St, Parramatta

3. Field Quality Assurance / Quality Control (QA/QC)

	Media	Number
a. Number of Primary Samples analysed *(does not include duplicates)*	Soil:	23
	Water:	2
	Material	4
b. Number of days of sampling		2

c. Number and Type of QA/QC Samples analysed	Soil	Water
Intra-Laboratory Field Duplicates	1	
Inter-Laboratory Field triplicates		
Trip Blanks	1	1
Wash Blanks		1
Other (Field Blanks, Spikes,Trip Blanks, etc.)	1	

Field Duplicates

	Yes	No (Comments below)
Adequate Numbers of intra-laboratory field duplicates analysed?	✓	
Adequate Numbers of inter-laboratory field duplicates analysed?	✓	
Were RPDs within Control Limits?		
i. Organics (+ 50%)	✓	
ii. Metals / Inorganics (+ 50%)		✓
iii. Nutrients (+ 50%)	N/A	

COMMENTS

RPD for Nickel exceeds control limits for 3374/108/2.5 and 3374/Dup3 (64%), but concentrations are well below adopted guideline limits and therefore not considered significant to effect results

DATA VALIDATION REPORT: 1A Morton St, Parramatta

Summary of Quality Assurance / Quality Control (QA/QC)

QA/QC Type	Satisfactory	Partially Satisfactory	Unsatisfactory
Sample handling	✓		
Precision / Accuracy of the Laboratory Report	✓		
Field QA / QC	✓		
Laboratory Internal QA / QC	✓		

Data Usability

1. Data directly usable ✓

2. Data usable with the following corrections/modifications
   (see comment below)

3. Data not usable.

COMMENTS

REV.	DESCRIPTION	DATE	ISSUED
1	Geotechnical and Contamination Assessment	22.03.2012	BM

NOT TO SCALE

DESIGNED: BM | DATUM: NA
DRAWN/REVIEWED: BM/JF | NA
PAPER SIZE: A3 | VERTICAL RATIO: NA

Parramatta City Council

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in mm unless otherwise specified.

martens & Associates Pty Ltd
Consulting Engineers
Environment
Water
Geotechnical
Civil
6/37 Leighton Place, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: http://www.martens.com.au

TESTING LOCATIONS

PROJECT MANAGER: JEFF FULTON

DRAWING NUMBER: P1203374JD01V01

SHEET 2 OF 2 SHEETS

NORTH

RANGIHOU CR.

NEW ZEALAND STREET

HARVEY STREET

RESIDENTIAL

RESIDENTIAL

BARBED WIRE BOUNDARY FENCE

GATE

PEDESTRIAN ACCESS ONLY

COMPOUND

Southern waste storage/stockpiles

OPEN SPACE

ANIMAL POUND

Southern vehical car park

L.P.G. STORAGE

UNDERGROUND 2X 30,000L DISTILLATE

Tankfarm 1

4 DISTILLATE DISPENSING POINTS 1 2 3 4

MECHANICS WORKSHOP

WASH BAY

Workshops

Washbay

Northern and north-western site boundary

PARRAMATTA NURSING HOME

CARPENTERS WORKSHOP

Tankfarm 2

TANK 4 30,000L UNLEADED

BOWSER

TANK 3 30,000L DISTILLATE

TANK 1 15,000L SUPER

TANK 2 30,000L UNLEADED

AMENITIES

EXISTING STORE & OFFICE

OFFICE

MAIN GATE

Stores and office building

CARPARK

Amenities building / carpark

RESIDENTIAL

MORTON STREET

Parramatta River

AEC

(C) Washbay

(E) Tankfarm 1

(D) Workshops

(F) Tankfarm 2

Southern waste storage/stockpiles

Southern vehical car park

Stores and office building

Amenities building / carpark

Northern and north western boundary

SITE PLAN

MORTON STREET DEPOT

Jann Kemp Depot X 5465

REV.	DESCRIPTION	DATE	ISSUED
1	AEC	27.03.12	BM

NOT TO SCALE

DESIGNED: BM	DATUM: NA	CLIENT/ PROJECT: 1A MORTON ST, PARRAMATTA PCC DEPOT	
DRAWN/REVIEWED: JF	HORIZONTAL RATIO: NA		
PAPER SIZE: A3	VERTICAL RATIO: NA	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY. All measurements in mm unless otherwise specified.	

martens & Associates Pty Ltd
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TITLE: FIGURE 4- AREAS OF ENVRIONMENTAL CONCERN

SHEET 1 OF 1 SHEETS

PROJECT MANAGER: JEFF FULTON

DRAWING NUMBER: P1103374JD02V01

Chris Curtis

From: Andrew Scholz
Sent: Thursday, 30 May 2024 2:04 PM
To: Andrew Scholz
Subject: Contamination Investigation Assessment - EIS - Proposed Passive Open Space Development & Proposed Works Compound Site - Rangihou Reserve.pdf
Attachments: Contamination Investigation Assessment - EIS - Proposed Passive Open Space Development & Proposed Works Compound Site - Rangihou Reserve.pdf

Contamination Investigation Assessment - EIS Consultant - Proposed Passive Open Space Development & Proposed Works Compound Site - Rangihou Reserve.pdf

ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

THE CITY OF PARRAMATTA COUNCIL

ON

CONTAMINATION INVESTIGATION ASSESSMENT

FOR

PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

AT

RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

11 APRIL 2018 **REF: E31269Krpt**

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EIS is a division of Jeffery and Katauskas Pty Ltd • ABN 17 003 550 801

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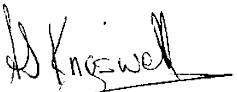

Adrian Kingswell
Principal | Environmental Scientist

EXECUTIVE SUMMARY

The City of Parramatta Council ('the client') commissioned Environmental Investigation Services (EIS) to undertake a Contamination Investigation Assessment for the proposed passive open space development at Rangihou Reserve, Part of 1C and 1D Morton Street, Parramatta, NSW ('the site'). The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

It is understood the most recent use of the site was as a vegetation / green waste storage area and builders yard for the adjacent developments along Morton Street and Broughton Streets. The proposed development intends to return the site to public open space.

The scope of work included the following:

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

Conceptual Site Model

Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated; and

Use as 'builders yard & Council depot – The site was used as both a builder's yard and Council depot. There is the possibility for hazardous building materials and/or contaminated fill (crushed demolition rubble/fill soils) to have been stored on the site. Similarly there is the potential for excess asphaltic concrete and tar to have been stored and or buried on the site.

Fieldwork and Results

Fieldwork was undertaken between 19 and 20 March 2018. Twenty six sampling location were identified and marked out. All twenty six locations (two boreholes and 24 test pits) were sampled for asbestos in soil, thirteen of the locations (two boreholes and eleven test pits) were sampled for asbestos and other contaminants of concern. Groundwater monitoring wells were installed in the two boreholes drilled for the investigation. During the fieldwork, asbestos fibre air monitoring was undertaken at four boundary locations and within the cab of the excavator.

During the fieldwork, numerous fragments of fibre cement were encountered on the site surface and within the fill material. Two representative sample were analysed for asbestos. Asbestos was detected in both fibre cement fragments analysed.

Carcinogenic PAH concentrations exceeded the HIL-C criteria in six fill samples TP07, TP10, TP12, TP14, TP15 and TP26. The maximum carcinogenic PAH concentration was 17mg/kg. Asbestos was detected in one soil sample, TP07 (0.0-0.2). Chrysotile asbestos was detected in matted material.

Benzo(a)pyrene concentrations exceeded the CT1 criterion in 14 fill samples collected from TP04, TP07, TP10, TP12, TP14, TP15, TP17, TP19, TP22, TP24 and TP26. Two of these results were above the CT2 criterion. The maximum benzo(a)pyrene concentration was 16mg/kg.

Asbestos fibre air monitoring results were all <0.01 fibres/ml, presenting a negligible asbestos related health risk.

All groundwater results were below the adopted SAC for the assessment.

Asbestos as ACM>7mm was encountered in one of the 500mL samples submitted for analysis (TP23 0.5-0.7). The calculated result was 0.4122% which exceeded the bonded ACM SAC of 0.02%. Asbestos as fines (AF) were

encountered in two of the 500ml samples submitted for analysis (TP18 0.0-0.2 and TP21 0.0-0.2). One of these results (TP21 0.0-0.2) exceeded the AF/FA SAC of 0.001%. The calculated result was 0.0044%.

EIS consider that the report objectives outlined in Section 1.2 have been addressed. Based on the scope of works undertaken, EIS are of the opinion that the CoPC identified at the site pose a risk to the current and future site receptors.

Immediate Recommendations for Management of the Site Conditions

EIS consider that due to the identified surficial carcinogenic PAHs and the potential for more ACM to come to the surface:

1. Immediate installation of a man-proof boundary fence around the site to restrict public access to the area, with shade cloth attached for obstruction of fugitive dust generated from the site to extend beyond the site boundaries;
2. Conduct an emu-bob of the site surface for collection of potential ACM as soon as possible (due to the public accessibility of the area);
3. Following inclement weather, an inspection of the site surface should be undertaken and any exposed fragments removed; and
4. In extended period of dry and windy weather, watering of the site surface may be employed for management of fugitive dust.

Recommendations for the Proposed Development

EIS consider that the site can be made suitable for the proposed development provided that the following recommendations are implemented to better manage the risks:

1. Prepare a Remediation Action Plan (RAP) to outline remedial measures for the site;
2. Prepare a Validation Assessment (VA) report on completion of remediation;
3. Prepare an Environmental Management Plan (EMP) for the ongoing management of contamination remaining on site. The EMP will require establishment of appropriate public notification under Section 10.7(2) of the E&PAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act 1919; and

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

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

TABLE OF CONTENTS

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ABBREVIATIONS

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**EIS**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Fibre Cement Fragment(s)	**FCF**
General Approval of Immobilisation	**GAI**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCBs**

ABBREVIATIONS

Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

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

1 INTRODUCTION

The City of Parramatta Council ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake a Contamination Investigation Assessment for the proposed passive open space development at Rangihou Reserve, Part of 1C and 1D Morton Street, Parramatta, NSW ('the site'). The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

1.1 Proposed Development Details

It is understood the most recent use of the site was as a vegetation / green waste storage area and builders yard for the adjacent developments along Morton Street and Broughton Streets. The proposed development intends to return the site to public open space.

1.2 Aims and Objectives

The primary aims of the assessment were to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil and groundwater contamination conditions. The assessment objectives were to:

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

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP46388K) of 29 January 2018 and written acceptance from the client of 16 February 2018 The scope of work included the following:

- Review of previous site reports prepared by Martens Consulting Engineers (MCE);
- Preparation of a CSM;
- Design and implementation of a sampling, analysis and quality plan (SAQP);

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

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

1.4 Terminology

This report refers to Fibre Cement Fragments (FCF) and Asbestos Containing Material (ACM). The report generally refers to fibre cement fragments as FCF until it was proven to contain asbestos (i.e. FCF was a visual observation). Bonded FCF that was found to contain asbestos has been referred to as ACM (the use of ACM refers to bonded material and aligns with the terminology in the NEPM 2013).

Fibrous asbestos is referred to as FA and comprises friable asbestos materials including severely weathered cement sheet, insulation products and woven asbestos material (the use of FA aligns with the terminology in the NEPM 2013).

Asbestos fines are referred to as AF and includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7mm x 7mm sieve (the use of AF aligns with the terminology in the NEPM 2013).

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

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

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

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Current Site Owner:	The City of Parramatta Council
Site Address:	Part of 1C and 1D Morton Street, Parramatta, NSW
Lot & Deposited Plan:	Part of Lot C in DP162815 and Lot 2 in DP1221620
Current Land Use:	Vacant land / Public open space
Proposed Land Use:	Passive public open space
Local Government Authority:	The City of Parramatta Council
Current Zoning:	RE1 – Public Recreation
Site Area (m^2):	~4,400m^2
Geographical Location (decimal degrees) (approx.):	Latitude: -33.815252 Longitude: 151.015871

2.2 Site Location and Regional Setting

The site is located in a predominantly residential area of Parramatta. The site is located at the end of Morton Street, to the south-west. The site is located approximately 50m to the north of the Parramatta River.

2.3 Topography

The regional topography is characterised by a south facing hillside that falls towards the Parramatta River with a natural levee between the southern boundary of the site and the river. Most of the site appears to have been cut and filled to account for the slope and accommodate previous site uses (builders yard).

