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Report on
Detailed Site Investigation (Contamination)

Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

Prepared for
Pacific Brook Christian School Ltd

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

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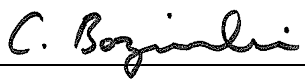
Reviewer		25 August 2020

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1. Introduction

This report presents the results of a detailed site investigation (DSI) for contamination undertaken at Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW. The investigation was commissioned by Stephanie Ferguson from NRBS Architecture on behalf of Pacific Brook Christian School Ltd and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal NCL190331 dated 5 June 2019.

It is understood that the proposed development on the site will comprise a school facility (primary or secondary school).

The site has undergone a preliminary contamination assessment (PCA) by JK Environments (JK) in April 2019. The PCA recommended a Stage 2 Detailed Site Assessment (DSI) and a hazardous building materials survey on the existing site structures.

This DSI was undertaken to further assess the potential contamination sources identified in the PCA (JK, 2019) as recommended, and assess the suitability of the site for the proposed development from a contamination perspective.

It is noted that the hazardous building material survey was also conducted by DP and has been reported separately.

The DSI comprised the following:

- Brief review of the PCA (JK, 2019) and confirmation of scope for the current investigation;
- Site inspection to assess current site conditions;
- Mark out and service locating at proposed test locations;
- Excavation of 16 shallow test pits across the site to supplement the PCA;
- Drilling of two boreholes and installation of two groundwater monitoring wells;
- Developing, purging and sampling of the two groundwater wells;
- Laboratory testing of selected soil and groundwater samples for a range of potential organic and inorganic contaminants;
- Preparation of this reporting presenting the results of the assessment.

The investigation was undertaken with reference to NEPM 2013 and NSW EPA “Guidelines for Consultants Reporting on Contaminated Sites”.

2. Site Description

The site is identified as Lot 100 DP 1261496, Maitland Street, Muswellbrook, New South Wales, as shown in Drawing 1, Appendix D.

The site comprises a triangular area of approximately 2.35 Hectares and has a frontage of approximately 334 m to Maitland Street.

At the time of the investigation the site was vacant and generally comprised several empty buildings in connection with the previous site use (plant nursery), gravel and asphalt paths, gravel garden beds and grass covering.

The site is bound by Maitland Street to the south west, residential developments immediately to the south east with a service station located further to the south east (approximately 60 m), a golf course to the west and north.

The site is currently zoned RU3 – Forestry and is within Muswellbrook Shire Council.

Refer to Drawing 1 – Test Location Plan in Appendix D for site features.

3. Geology and Hydrogeology

Reference to the 1:250,000 Geology geodatabase indicates that the majority of the site is underlain by Quaternary alluvium deposits which typically comprise gravel, sand, silt and clay and the south western portion is underlain by the Branxton Formation typically comprising conglomerate, sandstone, siltstone.

The regional groundwater flow regime is believed to the north and north west towards Muscle Creek (located approximately 350 m north of the site) and is considered to be the nearest sensitive receptor. The depth to the water table is likely to be <5 m based on site topography and geology. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

Reference to the Acid Sulphate Soil Risk Map, prepared by the Department of Land and Water Conservation (DLWC) indicates the site is not mapped within an area known to comprise acid sulfate soils.

4. Background

The PCA undertaken by J K Environmental in April 2019 comprised a site history review, drilling of 20 boreholes, sampling and laboratory testing. The results of the investigation identified following:

- Fill materials were identified in all bores form 0.1 m to 0.8 m which comprised a mixture of clayey silt, sandy gravel and gravel materials;

- Natural materials were encountered in all bores beneath the filling and typically comprised silty clay materials;
- Groundwater was not encountered during the previous investigation, however minor seepage was encountered in the southern portion of the site at a depth of 0.8 m which may have been attributed to site infrastructure (i.e. site irrigation) as opposed to natural groundwater;
- It was noted that no odours or staining were observed in the filling or natural materials during the investigation.
- Results of laboratory testing indicated minor exceedances of PAHs and hydrocarbons above human health and ecological criteria in regard to the proposed landuse.