2.4 Site Inspection

A walkover inspection of the site was undertaken by EIS on 19 and 20 March 2018. The inspection was limited to accessible areas of the site and immediate surrounds. A summary of the other inspection findings are outlined in the following subsections:

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

At the time of the inspection, the site was vacant and generally grass and or covered by exposed fill soils (gravels and sandy soils). The north-east corner of the site was fenced off and was being utilised as a storage yard for the adjacent Downer asset.

2.4.2 Buildings, Structures and Roads

There were no building, structures or pavements on the site.

2.4.3 Boundary Conditions, Soil Stability and Erosion

At the time of the site inspection the site was unsecured and it was observed that members of the general public were using the site as a thoroughfare between the newly constructed units to the north and the paved footpath running the extent of the river to the south of the site. Members of the public were also cutting across the southern portion of the site rather than following the path around the site and up to join Morton Street.

It was observed that due to the dryness of the surface soils (gravelly and sandy fill soils), dust was being generated from the site surface by the windy conditions experienced during the site inspection.

2.4.4 Visible or Olfactory Indicators of Contamination

Numerous fragments of fibre cement (FCF) were observed across the site surface. Over 20 FCF were collected during the site inspection, however due to the number of FCF, not all could be collected. Representative FCF from the site surface were analysed for asbestos.

The were no obvious indicators of above or below ground storage tanks or surface staining observed.

2.4.5 Presence of Drums/Chemicals, Waste and Fill Material

The site appeared to be generally fill covered with gravelly sandy soil.

2.4.6 Drainage and Services

Due to the topography of the site, it is assumed that surface water would flow towards the Parramatta River to the south of the site.

2.4.7 Sensitive Environments

The Parramatta River is located 50m to the south of the site, this is considered to be a sensitive environment.

2.4.8 Landscaped Areas and Visible Signs of Plant Stress

The grass covering on parts of the site generally appeared to be in good condition as did the vegetation to the south and west of the site in areas of public open space.

2.5 Surrounding Land Use

During the site inspection, EIS observed the site to generally be surrounded by residential lots to the north-west, north and north-east of the site (up-gradient). To the south and west of the site was public open space and to the east a new road and verges were under-construction. A small Downer asset (pump station) was also located to the north-east of the site.

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

2.6 Underground Services

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

2.7 Interview with Site Personnel

During the site inspection EIS was informed that the site was formerly utilised as a Council holding yard where excess asphaltic concrete and other road base materials were unloaded and or stored.

2.8 NSW EPA Records

The NSW EPA records available online were reviewed for the assessment. A summary of the relevant information is provided in the following table:

Table 2-2: Summary of NSW EPA Online Records

Source	Details
CLM Act 1997[5]	There were no notices for the site under Section 58 of the Act.
NSW EPA List of Contaminated Sites[6]	The site is not listed on the NSW EPA register.
POEO Register[7]	There were no notices for the site on the POEO register.

[5] http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx, visited on 29 March 2018
[6] http://www.epa.nsw.gov.au/clm/publiclist.htm, visited on 29 March 2018
[7] http://www.epa.nsw.gov.au/prpoeoapp/, visited on 29 March 2018

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

A review of the regional geological map of Sydney (1983)[8], indicates that the site is underlain by Quaternary aged deposits of silty to peaty quartz sand, silt and clay, with ferruginous and humic cementation in places and common shell layers.

3.2 Acid Sulfate Soil (ASS) Risk and Planning

A review of the acid sulfate soil (ASS) risk map prepared by Department of Land and Water Conservation (1997)[9] indicated that the site is located in an area classed as 'disturbed terrain'.

The Parramatta Local Environmental Plan 2011 indicated that the site is located within a Class 2 area. Works in Class 2 areas that could pose an environmental risk in terms of ASS include all works below existing ground level and works by which the water table is likely to be lowered.

3.3 Hydrogeology

A review of groundwater bore records available on the NSW Office of Water[10] (NOW) online database was undertaken on 29 March 2018. The search was limited to registered bores located within a radius of approximately 500m of the site.

The search indicated 1 bore registered for domestic purposes within the search area. The bore is located to the south of the site beyond the Parramatta River. The standing water levels (SWL) in the bore was recorded at 2.4m bgl.

A review of the regional geology and groundwater bore information indicates that the subsurface condition at the site is expected to consist of residual soils overlying relatively deep bedrock. The occurrence of groundwater that could be utilised as a resource for beneficial use is considered to be relatively low under such conditions. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable under these conditions, however the use of groundwater is not proposed as part of the development.

3.4 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is the Parramatta River located approximately 50m to the south of the site. This is down-gradient from site and is considered to be a potential receptor.

[8] Department of Mineral Resources, (1983). *1:100,000 Geological Map of Sydney (Series 9130)*
[9] Department of Land and Water Conservation, (1997). *1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)*
[10] http://www.waterinfo.nsw.gov.au/gw/

4 REVIEW OF REPORTS BY OTHERS

Two reports for were provided by the client for review and information purposes:

- Martens Consulting Engineers (MCE), Supplementary Contamination Assessment (SCA): Parramatta City Council Depot, Morton Street, Parramatta, (report ref: P1303374JR03V01, dated March 2013)[11]; and
- Martens Consulting Engineers, Contamination and Geotechnical Assessment (CGA), Parramatta City Council Depot, 1A Morton Street, Parramatta, (report ref: P1203374JR02V01, dated July 2012)[12].

Both of these investigations included most of the site within their investigation areas. A summary of relevant information is provided below.

4.1 Contamination and Geotechnical Assessment (MCE CGA report 2012)

The CGA report included a site walkover inspection, excavation of 15 test pit locations and installation of two groundwater monitoring wells. Site history information identified six underground storage tanks on site. Findings of the investigation included:

- Positive identification of asbestos within four surface samples of bonded materials;
- One surface soil sample contained asbestos;
- An elevated lead concentration in one soil sample;
- Heavy fraction TRH above the adopted site acceptance criteria was identified in all soil samples;
- TRH above the adopted groundwater investigation levels (GILs) in all groundwater samples; and
- Heavy metal concentrations above the adopted GIL.

The conclusion of the report indicated that further assessment of the site was required to outline the extent and degree of contamination identified.

The site plan attached to the report indicated the most southern area of the site (the current contamination assessment investigation area) to have been utilised as waste storage area/stockpile storage area.

It should be noted that only one soil sampling location from this investigation was within the current contamination assessment investigation site area.

4.2 Supplementary Contamination Assessment (MCE SCA report 2013)

The SCA report documented supplementary information to the CGA report and other previous contamination reports not provided to EIS. Soil contamination results identified asbestos, lead and PAH contamination in the southern portion of the site (in near proximity to the northern boundary of the current contamination assessment investigation area). Remediation was recommended for the

[11] Martens Consulting Engineers Report (2013) referred to as SCA report 2013

[12] Martens Consulting Engineers Report (2012) referred to as CGA report 2012

PAH and asbestos contamination identified, while lead was considered unlikely to present a significant risk of harm to sensitive receptors.

Low levels of TRH and BTEX were identified in the groundwater samples, however these were considered to be associated with the former underground storage tanks and associated infrastructure. Heavy metals were also encountered in the groundwater.

The investigation concluded that soil contamination encountered in the southern portion of the site (north of the current investigation area boundary), required remediation and development of a Remedial Action Plan would be required for the development of the site. Installation of additional groundwater monitoring wells was also recommended to assess migration and further evaluate groundwater quality.

5 CONCEPTUAL SITE MODEL

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

A review of the CSM in relation to source, pathway and receptor (SPR) linkages has been undertaken as part of the Tier 1 risk assessment process, as outlined in Section 10.

5.1 Potential Contamination Sources/AEC and CoPC

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

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

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated. Previous studies have identified lead, TRH, and PAHs at elevated concentrations. Asbestos was also identified at the site.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Use as 'builders yard & Council depot – The site was used as both a builder's yard and Council depot. There is the possibility for hazardous building materials and/or contaminated fill (crushed demolition rubble/fill soils) to have been stored on the site. Similarly there is the potential for excess asphaltic concrete and tar to have been stored and or buried on the site.	Asbestos, heavy metals, TRH, PAHs and BTEX

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

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

Table 5-2: CSM

Potential mechanism for contamination	The potential mechanisms for contamination are most likely to include 'top-down' impacts and spills. There is a potential for sub-surface releases to have

	occurred if deep fill (or other buried industrial infrastructure) is present, although this is considered to be the least likely mechanism for contamination. The mechanisms for contamination from off-site sources could have occurred via 'top down' impacts and spills, or sub-surface release. Impacts to the site could occur via the migration of contaminated groundwater.
Affected media	Soil and groundwater have been identified as potentially affected media.
Receptor identification	Human receptors include site occupants/users (including adults and children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, groundwater users and any recreational water users within the Parramatta River. Ecological receptors include terrestrial organisms and plants within unpaved areas, and marine ecology in the Parramatta River.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas such as gardens or inhalation of airborne asbestos fibres during soil disturbance. Exposure to groundwater in the Parramatta River.
Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems and those being used for recreation; and • Migration of groundwater off-site into areas where groundwater is being utilised as a resource (i.e. for irrigation).
Presence of preferential pathways for contaminant movement	Surface water run-off may act as preferential pathway for contaminant migration. This would be dependent on the contaminant type and transport mechanisms.

6 SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013) and the Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[13]. The seven-step DQO approach for this project is outlined in the following sub-sections.

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

6.1.1 Step 1 - State the Problem

The CSM identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the consent authority in exercising its planning functions in relation to the development proposal. A waste classification is required prior to off-site disposal of excavated soil.

6.1.2 Step 2 - Identify the Decisions of the Study

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

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

6.1.3 Step 3 - Identify Information Inputs

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

- Existing relevant environmental data from previous reports;
- Site information, including site observations and site history documentation;
- Sampling of potentially affected media, including soil and groundwater;
- Asbestos fibre air monitoring will be undertaken during the intrusive investigation works;

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

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

6.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 (spatial boundary). The sampling was completed between 19 and 20 March 2018 (temporal boundary). The assessment of potential risk to adjacent land users has been made based on data collected within the site boundary.

Sampling was not undertaken within the north east corner of the site due to access constraints imposed by the Downer yard.

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

6.1.5.1 Tier 1 Screening Criteria

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

For this assessment, the individual results have been assessed as either above or below the SAC. Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values has not been undertaken due to the spatial distribution of the data and the number of samples submitted for analysis.

6.1.5.2 Field and Laboratory QA/QC

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

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

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required,

consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, EIS typically adopt the most conservative concentration reported (or in some cases, consider the data from the affected sample as an estimate).

6.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

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

6.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results is undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For this assessment, the null hypothesis has been adopted which is that, there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis has been adopted for this assessment.

6.1.7 Step 7 - Optimise the Design for Obtaining Data

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

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

6.2 Soil Sampling Plan and Methodology

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

Table 6-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The sampling density for asbestos in soil included sampling at twice the minimum sampling density recommended in the Guidelines for the Assessment, Remediation and Management

Aspect	Input
	of Asbestos-Contaminated Sites in Western Australia (2009)[14] (endorsed in NEPM 2013). This density was considered adequate in the absence of any existing sub-surface data for the site. Samples for other contaminants were collected from 13 locations as shown on the attached Figure 2. Based on the site area (~4,400m^2), this number of locations corresponded to a sampling density of approximately one sample per 338m^2. The sampling plan was not designed to meet the minimum sampling density for hotspot identification, as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[15].
Sampling Plan	The sampling locations were placed on a systematic plan with a grid spacing of approximately 10m between sampling locations. A systematic plan was considered suitable to identify hotspots to a 95% confidence level and calculate UCLs for specific data populations (UCLs were only applied where appropriate and in accordance with the DQOs).
Set-out and Sampling Equipment	Sampling locations were set out using a hand-held GPS unit (with an accuracy of ±2m). In-situ sampling locations were cleared for underground services by an external contractor prior to sampling as outlined in the SSP. Samples from the boreholes were collected using a drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) split-spoon sampler, or directly from the auger when conditions did not allow use of the SPT sampler. Samples from the test pits were collected using a backhoe/excavator. Samples were obtained from the test pit walls or directly from the bucket by hand. Where sampling occurred from the bucket, EIS collected samples from the central portion of large soil clods, or from material that was unlikely to have come into contact with the bucket.
Sample Collection and Field QA/QC	Soil samples were obtained on 19 and 20 March 2018 in accordance with the standard sampling procedure (SSP) attached in the appendices. Soil samples were collected from the fill and natural profiles based on field observations. The sample depths are shown on the logs attached in the appendices. Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.

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

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

Aspect	Input
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp was used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by EIS. The field screening for asbestos quantification included the following: • A representative 10L sample was collected from fill at 1m intervals, or from each distinct fill profile. The bulk sample intervals are shown on the attached borehole/test pit logs; • Each 10L sample was weighed using an electronic scale; • Due to the cohesive nature of the soils, each sample was subsequently placed on a contrasting support (blue tarpaulin) and inspected for the presence of fibre cement. Any soil clumps/nodules were disaggregated; • The condition of fibre cement or any other suspected asbestos materials was noted on the field records; and • If observed, any fragments of fibre cement in the 10L sample were collected, placed in a zip-lock bag and assigned a unique identifier. Calculations for asbestos content were undertaken based on the requirements outlined in Schedule B1 of NEPM (2013), as summarised in Section 7.1. The scale used to weigh the 10L samples was not calibrated, however this is not considered significant as this method of providing a weight for the bulk sample is considered to be considerably more accurate than applying a nominal soil density conversion.
Decontami-nation and Sample Preservation	Sampling personnel used disposable nitrile gloves during sampling activities. Re-usable sampling equipment was decontaminated as outlined in the SSP. Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. On completion of the fieldwork, the samples were stored temporarily in fridges in the EIS warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

6.3 Groundwater Sampling Plan and Methodology

The groundwater sampling plan and methodology is outlined in the table below:

Table 6-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater monitoring wells were installed in BH01 (MW01) and BH02 (MW02). The wells were positioned to gain a snap-shot of the groundwater conditions. Considering the topography and the location of the nearest down-gradient water body, MW02 was

Aspect	Input
	considered to be in the down-gradient area of the site and would be expected to provide an indication of groundwater flowing across (beneath) the site and beyond the down-gradient site boundary (towards the Parramatta River). MW02 was considered to be in the up-gradient area of the site and would be expected to provide an indication of groundwater flowing onto (beneath) the site.
Monitoring Well Installation Procedure	The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices. The monitoring wells were installed to depths of approximately 5.94m and 6.02m below ground level. The wells were generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed); • A 2mm sand filter pack was used around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug was used on top of the sand pack to seal the well; and • A gatic cover was installed at the surface with a concrete plug to limit the inflow of surface water.
Monitoring Well Development	The monitoring wells were developed on 20 March 2018 using a submersible electrical pump/dedicated disposable plastic bailer in accordance with the SSP. Due to the hydrogeological conditions, groundwater inflow into MW02 was relatively low, therefore the well was pumped until it was effectively dry. MW01 could not be developed due to the silty conditions on the day of and after installation. The field monitoring records and calibration data are attached in the appendices.
Groundwater Sampling	The monitoring wells were allowed to recharge for approximately five to seven days after development. Groundwater samples were obtained on 26 March 2018. Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space was checked for VOCs using a calibrated PID unit. The samples were obtained using a peristaltic pump/disposable plastic bailer. During sampling, the following parameters were monitored using calibrated field instruments (see SSP): • Standing water level (SWL) using an electronic dip meter; and • pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter. Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%. Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers.

Aspect	Input
	Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling was transported to EIS in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring records are attached in the appendices.
Decontaminant and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP attached in the appendices. During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). The pump tubing was discarded after each sampling event and replaced therefore no decontamination procedure was considered necessary. The samples were preserved with reference to the analytical requirements and placed in an insulated container with ice in accordance with the SSP. On completion of the fieldwork, the samples were temporarily stored in a fridge at the EIS office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

6.4 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 6-3: Analytical Schedule

Analyte/CoPC	Fill Samples	Natural Soil Samples	Fibre Cement Material Samples	Groundwater Samples	Air Monitoring Samples
Heavy Metals	13	13	-	2	-
TRH/BTEX	13	13	-	2	-
PAHs	13	13	-	2	-
OCPs/OPPs	13	-	-	-	-
PCBs	13	-	-	-	-
Asbestos (in soil) 30g	13	13	-	-	-

Analyte/CoPC	Fill Samples	Natural Soil Samples	Fibre Cement Material Samples	Groundwater Samples	Air Monitoring Samples
Asbestos (in soil) 500mL	10	-	-	-	-
Asbestos (material)	-	2	-	-	-
pH/CEC/Clay Content (%)	2	-	-	-	-
pH/EC	-	-	-	2	-
Asbestos fibre air monitoring - undertaken by an external contractor	NA	NA	NA	NA	10

The rationale for the analysis of the 10 asbestos in soil samples (500ml), as outlined in Table H, is considered to be robust. Representative soil samples from fill profiles where FCF and or anthropogenic inclusions were observed during the bulk screening were analysed at the laboratory for asbestos in soil. This approach was considered appropriate to provide sufficient and representative data to characterise the fill across the site on the basis of the CSM where the source of asbestos was considered likely to be importation of uncontrolled fill.

6.4.1 Laboratory Analysis

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

Table 6-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicate and trip blank samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	187888 and 188130
Inter-laboratory duplicates	Envirolab Services Pty Ltd VIC, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	13400
Asbestos fibre air monitoring samples	Hibbs & Associates Pty Ltd, NATA Accreditation Number – 14911 (ISO/IEC 17025 compliance)	S10201-AMR01 and S10201-AMR02

7 SITE ASSESSMENT CRITERIA (SAC)

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

7.1 Soil

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

7.1.1 Human Health

- Health Investigation Levels (HILs) for a 'public open space; secondary schools; and footpaths' exposure scenario (HIL-C);
- The Health Screening Levels (HSLs) for 'Low/High Density Residential' land use exposure scenario (HSL-A/B) have been applied to the data. The HSL criteria for public open spaces including parks, playgrounds and playing fields are non-limiting, therefore as a conservative measure should any buildings or structures be proposed in the future, we have utilised HSL-A/B values as they are the most conservative;
- Asbestos fibre air monitoring will be assessed against the detection limit of the method (0.01fibres/ml) as set out in NOHSC:3003(2005))][16] ; and
- Asbestos was assessed against the HSL for Recreational land use (HSL-C). A summary of the asbestos criteria is provided in the table below:

Table 7-1: Details for Asbestos SAC

Guideline	Applicability
Asbestos in Soil	The HSL-C criteria were adopted for the assessment of asbestos in soil. The SAC adopted for asbestos were derived from the NEPM 2013 and are based on WA DoH (2009) guidance. The SAC include the following: • <0.02% w/w bonded asbestos containing material (ACM) in soil; and • <0.001% w/w asbestos fines/fibrous asbestos (AF/FA) in soil. The NEPM (2013) and WA DoH (2009) also specify that the surface should be free of visible asbestos. Concentrations for bonded ACM concentrations in soil are based on the following equation which is presented in Schedule B1 of NEPM (2013): $\%\ w/w\ asbestos\ in\ soil = \frac{\%\ asbestos\ content \times bonded\ ACM\ (kg)}{Soil\ volume\ (L) \times soil\ density\ (kg/L)}$

[16] National Occupational Health and Safety Commission 'Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]' April 2005.

Guideline	Applicability
	However, as most of the soil sampled was cohesive the actual soil volume in the 10L bucket varied considerably due to the presence of voids. Therefore, each bucket sample was weighed using electronic scales and the above equation was adjusted as follows: $\%\ w/w\ asbestos\ in\ soil = \frac{\%\ asbestos\ content \times bonded\ ACM\ (kg)}{Soil\ weight\ (kg)}$

7.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. The criteria for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the information presented in the CRC Care Technical Report No. 39 – Risk-based management and guidance for benzo(a)pyrene (2017)[17];
- ESLs were calculated based on the soil type. EILs for selected metals were calculated using average site specific soil parameters for pH, cation exchange capacity and clay content. These were calculated to be pH 7.85, 21.5 $cmol_c/kg$ and % clay respectively. These data were used to select the added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013), and published ambient background concentration (ABC) presented in the document titled Trace Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[18]. This method is considered to be adequate for the Tier 1 screening.

7.1.3 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[19] as outlined in the following table:

Table 7-2: Waste Categories

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

[17] CRC Care, (2011). *Technical Report No. 39 - Risk-based management and guidance for benzo(a)pyrene*

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

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

Category	Description
Restricted Solid Waste (non-putrescible)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as restricted solid waste; and • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as restricted solid waste.
Hazardous Waste	• If SCC > CT2 then TCLP not needed to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

7.2 Groundwater

Groundwater data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[20]. Environmental values for this assessment include aquatic ecosystems, human uses, and human-health risks in non-use scenarios.

7.2.1 Human Health

- HSLs for a 'low-high density residential' exposure scenario (HSL-A/HSL-B). HSLs were calculated based on the soil type and the observed depth to groundwater as a conservative measure;
- The Australian Drinking Water Guidelines (2011)[21] were adopted as screening criteria for consumption of groundwater; and
- The guidelines for recreational water quality (primary and secondary contact) presented in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)[22] were adopted as screening criteria to assess potential human-health risks in the nearest receiving water body as it is used for recreational purposes.

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

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

[22] ANZECC, (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* (referred to as ANZECC 2000)

7.2.2 Environment (Ecological - aquatic ecosystems)

- Groundwater Investigation Levels (GILs) for 95% trigger values for protection of marine species presented in ANZECC 2000. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist.

8 RESULTS

8.1 Summary of Data (QA/QC) Evaluation

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

8.2 Subsurface Conditions

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

Table 8-1: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all boreholes and test pits and extended to depths ranging from approximately 1.7m to 3.0m. TP03 to TP08 and TP22 to TP26 were terminated in the fill at a maximum depth of between approximately 1.8m and 3.0m. The fill typically comprised silty clay, gravelly silty, and sandy silty clay with inclusions of sand, igneous and sandstone gravels, building and demolition rubble (bricks, concrete, glass, tile fragments), ash and root fibres. Strong hydrocarbon odours were observed in two test pits, (TP04 and TP08), at depths of between 1.8m and 2.3m. Fibre cement fragments were observed throughout the fill across the site.
Natural Soil	Natural silty clay; sandy; sandy silty clay; and silty sandy clay soils were encountered in BH01, BH02, TP09 to TP21 only. Odours or staining were not observed in the natural soil during the investigation.
Groundwater	Groundwater seepage was encountered in the two boreholes (BH01 and BH02) and in three test pits (TP09, TP12 and TP20) at depths of between 2.3m and 3.15m. All other test pits remained dry on completion of excavation.

8.3 Field Screening

A summary of the field screening results are presented in the table below.

Table 8-2: Summary of Field Screening

Aspect	Details
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The results ranged from 0ppm to 0.2ppm equivalent isobutylene. These results indicate minimal PID detectable VOCs.

Aspect	Details
Bulk Screening for Asbestos	FCF's were encountered in 22 of the 26 sampling location at a range of profiles. The bulk field screening results are summarised in the attached report tables. ACM concentrations in 26 profiles exceeded the SAC (0.02%). All other results were below the SAC.
Groundwater Depth & Flow	Groundwater seepage was encountered in boreholes BH01 and BH02 and test pits TP09, TP12, and TP20 during intrusive works at depths of approximately 2.3m to 3.2m. A standing water level (SWL) was measured in the boreholes at depths ranging from 2.65m to 3.15m a short time after completion of drilling. The remaining boreholes were dry during and a short time after completion of drilling. SWLs measured in the monitoring wells installed at the site ranged from 2.56m to 2.93m. It is assumed that groundwater would flow in a southern direction towards the Parramatta River.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 6.24 to 6.38; - EC ranged from 1589µS/cm to 1690µS/cm; - Eh ranged from -37.3mV to -1.1mV; and - DO ranged from 0.3mg/L to 1.4mg/L.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

8.4 Soil Laboratory Results

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

8.4.1 Human Health and Environmental (Ecological) Assessment

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

Analyte	Results Compared to SAC
Heavy Metals	All heavy metals results were below the SAC.
TRH	All TRH results were below the SAC.
BTEX	All BTEX results were below the SAC.
PAHs	Carcinogenic PAH concentrations exceeded the HIL-C criteria in six fill samples TP07, TP10, TP12, TP14, TP15 and TP26. The maximum carcinogenic PAH concentration was 17mg/kg. All other carcinogenic PAH results and total PAH results were below the SAC.