The previous investigation also outlined the following data gaps:

- The sampling density was approximately 57% of the minimum sampling density recommended for hotspot identification, as outlined in the NSW EPA Sampling Design Guidelines (1995) for a site area of approximately 25,000 m^2. A minimum of 15 additional sampling locations would be required to meet the guidelines for a Stage 2 Detailed Site Investigation (DSI). It is recommended that any further investigation is undertaken from test pits to provide a better visual assessment of the soil;
- Groundwater sampling was outside the scope of the preliminary assessment. The potential for on-site activities to have resulted in significant groundwater contamination is considered to be relatively low (based on the site observations and soil analysis results). However, an investigation will be required to assess the potential for contamination impacts associated with the service station to the south-east of the site;
- Chemical storage within the Hazchem sheds has the potential to leach through concrete slabs through historical leaks or spills. Additional sampling would be required around the edges of building slabs and within the building footprint to better characterise these areas; and
- The potential presence of hazardous building materials within the existing buildings.

5. Site Condition

Site conditions observed during the site walkover on 1 July 2019 are summarised below as follows:

- The site was vacant and contained several site structures as follows:
    - A possible residential property in the central northern portion of the site (Figure 1);
    - Administration buildings in the south central portion of the site;
    - A glasshouse in the south eastern portion of the site (Figure 2);
    - Two Hazchem sheds in the south eastern portion of the site (Figures 3); and
    - Several awning and shed structures and a large water tank were also located across the site (Figures 3 and 4).

The south eastern portion of the site was fenced housed majority of the building which were made of weatherboard cladding or metal sheeting along with metal sheet roofing.

The south eastern areas also comprised several mature trees along and adjacent to the site boundaries and internal gravel paths and gravel areas covered in weed matting presumably used as display beds when the previous nursery was in operation, the undeveloped areas in the south eastern portion were grassed covers (Figure 5).

The north western portion of the site was unfenced and appeared to be undeveloped comprising abundant mature trees and vegetative ground cover (Figure 6).

At the time of the inspection the majority of the accessible buildings (sheds, Hazchem and glasshouse) were mostly vacant. The two Hazchem buildings contained remnants of previous chemical storage (i.e. containers of pesticides etc) (Figure 7).

The concrete flooring and concrete surrounds within the Hazchem buildings did not comprised gross staining or evidence of chemicals leaking from the buildings.

Fibrous cement fragments were also encountered in south eastern portion of the site adjacent to the northern boundary (Figure 8).

Figure 1: Possible residential building in the central portion of the site, looking south east.

Figure 2: Glasshouse in the south eastern portion of the site, looking north.

Figure 3: Hazchem buildings in the background and on the right and awning / shed on the left, looking south east.

Figure 4: Large water tank on the right and gravel beds lined with weed matting on left, looking south west.

Figure 5: Grassed covered areas, internal gravel paths and gravel / weed matting areas, looking north west.

Figure 6: Dense grass covered area with abundant mature trees in the undeveloped north western portion of the site, looking south.

Figure 7: Stored chemical containers within the Hazchem building.

Figure 8: Fibrous cement fragments encountered adjacent to the northern boundary in the south eastern portion of the site, looking north.

6. Conceptual Site Model

A Conceptual Site Model (CSM) has been prepared for the site with reference to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amendment Measure 2013) Schedule B2. The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. The CSM is presented in Table 1 below.