Analyte	Results Compared to SAC
OCPs and OPPs	All OCP and OPP results were below the SAC. All pesticide concentrations were below the laboratory PQLs.
PCBs	All PCB results were below the SAC. All PCB concentrations were below the laboratory PQLs.
Asbestos (detection in soil)	Asbestos was detected in one soil sample, TP07 (0.0-0.2). Chrysotile asbestos was detected in matted material.
Asbestos in fibre cement	Asbestos was detected in both fibre cement fragments analysed.

8.4.2 Waste Classification Assessment

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

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

Analyte	No. of Samples Analysed	No. of Results > CT Criteria	No. of Results > SCC Criteria	Comments
Heavy Metals	26	5	0	Lead concentrations exceeded the CT1 criterion in three fill samples collected from TP10 (0.0-0.2m), TP14 (0.0-0.2m) and TP19 (0.0-0.2m). The maximum lead concentration was 190mg/kg. Nickel concentrations exceeded the CT1 criterion in two fill samples collected from BH1 (0-0.1m) and TP22 (0.5-0.7m). The maximum nickel concentration was 55mg/kg.
TRH	26	0	-	-
BTEX	26	0	-	-
Total PAHs	26	0	-	-

Analyte	No. of Samples Analysed	No. of Results > CT Criteria	No. of Results > SCC Criteria	Comments
Benzo(a)pyrene	26	14	2	Benzo(a)pyrene concentrations exceeded the CT1 criterion in 14 fill samples collected from TP04, TP07, TP10, TP12, TP14, TP15, TP17, TP19, TP22, TP24 and TP26. Two of these results were above the CT2 criterion. The maximum benzo(a)pyrene concentration was 16mg/kg.
OCPs & OPPs	13	0	-	-
PCBs	13	0	-	-
Asbestos (in soil)	13	-	-	Asbestos was detected one soil sample analysed TP07 (0.0-0.2).

8.4.3 Statistical Analysis

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

- The calculated 95%UCL for lead was 84.06mg/kg which is less than the CT1 criterion of 100mg/kg;
- The calculated 95%UCL for nickel was 30.97mg/kg which is less than the CT1 criterion of 40mg/kg; and
- The calculated 95%UCL for benzo(a)pyrene was 5.362mg/kg which is greater than the CT2 criteria of 3.2mg/kg.

8.5 Groundwater Laboratory Results

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

Table 8-5: Summary of Groundwater Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	All heavy metals results were below the SAC.
TRH	All TRH results were below the SAC.
BTEX	All BTEX results were below the SAC.

Analyte	Results Compared to SAC
PAHs	All PAH results were below the SAC.
Other Parameters	The results for pH, EC and hardness are summarised below: • pH ranged from 6.7 to 6.9; and • EC ranged from 1400µS/cm to 1700µS/cm

8.6 Asbestos Fibre Air Monitoring

Asbestos fibre air monitoring results were all <0.01 fibres/ml, presenting a negligible asbestos related health risk.

8.7 ACM and Asbestos in Soil Laboratory Results

8.7.1 Percentage AF/FA in 500ml Samples Calculated by Laboratory

A 500ml sample from each location/fill stratum were collected. Ten selected discrete samples (500ml) were forwarded to the laboratory for analysis if FCF was identified within the corresponding location/stratum.

Asbestos as ACM>7mm was encountered in one of the 500mL samples submitted for analysis (TP23 0.5-0.7). The calculated result was 0.4122% which exceeded the bonded ACM SAC of 0.02%. The results are summarised in Table H.

Asbestos as fines (AF) were encountered in two of the 500ml samples submitted for analysis (TP18 0.0-0.2 and TP21 0.0-0.2). One of these results (TP21 0.0-0.2) exceeded the AF/FA SAC of 0.001%. The calculated result was 0.0044%. The results are summarised in Table H.

8.7.2 FCF/ACM Presence/Absence

FCF encountered at the surface during the fieldwork and following the backfilling of the test pits were collected by EIS and disposed of appropriately in accordance with our internal asbestos waste procedure.

Two representative samples of potential ACM materials encountered during the bulk sampling were submitted to the laboratory for asbestos analysis (presence/absence). Potential ACM materials at the site were generally in the form of flat or corrugated fibre cement. One of each of these forms was sent as a representative sample. The results are summarised in the attached tables. Both samples were confirmed to contain asbestos.

8.7.3 Percentage Asbestos in Soil Calculated from ACM

The concentration of bonded ACM in fill samples has been calculated based on the following:

- Weight of bonded ACM in soil sample(kg);
- % asbestos content – 15% (assumed); and
- Weight of soil screened (kg) – the 10L sample was weighed in the field.

Of the 36 potential ACM materials encountered during bulk screening, 26 were calculated to be above the ACM SAC of 0.05%. The results are summarised in Tables H.

9 WASTE CLASSIFICATION ASSESSMENT

9.1 Waste Classification of Fill

Based on the results of the assessment, and at the time of reporting, the fill material at the site is classified as **Hazardous Waste containing Special Waste (asbestos)**. Hazardous Waste material will require treatment prior to disposal. On completion of treatment the material should only be disposed of to a NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.

This classification could potentially be reduced if additional analysis using Toxicity Characteristics Leaching Procedure (TCLP) was used and additional sampling was undertaken.

9.2 Classification of Natural Soil

Due to detections of PAHs including benzo(a)pyrene in the natural soil at the site, the material does not meet the VENM criteria. The natural soil as sampled may be able to be reclassified as VENM by further sampling and analysis following removal of the fill soil.

10 DISCUSSION AND CONCLUSIONS

10.1 Summary of Site Contamination

The assessment has identified the following issues associated with the AEC identified at the site. The site contamination data is shown on the attached Figure 3.

10.2 Tier 1 Risk Assessment and Review of CSM

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

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

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

10.2.1 Soil

Five surface soil samples (TP10, TP12, TP14, TP17 and TP26) and one soil sample at depth (TP07), encountered carcinogenic PAHs above the HIL-C criteria. The reported concentrations of carcinogenic PAHs ranged between 3.2mg/kg and 17mg/kg. The source of the carcinogenic PAHs in the fill material is considered likely to be associated with the importation of contaminated fill material. No point sources were identified on site or in the immediate area.

The elevated concentrations of carcinogenic PAHs in TP10, TP12, TP14, TP17 and TP26 appeared to be confined to the top metre of fill soil in these locations.

Asbestos was detected in one soil sample (TP07 0.0-0.2). The asbestos was in the form of matted material.

In excess of 10 fibre cement fragments (FCF) were encountered across the site surface during the initial site walkover and throughout the fill profiles during the field work. The FCF identified was in the form of flat or corrugated fibre cement. Two representative samples of FCF were analysed for asbestos. Results for both samples returned positive results. None of the FCF observed could be broken by hand pressure, therefore the material is considered to be bonded asbestos containing material (ACM). The source of this FCF is considered to be associated with the uncontrolled importation of contaminated fill material.

10.2.2 Groundwater

Elevated concentrations of CoPC were not encountered above the adopted SAC in any of the groundwater samples analysed.

10.2.3 Asbestos Quantification

Based on the results of the assessment, asbestos was identified in the fill soil at the site which exceeds the Tier 1 SAC (referred to as 'elevated ACM' and 'elevated AF/FA'). Under the proposed development scenario, there is a complete exposure pathway between the contaminant and the receptors.

The ACM and AF/FA identified at the site is most likely from the uncontrolled importation of asbestos contaminated fill material to generate existing site levels.

10.3 Extent of Contamination

Soil contamination by carcinogenic PAHs and asbestos is generally considered to be associated with fill materials at the site. The north-east corner of the site within the area fenced off and utilised by Downer was excluded from the investigation, as was the area of the site beyond the log fence line along the west of the site. Based on the data collected for this study it would be reasonable to expect that if the fill extends into those areas then it would also be contaminated with PAHs and asbestos.

10.4 Fate and Transport of Contaminants

Non-volatile contaminants are predominantly confined to the soil and groundwater medium. The mobility of these contaminants varies depending on: the nature and type of contaminant present (e.g. leachability, viscosity etc.); soil type/porosity; surface water infiltration; groundwater levels; and the rate of groundwater movement. Heavier PAH compounds (such as carcinogenic PAHs) are relatively insoluble in water and preferentially bind to soil particles, limiting their mobility.

Surface water has the potential to infiltrate into the subsurface at the site as the entire site surface is unpaved. Surface water infiltration could increase the migration potential of certain contaminants. Excess surface water has the potential to run-off into the Parramatta River.

The transport of asbestos fibres may occur during disturbance of soil. Asbestos in bonded ACM is typically bound in the cement matrix and is less likely to become airborne. AF/FA is considered to be friable with reference to NEPM (2013) and WA DoH (2009) and poses a comparatively higher risk as there is a greater potential for asbestos fibres to become airborne.

10.5 Decision Statements

The decision statements are addressed below:

Did the site inspection identify potential contamination sources/AEC at the site?

FCF was encountered across the site surface during the site inspection.

Are any results above the SAC?

Yes. Carcinogenic PAHs in six samples (TP07, TP10, TP12, TP14, TP17 and TP26) were above the human health based site acceptance criteria. The concentration of ACM in one sample (TP23) returned a result which was above the HSL-C SAC of 0.02% w/w. The concentration of AF/FA in one sample (TP21) returned a result above the AF/FA SAC of 0.001% w/w.

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

EIS are of the opinion that there is a risk to current and future site users as there is a complete exposure pathway between carcinogenic PAHs, and asbestos in both bonded and AF/FA forms.

Is remediation required?

Yes. Based on the findings of the investigation and the proposed development of the site as passive public open space, remediation of the site is required.

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

Remediation will be required to render the site suitable for the proposed development as passive public open space. Implementation of a Remediation Action Plan (RAP) is recommended to render the site suitable for the proposed development.

10.6 Data Gaps

Sampling was not able to be undertaken in the north-east corner of the site due to the location of the Downer yard, similarly sampling was not undertaken along the western boundary of the site due to dense vegetation and restricted access due to a low timber log fence-line.

11 CONCLUSIONS AND RECOMMENDATIONS

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

Based on the scope of works undertaken, EIS are of the opinion that the CoPC identified at the site pose a risk to the current and future site receptors.

11.1 Immediate Recommendations for Management of the Site Conditions

EIS consider that due to the identified surficial carcinogenic PAHs and the potential for more ACM to come to the surface:

1. Immediate installation of a man-proof boundary fence around the site to restrict public access to the area, with shade cloth attached for obstruction of fugitive dust generated from the site to extend beyond the site boundaries;
2. Conduct an emu-bob of the site surface for collection of potential ACM as soon as possible (due to the public accessibility of the area);
3. Following inclement weather, an inspection of the site surface should be undertaken and any exposed fragments removed; and
4. In extended period of dry and windy weather, watering of the site surface may be employed for management of fugitive dust.

11.2 Recommendations for the Proposed Development

EIS consider that the site can be made suitable for the proposed development provided that the following recommendations are implemented to better manage the risks:

1. Prepare a Remediation Action Plan (RAP) to outline remedial measures for the site;

2. Prepare a Validation Assessment (VA) report on completion of remediation;

3. Prepare an Environmental Management Plan (EMP) for the ongoing management of contamination remaining on site. The EMP will require establishment of appropriate public notification under Section 10.7(2) of the E&PAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act 1919; and

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

12 LIMITATIONS

The report limitations are outlined below:

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

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

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

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

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

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

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

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

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

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

Misinterpretation of Site Assessments by Design Professionals

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

Logs Should not be Separated from the Assessment Report

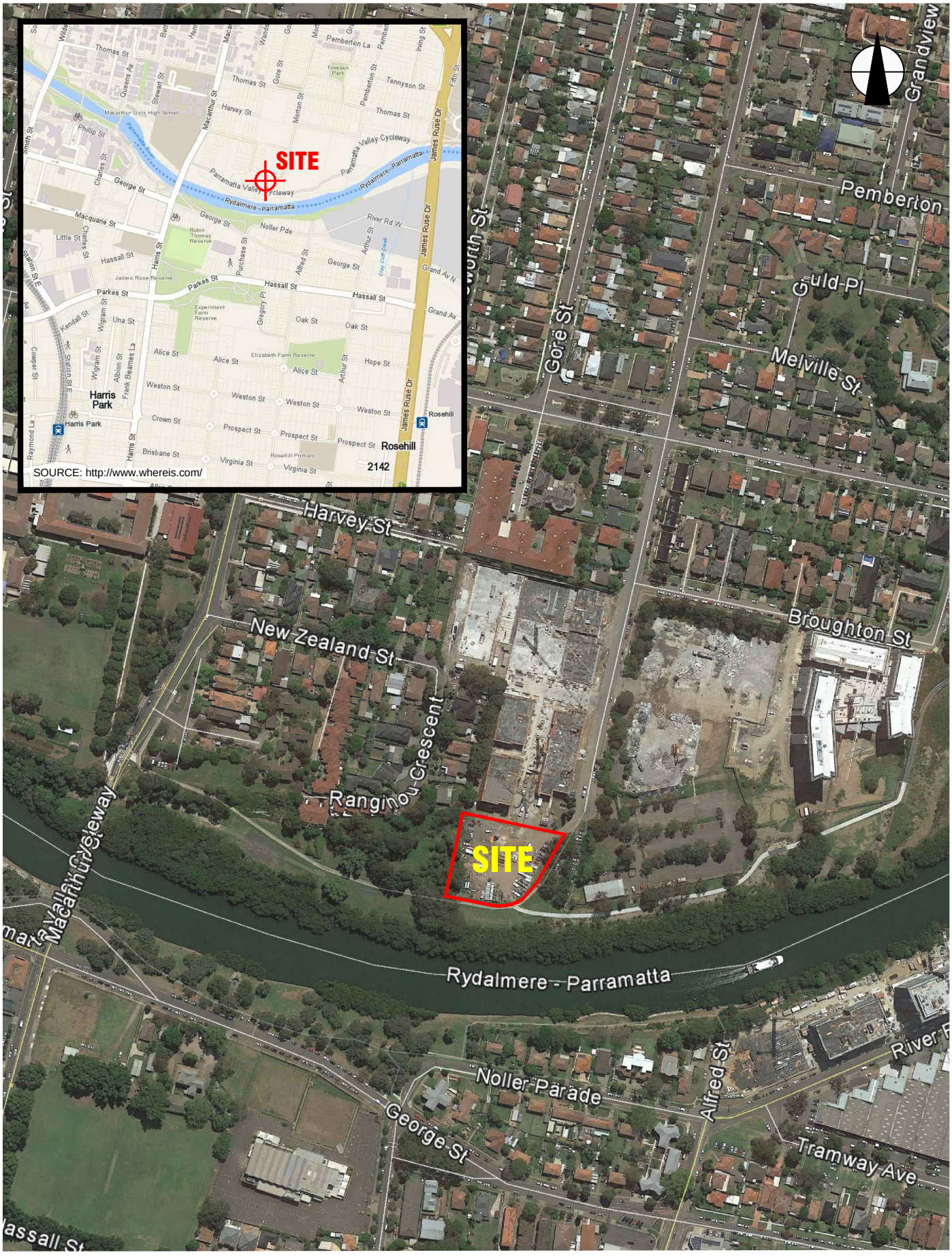
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

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

Read Responsibility Clauses Closely

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

REPORT FIGURES



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

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

Title: **SITE LOCATION PLAN**

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Report No: E31269K

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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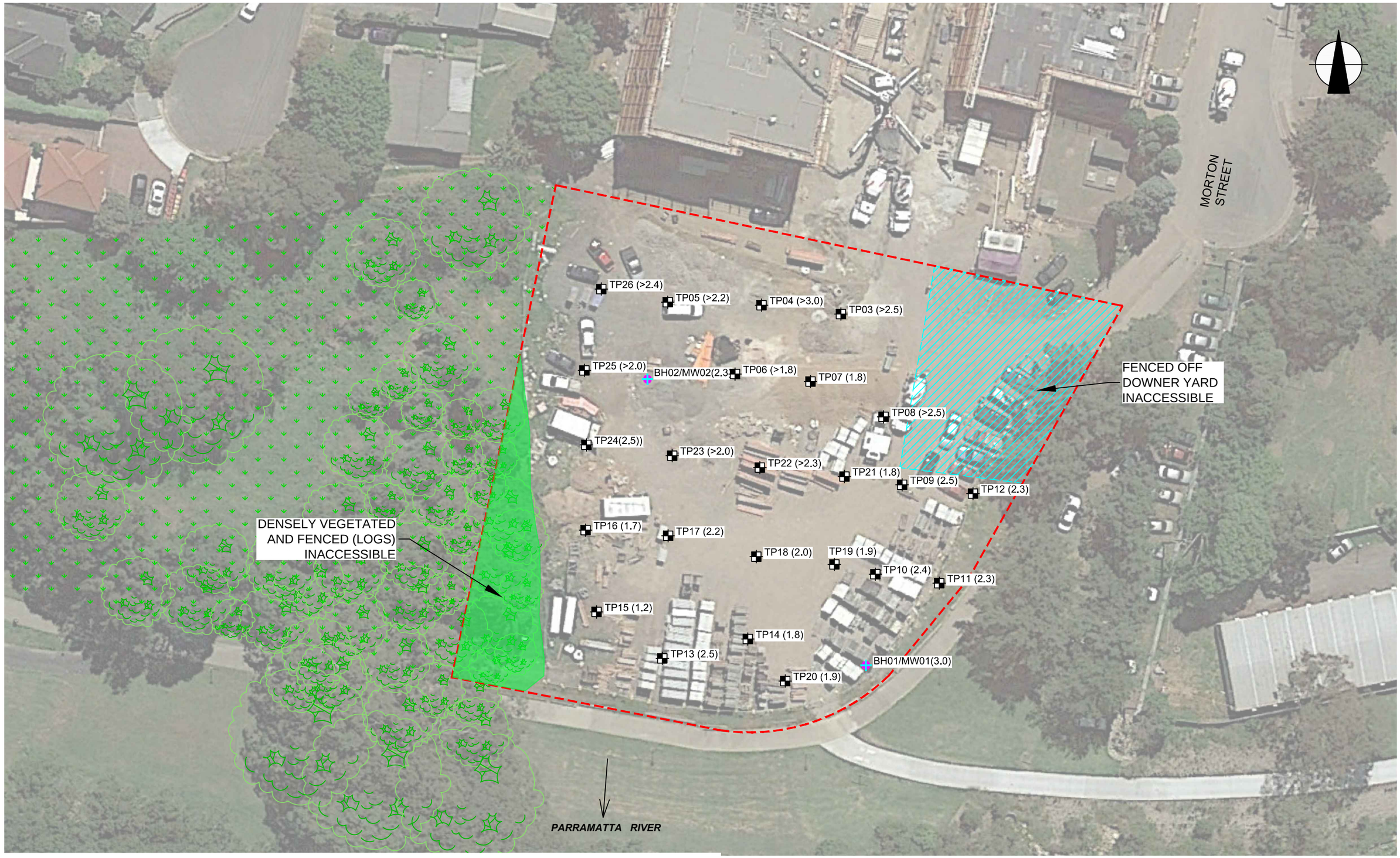

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH/MW(Fill Depth) — BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- TP(Fill Depth) — TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)

0 5 10 15 20 25
SCALE 1:500 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Report No: E31269K

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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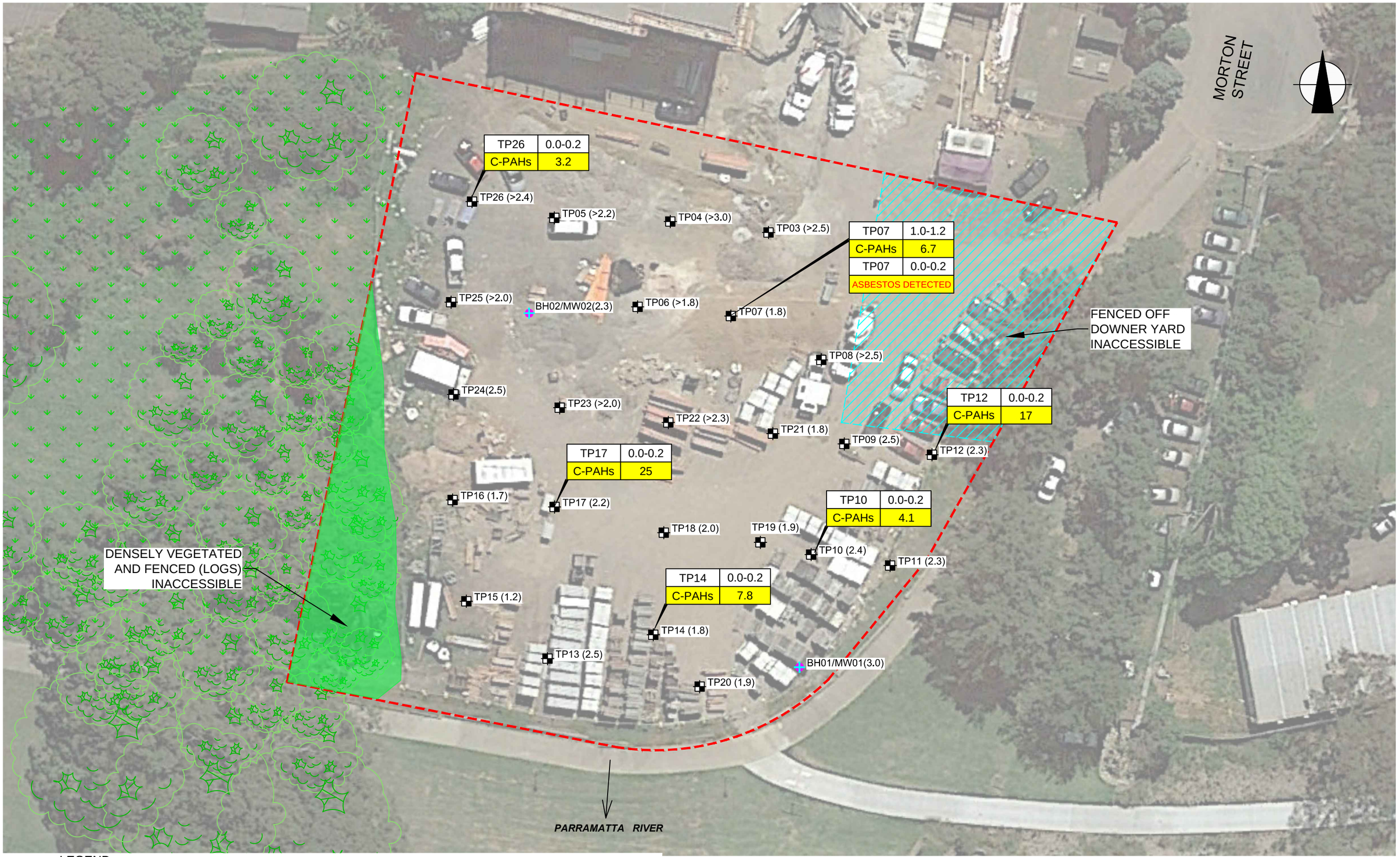

LEGEND

- APPROXIMATE SITE BOUNDARY
- BH/MW(Fill Depth) — BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)
- TP(Fill Depth) — TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION

CARCINOGENIC PAHs — SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (mg/kg)