Table 1: Conceptual Site Model

Known and Potential Primary Sources	Primary Release Mechanism	Secondary Release Mechanism	Potential Impacted Media	Contaminants of Concern	Exposure Pathway	Potential Receptors	
						Current	Future
Filling observed within the site & opportunistic dumping	Placement/ storage of filling on-site or opportunistic dumping	Long-term leaching of contaminants via runoff, rain water infiltration / percolation	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, Pesticides, PCB, Asbestos	Dermal contact, inhalation (dust/vapours), ingestion	Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties.	Site workers, members public, maintenance workers, construction workers, consultants, trespassers, surface water bodies, neighbouring properties, groundwater
Hazchem buildings	Spills and leaks, from storage/use of fuels, oils, paints, pesticides etc.	Long-term leaching of contaminants via runoff, rain water infiltration / percolation, through soil or cracks/joints in concrete	Soil, groundwater, surface water	TRH, BTEX, PAH, Metals, Pesticides, PCB,	Dermal contact, inhalation (dust/vapours), ingestion		
Former structures	Demolition of former structures	Long-term leaching of contaminants via runoff, rain water infiltration / percolation or disturbance via traffic/excavation	Soil, groundwater, surface water	Asbestos, PCB, Metals	Dermal contact, inhalation (dust), ingestion		
Adjacent Land Uses including petrol station	Activities on-site	Migration of contamination onto site via runoff or groundwater migration	Soil, groundwater, surface water	TRH, BTEX, PAH, Lead	Dermal contact, inhalation (dust), ingestion		

7. Field Work

7.1 Sampling Rationale

A systematic and judgemental sampling procedure was conducted for the detailed site assessment to further assess the principal sources of contamination identified in the PCA and to meet the sampling density (in conjunction with the PCA) across the site area.

A total of 16 shallow test pits (Pits 101 to 116) and two boreholes (Boreholes 201 and 202) were drilled / excavated and sampled for the assessment. The pits were located to provide a systematic coverage of the site and in conjunction with the PCA meet the required sampling density.

Two groundwater monitoring wells were installed within the two boreholes adjacent to the south eastern boundary. The wells were installed in Bores 201 and 202 to assist in determining groundwater levels and potential groundwater contamination from the nearby service station approximately 60 south east of the site.

Soil samples were selected for analysis on the basis of the likely presence of contamination, based on material type, visual or olfactory evidence of possible contamination (i.e. odour or staining), proximity to a known source of contamination, and whether generally representative of soil/fill conditions.

Groundwater samples were collected and analysed from each of the two installed monitoring wells for the DSI.

7.2 Methods

Field work was conducted between 1 and 8 July 2019 and comprised the following:

- Checking for underground services at proposed bore locations by a professional service locator prior to drilling;
- Drilling of two boreholes to depths of 7 m to 10 m using a track mounted drill rig with dual push tubes to facilitate collection of undisturbed samples;
- Excavation of 16 test pits to depths of 0.4 m to 1.5 m using a small excavator;
- Logging of the subsurface profile, including visual and olfactory assessment of potential contaminants in soil;
- Screening of soil samples for volatile organic impact with a photo-ionisation detector (PID);
- Installation, development, purging and sampling of two groundwater wells for contamination testing purposes.

The test locations were set out by an environmental engineer from DP who also logged the subsurface profile in the bores/pits and collected samples for identification and laboratory testing purposes. The approximate locations of the bores are shown on Drawing 1, Appendix D.

Samples for environmental purposes were generally collected from the near surface, and at regular depth intervals or changes in strata within each bore/pit. Soil samples were collected directly from within the tube liners or test pits walls using stainless steel sampling equipment and / or disposable gloves. Care was taken to remove any extraneous material deposited on the sample.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on DP standard Chain of Custody (C-O-C) forms. Copies of completed forms are contained in Appendix C.

7.3 Well Design and Installation

The groundwater wells were constructed of 50 mm diameter flush threaded Class 18 PVC and were installed in Bores 201 and 202 with reference to current industry standards, using push tubes from the drilling rig.

A 3 m to 6 m machine-slotted PVC screen with an end cap was installed at approximately from 4 m to below ground level to the termination depth (7 m to 10 m). A filter pack was installed in the bore annulus consisting of 5 mm graded and washed gravel to generally 0.5 m above the slotted PVC screen. A bentonite seal was placed above the filter pack within the annulus. Details of well design and construction are shown on the Borehole logs, Appendix A.