0 4 8 12 16 20
SCALE 1:400 @A3 METRES

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

Title: **CONTAMINATION LOCATION PLAN**

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Report No: E31269K

Figure No: 3

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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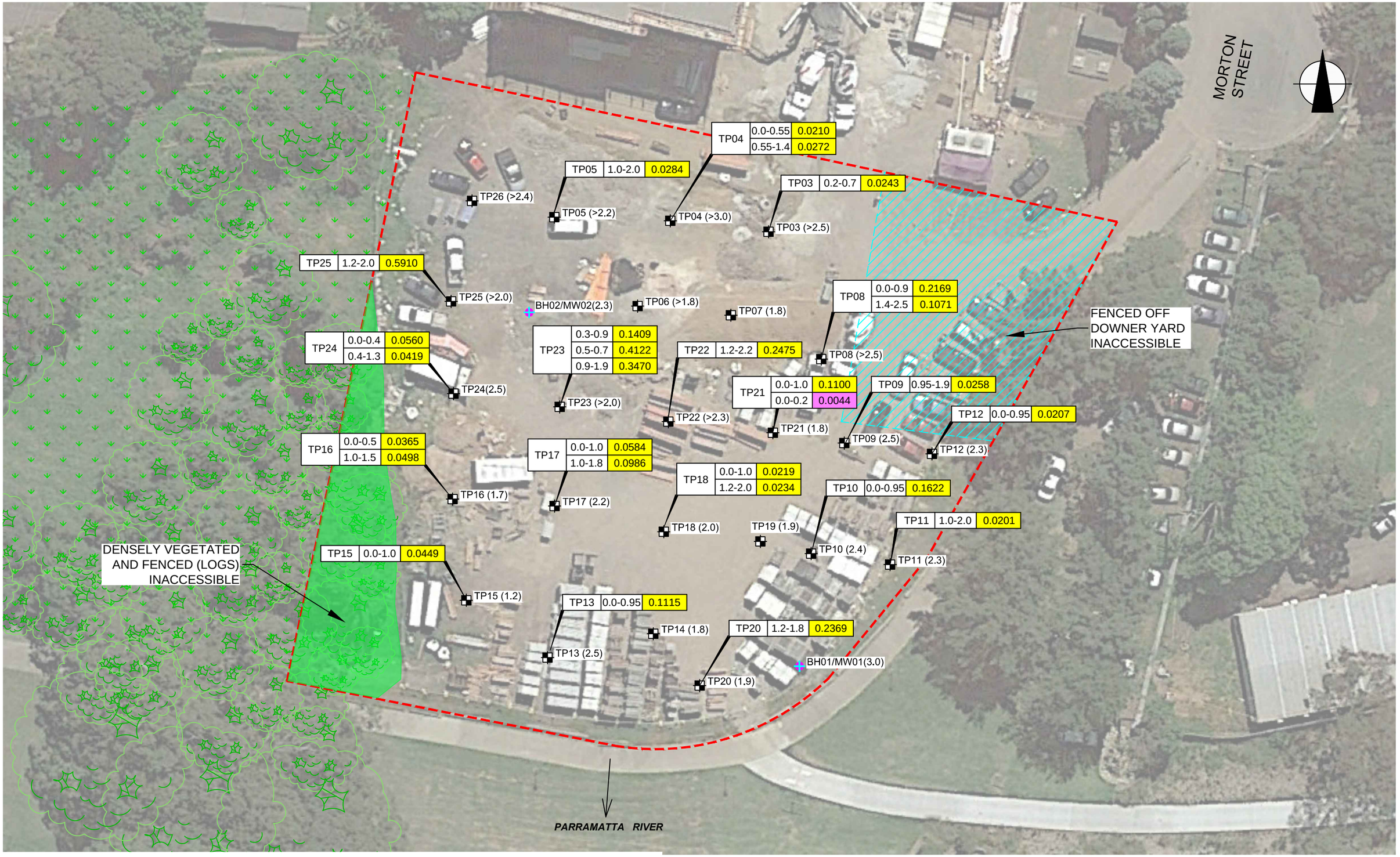

LEGEND

APPROXIMATE SITE BOUNDARY

BH/MW(Fill Depth) BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m)

TP(Fill Depth) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)

SAMPLE ID	DEPTH (metres)	CONCENTRATION

ABOVE ASBESTOS CONTAMINATION IN SOIL FOR HSL-C (RECREATIONAL) (%w/w)

ABOVE ASBESTOS CONTAMINATION IN SOIL AF/FA (%w/w)

0 4 8 12 16 20

SCALE 1:400 @A3 METRES

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

Title: **ASBESTOS QUANTIFICATION**

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Report No: E31269K

Figure No: 4

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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LABORATORY SUMMARY TABLES

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

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

Table Specific Explanations:

HIL Tables:

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

EIL/ESL Table:

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

Waste Classification and TCLP Table:

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

TABLE A
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013, HIL-C: 'Public open space; secondary schools; and footpaths'
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH01	0.0-0.1	Fill: silty clay	<4	<0.4	39	48	23	<0.1	55	50	2.6	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH01	3.2-3.45	Sand	21	<0.4	8	38	7	<0.1	8	17	<0.1	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH02	0.0-0.1	Fill: silty clay	<4	<0.4	20	38	21	<0.1	29	46	3.4	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH02	3.2-3.45	Sandy silty clay	4	<0.4	13	17	39	<0.1	7	33	0.59	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP04	0.0-0.2	Fill: gravelly silty clay	4	<0.4	15	42	36	<0.1	36	65	9.92	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP04	0.7-1.0	Fill: silty clay	5	0.7	15	27	30	<0.1	15	33	11.9	1.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP07	0.0-0.2	Fill: gravelly silty clay	7	<0.4	40	31	50	<0.1	37	75	6.55	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Detected
TP07	1.0-1.2	Fill: silty clay	17	<0.4	21	36	66	0.1	19	71	46.2	**6.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP10	0.0-0.2	Fill: gravelly silty clay	8	<0.4	34	120	190	0.2	29	120	26.7	**4.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP10	2.5-2.7	Sand	<4	<0.4	2	1	3	<0.1	<1	1	<0.1	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP12	0.0-0.2	Fill: silty clay	6	<0.4	21	38	86	0.2	18	75	133.6	**17**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP12	2.3-2.6	Sand	5	<0.4	5	4	10	<0.1	2	9	1.3	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP14	0.0-0.2	Fill: gravelly silty clay	9	<0.4	26	41	110	0.1	21	96	55.8	**7.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP14	2.0-2.2	Sandy silty clay	8	<0.4	10	12	17	<0.1	8	19	0.59	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP15	0.0-0.2	Fill: silty clay	5	<0.4	14	43	47	<0.1	11	86	11.69	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP15	1.2-1.4	Silty clay	7	<0.4	11	13	19	<0.1	9	27	<0.1	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP17	0.0-0.2	Fill: gravelly silty clay	6	<0.4	23	38	97	0.2	18	110	191.4	**25**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP17	2.3-2.5	Sand	<4	<0.4	2	2	4	<0.1	1	4	<0.1	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP19	0.0-0.2	Fill: gravelly silty clay	5	<0.4	25	76	120	<0.1	25	120	19.9	3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP19	2.0-2.2	Sandy silty clay	5	<0.4	23	11	26	<0.1	8	28	3.9	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP22	0.0-0.2	Fill: silty clay	<4	<0.4	8	38	12	<0.1	23	30	1.3	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP22	0.5-0.7	Fill: gravelly silty clay	5	<0.4	62	29	43	<0.1	44	63	14.1	2.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP24	0.0-0.2	Fill: silty clay	7	<0.4	20	51	70	<0.1	15	79	13.8	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP24	0.5-0.7	Fill: silty clay	13	<0.4	25	39	85	<0.1	21	110	12.9	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TP26	0.0-0.2	Fill: gravelly silty clay	<4	<0.4	15	56	23	<0.1	37	46	21.8	**3.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
TP26	0.5-0.7	Fill: silty clay	5	<0.4	15	47	74	0.2	19	140	18.1	2.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SF1	surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
SF2	surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of Samples			26	26	26	26	26	26	26	26	26	26	13	13	13	13	13	13	13	13	13	15
Maximum Value			21	0.7	62	120	190	0.2	55	140	191.4	25	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	Detected

Concentration above the SAC **VALUE**

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

					C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B:LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH01	0.0-0.1	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
BH01	3.2-3.45	Sand	2m to <4m	Sand	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
BH02	0.0-0.1	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
BH02	3.2-3.45	Sandy silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0.1
TP04	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0.2
TP04	0.7-1.0	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0.1
TP07	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP07	1.0-1.2	Fill: silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	0.1	1
TP10	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP10	2.5-2.7	Sand	2m to <4m	Sand	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP12	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	0.2	0
TP12	2.3-2.6	Sand	2m to <4m	Sand	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP14	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP14	2.0-2.2	Sandy silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP15	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP15	1.2-1.4	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP17	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	0.5	0
TP17	2.3-2.5	Sand	2m to <4m	Sand	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP19	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP19	2.0-2.2	Sandy silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP22	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP22	0.5-0.7	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP24	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP24	0.5-0.7	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP26	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
TP26	0.5-0.7	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<0.1	0
Total Number of Samples					26	26	26	26	26	26	26	26
Maximum Value					<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.5	1

Concentration above the SAC **VALUE**

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

SITE ASSESSMENT CRITERIA

					C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1
NEPM 2013 HSL Land Use Category					**HSL-A/B:LOW/HIGH DENSITY RESIDENTIAL**						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH01	0.0-0.1	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH01	3.2-3.45	Sand	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
BH02	0.0-0.1	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH02	3.2-3.45	Sandy silty clay	2m to <4m	Clay	150	NL	2	NL	NL	NL	NL
TP04	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP04	0.7-1.0	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP07	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP07	1.0-1.2	Fill: silty clay	1m to <2m	Clay	90	NL	1	NL	NL	310	NL
TP10	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP10	2.5-2.7	Sand	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
TP12	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP12	2.3-2.6	Sand	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
TP14	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP14	2.0-2.2	Sandy silty clay	2m to <4m	Clay	150	NL	2	NL	NL	NL	NL
TP15	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP15	1.2-1.4	Silty clay	1m to <2m	Clay	90	NL	1	NL	NL	310	NL
TP17	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP17	2.3-2.5	Sand	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
TP19	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP19	2.0-2.2	Sandy silty clay	2m to <4m	Clay	150	NL	2	NL	NL	NL	NL
TP22	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP22	0.5-0.7	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP24	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP24	0.5-0.7	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP26	0.0-0.2	Fill: gravelly silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
TP26	0.5-0.7	Fill: silty clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5

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

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH01	0.0-0.1	Fill: silty clay	Fine	7.85	21.5	17	<4	39	48	23	55	50	<0.1	<0.1	<25	<50	160	250	<0.2	<0.5	<1	<1	0.3
BH01	3.2-3.45	Sand	Coarse	7.85	21.5	17	21	8	38	7	8	17	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
BH02	0.0-0.1	Fill: silty clay	Fine	7.85	21.5	17	<4	20	38	21	29	46	<0.1	<0.1	<25	<50	<100	150	<0.2	<0.5	<1	<1	<0.2
BH02	3.2-3.45	Sandy silty clay	Fine	7.85	21.5	17	4	13	17	39	7	33	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
TP04	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	4	15	42	36	36	65	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1
TP04	0.7-1.0	Fill: silty clay	Fine	7.85	21.5	17	5	15	27	30	15	33	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2
TP07	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	7	40	31	50	37	75	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1
TP07	1.0-1.2	Fill: silty clay	Fine	7.85	21.5	17	17	21	36	66	19	71	0.1	NA	<25	<50	230	140	<0.2	<0.5	<1	<1	7.2
TP10	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	8	34	120	190	29	120	<0.1	<0.1	<25	<50	130	<100	<0.2	<0.5	<1	<1	4.3
TP10	2.5-2.7	Sand	Coarse	7.85	21.5	17	<4	2	1	3	<1	1	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
TP12	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	6	21	38	86	18	75	0.2	<0.1	<25	<50	440	160	<0.2	<0.5	<1	<1	19
TP12	2.3-2.6	Sand	Coarse	7.85	21.5	17	5	5	4	10	2	9	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.2
TP14	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	9	26	41	110	21	96	<0.1	<0.1	<25	<50	180	110	<0.2	<0.5	<1	<1	8.3
TP14	2.0-2.2	Sandy silty clay	Fine	7.85	21.5	17	8	10	12	17	8	19	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
TP15	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	5	14	43	47	11	86	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	2
TP15	1.2-1.4	Silty clay	Fine	7.85	21.5	17	7	11	13	19	9	27	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
TP17	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	6	23	38	97	18	110	0.5	<0.1	<25	<50	880	310	<0.2	<0.5	<1	<1	29
TP17	2.3-2.5	Sand	Coarse	7.85	21.5	17	<4	2	2	4	1	4	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.2
TP19	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	5	25	76	120	25	120	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	3.2
TP19	2.0-2.2	Sandy silty clay	Fine	7.85	21.5	17	5	23	11	26	8	28	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.6
TP22	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	<4	8	38	12	23	30	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.2
TP22	0.5-0.7	Fill: gravelly silty clay	Fine	7.85	21.5	17	5	62	29	43	44	63	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.5
TP24	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	7	20	51	70	15	79	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	1.2
TP24	0.5-0.7	Fill: silty clay	Fine	7.85	21.5	17	13	25	39	85	21	110	<0.1	NA	<25	<50	160	120	<0.2	<0.5	<1	<1	1.3
TP26	0.5-0.7	Fill: silty clay	Fine	7.85	21.5	17	5	15	47	74	19	140	<0.1	NA	<25	<50	250	250	<0.2	<0.5	<1	<1	1.8
Total Number of Samples				26	26	26	26	26	26	26	26	26	26	13	26	26	26	26	26	26	26	26	26
Maximum Value				7.85	21.5	17	21	62	120	190	55	140	0.5	<PQL	<PQL	<PQL	880	780	<PQL	<PQL	<PQL	<PQL	29

Concentration above the SAC — VALUE

The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																			
							AGED HEAVY METALS-EILs						EILs		ESLs								
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH01	0.0-0.1	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
BH01	3.2-3.45	Sand	Coarse	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	33
BH02	0.0-0.1	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
BH02	3.2-3.45	Sandy silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP04	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP04	0.7-1.0	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP07	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP07	1.0-1.2	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP10	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP10	2.5-2.7	Sand	Coarse	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	33
TP12	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP12	2.3-2.6	Sand	Coarse	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	33
TP14	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP14	2.0-2.2	Sandy silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP15	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP15	1.2-1.4	Silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP17	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP17	2.3-2.5	Sand	Coarse	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	300	2800	50	85	70	105	33
TP19	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP19	2.0-2.2	Sandy silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP22	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP22	0.5-0.7	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP24	0.0-0.2	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP24	0.5-0.7	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33
TP26	0.0-0.2	Fill: gravelly silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	180	180	120	1300	5600	60	105	125	45	33
TP26	0.5-0.7	Fill: silty clay	Fine	7.85	21.5	17	100	413	248	1263	355	1082	170	--	180	120	1300	5600	60	105	125	45	33

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

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled	PCBs	C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.2	0.5	1	3	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	<50	<50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH01	0.0-0.1	Fill: silty clay	<4	<0.4	39	48	23	<0.1	**55**	50	2.6	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	200	200	<0.2	<0.5	<1	<1	Not Detected
BH01	3.2-3.45	Sand	21	<0.4	8	38	7	<0.1	8	17	<0.1	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH02	0.0-0.1	Fill: silty clay	<4	<0.4	20	38	21	<0.1	29	46	3.4	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	120	120	<0.2	<0.5	<1	<1	Not Detected
BH02	3.2-3.45	Sandy silty clay	4	<0.4	13	17	39	<0.1	7	33	0.59	0.09	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP04	0.0-0.2	Fill: gravelly silty clay	4	<0.4	15	42	36	<0.1	36	65	9.92	**0.92**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
TP04	0.7-1.0	Fill: silty clay	5	0.7	15	27	30	<0.1	15	33	11.9	**1.1**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP07	0.0-0.2	Fill: gravelly silty clay	7	<0.4	40	31	50	<0.1	37	75	6.55	0.65	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Detected
TP07	1.0-1.2	Fill: silty clay	17	<0.4	21	36	66	0.1	19	71	46.2	**4.5**	NA	NA	NA	NA	NA	<25	<50	110	160	270	<0.2	<0.5	<1	<1	NA
TP10	0.0-0.2	Fill: gravelly silty clay	8	<0.4	34	120	**190**	0.2	29	120	26.7	**2.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	110	110	<0.2	<0.5	<1	<1	Not Detected
TP10	2.5-2.7	Sand	<4	<0.4	2	1	3	<0.1	<1	1	<0.1	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP12	0.0-0.2	Fill: silty clay	6	<0.4	21	38	86	0.2	18	75	133.6	**12**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	250	240	490	<0.2	<0.5	<1	<1	Not Detected
TP12	2.3-2.6	Sand	5	<0.4	5	4	10	<0.1	2	9	1.3	0.2	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP14	0.0-0.2	Fill: gravelly silty clay	9	<0.4	26	41	**110**	0.1	21	96	55.8	**5.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<1	Not Detected
TP14	2.0-2.2	Sandy silty clay	8	<0.4	10	12	17	<0.1	8	19	0.59	0.09	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP15	0.0-0.2	Fill: silty clay	5	<0.4	14	43	47	<0.1	11	86	11.69	**0.99**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
TP15	1.2-1.4	Silty clay	7	<0.4	11	13	19	<0.1	9	27	<0.1	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP17	0.0-0.2	Fill: gravelly silty clay	6	<0.4	23	38	97	0.2	18	110	191.4	**16**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	510	460	970	<0.2	<0.5	<1	<1	Not Detected
TP17	2.3-2.5	Sand	<4	<0.4	2	2	4	<0.1	1	4	<0.1	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP19	0.0-0.2	Fill: gravelly silty clay	5	<0.4	25	76	**120**	<0.1	25	120	19.9	**2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
TP19	2.0-2.2	Sandy silty clay	5	<0.4	23	11	26	<0.1	8	28	3.9	0.4	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP22	0.0-0.2	Fill: silty clay	<4	<0.4	8	38	12	<0.1	23	30	1.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
TP22	0.5-0.7	Fill: gravelly silty clay	5	<0.4	62	29	43	<0.1	**44**	63	14.1	**1.5**	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
TP24	0.0-0.2	Fill: silty clay	7	<0.4	20	51	70	<0.1	15	79	13.8	**1.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
TP24	0.5-0.7	Fill: silty clay	13	<0.4	25	39	85	<0.1	21	110	12.9	**1.3**	NA	NA	NA	NA	NA	<25	<50	<100	140	140	<0.2	<0.5	<1	<1	NA
TP26	0.0-0.2	Fill: gravelly silty clay	<4	<0.4	15	56	23	<0.1	37	46	21.8	**2.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	180	620	800	<0.2	<0.5	<1	<1	Not Detected
TP26	0.5-0.7	Fill: silty clay	5	<0.4	15	47	74	0.2	19	140	18.1	**1.8**	NA	NA	NA	NA	NA	<25	<50	<100	230	230	<0.2	<0.5	<1	<1	NA
SF1	surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
SF2	surface	Material	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Detected
Total Number of samples			26	26	26	26	26	26	26	26	26	26	13	13	13	13	13	26	26	26	26	26	26	26	26	26	15
Maximum Value			21	0.7	62	120	190	0.2	55	140	191.4	16	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	510	620	970	<PQL	<PQL	<PQL	<PQL	NC
Statistical Analysis on Fill Samples																											
Number of Fill Samples			NC	NC	NC	NC	18	NC	18	NC	NC	18	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mean Value			NC	NC	NC	NC	66	NC	26	NC	NC	3.05	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Standard Deviation			NC	NC	NC	NC	44.7	NC	11.6	NC	NC	4.26	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
% UCL			NC	NC	NC	NC	95	NC	95	NC	NC	95	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
UCL Value			NC	NC	NC	NC	84.06	NC	30.97	NC	NC	**5.362**	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

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

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

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID
PQL - Envirolab Services				10	50	1	1	1	3	1	
NEPM 2013 - Land Use Category				**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**								
MW01	3.65	2m to <4m	Clay	<10	<50	<1	<1	<1	<1	<0.2	2
MW02	2.93	2m to <4m	Clay	<10	<50	<1	<1	<1	<1	<0.2	2
Total Number of Samples				2	2	2	2	2	2	2	2
Maximum Value				<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	2

Concentration above the SAC VALUE
Site specific assesment (SSA) required VALUE

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

HSL GROUNDWATER ASSESSMENT CRITERIA

				C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				10	50	1	1	1	3	1
NEPM 2013 - Land Use Category				**HSL-A/B: LOW/HIGH DENSITY RESIDENTIAL**						
Sample Reference	**Water Depth**	**Depth Category**	**Soil Category**							
MW01	3.65	2m to <4m	Clay	NL	NL	5000	NL	NL	NL	NL
MW02	2.93	2m to <4m	Clay	NL	NL	5000	NL	NL	NL	NL

TABLE F

SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZECC 2000 Marine Waters	SAMPLES	
			MW01	MW02
			26/03/2018	26/03/2018
Inorganic Compounds and Parameters				
pH	0.1	7 - 8.5	6.9	6.7
Electrical Conductivity (µS/cm)	1	NSL	1400	1700
Metals and Metalloids				
Arsenic (As lll)	1	2.3	2	3
Cadmium	0.1	0.7	<0.1	0.1
Chromium (Vl)	1	4.4	<1	<1
Copper	1	1.3	<1	<1
Lead	1	4.4	<1	<1
Total Mercury (inorganic)	0.05	0.1	<0.05	<0.05
Nickel	1	7	1	2
Zinc	1	15	<1	12
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)				
Benzene	1	500	<1	<1
Toluene	1	180	<1	<1
Ethylbenzene	1	5	<1	<1
m+p-xylene	2	75	<2	<2
o-xylene	1	350	<1	<1
Total xylenes	2	NSL	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	0.2	50	<0.2	<0.2
Acenaphthylene	0.1	NSL	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1
Anthracene	0.1	**0.01**	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1

Concentration above the GIL — VALUE

PQL exceeds GIL — **BOLD/RED**

TABLE G

SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZECC 2000 Recreational	NHMRC ADWG 2011	SAMPLES	
				MW01	MW02
				26/03/2018	26/03/2018
Inorganic Compounds and Parameters					
pH	0.1	6.5 - 8.5	6.5 - 8.5	6.9	6.7
Electrical Conductivity (µS/cm)	1	NSL	NSL	1400	1700
Metals and Metalloids					
Arsenic (As lll)	1	50	10	2	3
Cadmium	0.1	5	2	<0.1	0.1
Chromium (total)	1	50	50	<1	<1
Copper	1	1000	2000	<1	<1
Lead	1	50	10	<1	<1
Total Mercury (inorganic)	0.05	1	1	<0.05	<0.05
Nickel	1	100	20	1	2
Zinc	1	5000	3000	<1	12
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)					
Benzene	1	10	1	<1	<1
Toluene	1	NSL	800	<1	<1
Ethylbenzene	1	NSL	300	<1	<1
m+p-xylene	2	NSL	NSL	<2	<2
o-xylene	1	NSL	NSL	<1	<1
Total xylenes	2	NSL	600	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	0.2	NSL	NSL	<0.2	<0.2
Acenaphthylene	0.1	NSL	NSL	<0.1	<0.1
Acenaphthene	0.1	NSL	NSL	<0.1	<0.1
Fluorene	0.1	NSL	NSL	<0.1	<0.1
Phenanthrene	0.1	NSL	NSL	<0.1	<0.1
Anthracene	0.1	NSL	NSL	<0.1	<0.1
Fluoranthene	0.1	NSL	NSL	<0.1	<0.1
Pyrene	0.1	NSL	NSL	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	NSL	<0.1	<0.1
Chrysene	0.1	NSL	NSL	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	NSL	<0.2	<0.2
Benzo(a)pyrene	0.1	**0.01**	**0.01**	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	NSL	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	NSL	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	NSL	<0.1	<0.1

Concentration above the GIL — VALUE
PQL exceeds GIL — **BOLD/RED**

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

FIELD DATA															LABORATORY DATA											
Date Sampled	Sample reference	Sample Depth	Visible ACM in top 100mm	Approx. Volume of Soil (L)	Soil Mass (g)	Mass ACM (g)	Mass Asbestos in ACM (g)	[Asbestos from ACM in soil] (%w/w)	Mass ACM <7mm (g)	Mass Asbestos in ACM <7mm (g)	[Asbestos from ACM <7mm in soil] (%w/w)	Mass FA (g)	Mass Asbestos in FA (g)	[Asbestos from FA in soil] (%w/w)	Lab Report Number	Sample refeference	Sample Depth	Sample Mass (g)	Asbestos ID in soil (AS4964) >0.1g/kg	Trace Analysis	Total Asbestos (g/kg)	Asbestos ID in soil <0.1g/kg	ACM >7mm Estimation (g)	FA and AF Estimation (g)	ACM >7mm Estimation %(w/w)	FA and AF Estimation %(w/w)
SAC			**No**					**0.02**			**0.001**			**0.001**									0.01		**0.02**	**0.001**
19/03/2018	BH01	0.0-0.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	BH01	0.5-1.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	BH02	0.0-0.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	BH02	0.3-1.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	BH02	1.0-2.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	BH02	2.0-3.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP03	0.0-0.2	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP03	0.2-0.7	Yes	10	10,000	16.2	2.43	0.0243	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP03	0.3-0.5	876.5	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
19/03/2018	TP03	0.7-1.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP03	1.3-1.9	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP03	1.9-2.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP04	0.0-0.55	Yes	10	10,000	14.0	2.1	0.0210	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP04	0.55-1.4	Yes	10	10,000	18.1	2.715	0.0272	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP04	1.4-2.4	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP05	0.0-1.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP05	1.0-2.0	Yes	10	10,000	18.9	2.835	0.0284	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP05	2.0-2.2	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP06	0.0-0.4	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP06	0.4-1.0	Yes	10	10,000	11.9	1.785	0.0179	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP06	1.0-1.8	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP07	0.0-0.9	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP07	0.9-1.9	Yes	10	10,000	9.9	1.485	0.0149	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP08	0.0-0.9	Yes	10	10,000	144.6	21.69	0.2169	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP08	0.9-1.4	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP08	1.4-2.5	Yes	10	10,000	71.4	10.71	0.1071	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP08	1.3-1.5	688.6	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
19/03/2018	TP09	0.0-0.95	Yes	10	10,000	6.7	0.999	0.0100	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP09	0.0-0.2	803.3	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
19/03/2018	TP09	0.95-1.9	Yes	10	10,000	17.2	2.583	0.0258	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP09	1.9-2.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP10	0.0-0.95	Yes	10	10,000	108.1	16.215	0.1622	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP10	0.95-1.8	Yes	10	10,000	4.1	0.609	0.0061	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP10	1.8-2.4	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP11	0.0-1.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP11	0.0-0.2	760.5	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
19/03/2018	TP11	1.0-2.0	Yes	10	10,000	13.4	2.013	0.0201	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP11	2.0-2.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP12	0.0-0.95	Yes	10	10,000	13.8	2.07	0.0207	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP12	0.95-2.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19/03/2018	TP12	2.0-2.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP13	0.0-0.95	Yes	10	10,000	74.3	11.145	0.1115	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP13	0.0-0.2	764.3	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
20/03/2018	TP13	0.95-1.95	Yes	10	10,000	8.4	1.254	0.0125	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP13	1.95-2.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP14	0.0-0.95	Yes	10	10,000	2.1	0.315	0.0032	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP14	0.95-1.8	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP15	0.0-1.0	Yes	10	10,000	29.9	4.485	0.0449	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP15	1.0-1.2	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP16	0.0-0.5	Yes	10	10,000	24.3	3.645	0.0365	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP16	0.0-0.2	801.1	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
20/03/2018	TP16	0.5-1.0	Yes	10	10,000	4.1	0.615	0.0062	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP16	1.0-1.5	Yes	10	10,000	33.2	4.98	0.0498	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP17	0.0-1.0	Yes	10	10,000	38.9	5.835	0.0584	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP17	1.0-1.8	Yes	10	10,000	65.7	9.855	0.0986	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP17	1.8-2.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP18	0.0-1.0	Yes	10	10,000	14.6	2.19	0.0219	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP18	0.0-0.2	809.7	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	Chrysotile	–	0.0025	<0.01	<0.001
20/03/2018	TP18	1.2-2.0	Yes	10	10,000	15.6	2.34	0.0234	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP19	0.0-1.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP19	1.2-1.9	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP20	0.0-1.0	Yes	10	10,000	2.4	0.36	0.0036	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP20	0.0-0.2	807.6	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	No visible asbestos detected	–	–	<0.01	<0.001
20/03/2018	TP20	1.2-1.8	Yes	10	10,000	157.9	23.685	0.2369	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP21	0.0-1.0	Yes	10	10,000	73.3	10.995	0.1100	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP21	0.0-0.2	885.3	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected	<0.1	Chrysotile	–	0.039	<0.01	0.0044
20/03/2018	TP21	1.0-1.8	Yes	10	10,000	2.0	0.3	0.0030	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP22	0.0-0.4	Yes	10	10,000	2.2	0.33	0.0033	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP22	0.4-1.2	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP22	1.2-2.2	Yes	10	10,000	165.0	24.75	0.2475	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP23	0.0-0.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP23	0.3-0.9	Yes	10	10,000	93.9	14.085	0.1409	No ACM <7mm observed	--	--	No FA observed	--	--	187888	TP23	0.5-0.7	688.1	Chrysotile and Amosite asbestos detected	No asbestos detected	4.1225	Chrysotile and Amosite	2.8367	–	0.4122	<0.001
20/03/2018	TP23	0.9-1.9	Yes	10	10,000	231.3	34.695	0.3470	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP24	0.0-0.4	Yes	10	10,000	37.3	5.595	0.0560	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP24	0.4-1.3	Yes	10	10,000	27.9	4.185	0.0419	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP24	1.3-2.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP24	2.0-2.5	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP25	0.0-0.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP25	0.3-1.2	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP25	1.2-2.0	Yes	10	10,000	394.0	59.1	0.5910	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP26	0.0-0.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP26	0.3-1.3	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP26	1.3-2.0	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20/03/2018	TP26	2.0-2.4	No	10	10,000	No ACM observed	--	--	No ACM <7mm observed	--	--	No FA observed	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE I

SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = TP14 (0.0-0.2)	Arsenic	4	9	10	9.5	11
Dup Ref = DUPKT1	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	26	18	22.0	36
Envirolab Report: 187888	Copper	1	41	52	46.5	24
	Lead	1	110	100	105.0	10
	Mercury	0.1	0.1	0.2	0.2	67
	Nickel	1	21	16	18.5	27
	Zinc	1	96	85	90.5	12

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE J

SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = TP15 (0.0-0.2)	Arsenic	4	4	5	5	5.0	0
Dup Ref = DUPKT2	Cadmium	0.4	0.4	<0.4	<0.4	NC	NC
	Chromium	1	1	14	15	14.5	7
Envirolab Report: 187888	Copper	1	1	43	33	38.0	26
Envirolab VIC Report: 13400	Lead	1	1	47	71	59.0	41
	Mercury	0.1	0.1	<0.1	<0.1	NC	NC
	Nickel	1	1	11	14	12.5	24
	Zinc	1	1	86	86	86.0	0

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE K

GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MW01	Arsenic	1	3	3	3	0.000
Dup Ref = JHDUP1	Cadmium	0.1	0.1	0.1	0	0
	Chromium	1	<1	<1	NC	NC
Envirolab Report: 188103	Copper	1	<1	<1	NC	NC
	Lead	1	<1	<1	NC	NC
	Mercury	0.05	<0.05	<0.05	NC	NC
	Nickel	1	2	2	2	0
	Zinc	1	12	11	12	9

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE L

SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TB1[S]	TS[S]	TS[W]
			20/03/2018	20/03/2018	26/03/2018
	mg/kg	µg/L	mg/kg	% Recovery	% Recovery
Benzene	1	1	<0.2	100	110
Toluene	1	1	<0.5	100	110
Ethylbenzene	1	1	<1	95	110
m+p-xylene	2	2	<2	97	120
o-xylene	1	1	<1	96	110

Explanation:

[W] Sample type (water)

[S] Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

Appendix A: Borehole & Test pit Logs

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
BH1
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** JK300 **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■				0			FILL: Silty clay, medium plasticity, dark brown, trace of sandstone and igneous gravel, asphalt, ash, and root fibres.	w<PL			GRASS COVER
	■		■			N = 15 10,8,7	1			FILL: Silty clay, medium plasticity, brown, trace of medium to coarse grained sandstone and igneous gravel, ironstone, asphalt, ash, slag, and root fibres.				
	■		■			N = 6 2,2,4	2			FILL: Silty clay medium plasticity, dark brown, trace of sandstone and igneous gravel, and root fibres.	w<PL			
▶			■											
	■					N = 6 3,3,3	3		SP	SAND: medium to coarse grained, grey, trace of shell.	W			GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.0m TO 6.0m. CASING 0m TO 3.0m. 2mm SAND FILTER PACK 3.0m TO 6.0m. BENTONITE SEAL 0.2m TO 3.0m COMPLETED WITH GATIC COVER.
							4							
							5							
							6		CI-CH	Silty CLAY: medium to high plasticity, brown.	w=PL			
										END OF BOREHOLE AT 6.2m				
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
BH2
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** JK300 **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■				0			FILL: Silty clay, medium plasticity, dark brown, trace of glass, metal, brick, tile, sand, ash, and root fibres.	w<PL			GRASS AND GRAVEL COVER
						N = 9 5,4,5	1			FILL: Silty clay, medium plasticity, brown, trace of sand, igneous gravel, shale, brick, ash, and root fibres.				
	■		■			N = 19 2,8,11	2							
▶									CI-CH	Silty CLAY: medium to high plasticity, dark brown, trace of sand.	w=PL			
	■					N = 3 2,1,2	3		CI-CH	Sandy Silty CLAY: medium to high plasticity, dark brown, fine to coarse grained sand.	w=PL			GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.0m TO 6.0m. CASING 0m TO 3.0m. 2mm SAND FILTER PACK 3.0m TO 6.0m. BENTONITE SEAL 0.2m TO 3.0m COMPLETED WITH GATIC COVER.
							4							
							5							
							6			END OF BOREHOLE AT 6.0m				
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP3
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Gravelly sand, fine to coarse grained, grey, fine to coarse grained igneous gravel, trace of tile, brick, glass, plastic metal, ash, and root fibres.	D			BUCKET = 10L
											w<PL			BUCKET = 10L FCF-JHF1
							0.5			FILL: Gravelly sandy clay, medium plasticity, brown grey, fine to medium grained sand, fine to coarse sandstone gravel, trace of shale fragments, and concrete, fibre cement fragments.				
										FILL: Silty clay, medium plasticity, brown, trace of shale fragments, and root fibres.				BUCKET = 10L
							1							
										FILL: Silty clay, medium to high plasticity, brown, trace of brick, concrete, shale, and ash.				BUCKET = 10L
							1.5							
										FILL: Silty clay, medium to high plasticity, dark brown, trace of timber, brick, glass, tile, metal, and ash.				BUCKET = 10L
							2							
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP4
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, blue grey, fine to coarse grained igneous gravel, trace of glass.	w<PL			BUCKET = 10L
							0.5			FILL: Silty clay, medium plasticity, brown, trace of sandstone and igneous gravel, brick, shale fragments, and ash.				BUCKET = 10L JHF2
	■		■		■		1							
							1.5			FILL: Silty clay, medium plasticity, brown, trace of sandstone and igneous gravel, sandstone boulders, sand, shale fragments, brick, asphalt, and ash.	w≤PL			BUCKET = 10L JHF3
	■		■		■		2							STRONG HYDROCARBON/ COALTAR ODOUR BUCKET = 10L
							2.5							REDUCING WITH DEPTH BUCKET = 10L
							3			END OF TEST PIT AT 3.0m				
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP5
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION			■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous gravel, trace of glass, and plastic.	w<PL			BUCKET = 10L
							0.5							
			■				1							
					■		1.5			FILL: Silty clay, medium plasticity, brown, trace of sandstone and igneous gravel, and ash.				BUCKET = 10L JHF4
			■				2							BUCKET = 10L
							2.5			END OF TEST PIT AT 2.2m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP6
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Silty clay, medium plasticity, grey, trace of igneous and sandstone gravel, concrete, brick, and root fibres.	w<PL			BUCKET = 10L
							0.5			FILL: Silty clay, medium plasticity, brown, trace of sandstone cobbles, shale, sand, and ash.				BUCKET = 10L JHF5
							1			FILL: Silty clay, medium plasticity, brown, trace of sandstone gravel, brick, timber, sand, glass, plastic, and ash.				BUCKET = 10L
							1.5							
										END OF TEST PIT AT 1.8m				BUCKET REFUSAL ON BURIED STRUCTURE
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP7
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, trace of brick, concrete, and ash.	w≤PL			BUCKET = 10L
							0.5							
	■		■				1			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel, brick, tiles, wood, and ash.				BUCKET = 10L JHF6
							1.5							
										END OF TEST PIT AT 1.8m				REFUSAL ON ROCK (POSSIBLE BOULDER)
							2							
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP8
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Gravelly silty clay, medium plasticity, brown grey, fine to coarse grained igneous gravel, coarse grained sandstone gravel, trace of metal.	w<PL			BUCKET = 10L JHF7 JHF8
							0.5							
							1			FILL: Silty clay, medium plasticity, dark brown, trace of coarse grained sandstone and igneous gravel, and plastic.				BUCKET = 10L
							1.5			FILL: Silty clay, medium plasticity, dark brown, trace of medium to coarse grained sandstone and igneous gravel, wood, and ash.				BUCKET = 10L JHF9
							2							STRONG HYDROCARBON ODOUR
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP9
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, trace of glass, wood, ash, and brick.	w<PL			BUCKET = 10L JHF11
					■		0.5							
					■		1			FILL: Silty clay, medium plasticity, dark brown, trace of igneous and sandstone gravel, brick, and ash.				BUCKET = 10L JHF10
			■				1.5							
					■		2			FILL: Silty clay, medium plasticity, dark brown, trace of medium to coarse grained igneous and sandstone gravel, and ash.				BUCKET = 10L
▶							2.5		SP	SAND: medium to coarse grained, dark grey.	W			
										END OF TEST PIT AT 2.7m				
							3							
							3.5							