Drilling and well installation was undertaken under Quality Assurance / Quality Control (QA/QC) protocols to minimise the risk of cross contamination.

7.4 Well Development / Purging and Sampling

Following installation, the wells were developed by removing groundwater until steady pH, Electricity Conductivity (EC) and Oxidation Reduction Potential (ORP) readings were achieved using new dedicated single check valve disposable bailers in order to provide an efficient hydraulic connection between the well and the formation. Regular measurements of the above field parameters were undertaken on groundwater during development using a calibrated portable meter until steady readings were achieved.

Prior to sampling, the wells were purged until steady pH, EC, ORP, Dissolved Oxygen (DO), temperature, turbidity readings were achieved using a disposable bailer.

Groundwater samples from the wells were collected using a disposable bailer and preserved in laboratory prepared containers for analysis. The samples were delivered to the laboratory within the recommended holding times for analysis. The groundwater level was allowed to recover from the effects of purging prior to sampling. Samples were collected under strict QA/QC protocols.

The headspace of the well and groundwater collected from the well was also screened for the presence of volatile organic compounds (VOC's) using a calibrated Photo-ionisation Detector (PID) following purging. Following development and prior to purging, an oil-water interface meter was used to confirm the depth to groundwater in each well for future groundwater contouring purposes and to assess the possible presence of floating product within each well.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on DP standard C-O-C forms. Copies of completed forms are contained in Appendix C.

7.5 Results

The subsurface conditions are presented in detail in the borehole / test pit logs, Appendix A. These should be read in conjunction with the general notes preceding them, which explain definitions of the classification methods and descriptive terms.

FILLING:	Encountered in majority of the pits and bores with the exception of Pits 113, 114 and 115. The filling generally comprised a sandy silty topsoil filling to 0.1 m to 0.2 m. A gravelly sand sub base filling was encountered in Pits 105, 106 and 107 to 0.25 m to 0.4 m. Deeper sand filling was encountered in Pits 108 and 113 to 0.5 m. Ash was encountered in Pits 103, 107 and 111 along with asphalt lenses in Pit 106.
SILTY CLAY/CLAYEY SILT:	Encountered in all bores and pits form 0.1 m to 1.3 m (termination depth of pits).
SANDY GRAVEL:	Encountered in both bores from 2.1 m to 6.6 m.
CLAYEY SAND:	Encountered in Bore 201 from 3.4 m to 5.7 m.
CLAY:	Encountered in both bores from 2.3 m to termination depth of 7 m to 10 m.

The subsurface conditions encountered were generally commensurate with those found in JK, 2019.

7.6 Groundwater

Groundwater was not encountered during drilling of the two boreholes. It should be noted that groundwater levels are affected by factors such as climatic conditions, soil permeability and tidal influences and will therefore vary with time.

The results of gauging of groundwater wells conducted on 8 July 2019 prior to purging are presented in Table 2 below.

Table 2: Groundwater Gauging and Field Parameters Measured During Purging & Sampling on 8 July 2019

Sample ID	Floating Product (mm)	PID Well Headspace (ppm)	PID GW Headspace (ppm)	Water Level below TOC (m)	Volume Purged (L)	pH	EC (µS/cm)	DO (mg/L)	Turbidity (NTU)	ORP (mV)	Temp. (°C)	Comments
201	0	<1	<1	6.87	1	7	2660	4.2	270	154	18.3	Slightly turbid, brown
202	0	<1	<1	7.12	8	6.9	16100	2.4	304	56	19.5	Very trubid, brown

Notes to Table 2:

EC – Electrical Conductivity
ORP – Oxidation Reduction Potential
DO – Dissolved Oxygen
PID – Photo-ionisation Detector

The results of groundwater field testing indicated the following:

- Groundwater was neutral (i.e. pH 6.9 to pH 7);
- Groundwater was generally slightly saline to very saline
- Aerobic conditions were encountered;
- Moderate oxygen conditions;
- PID readings were low (i.e. <1 ppm) suggesting the absence of gross volatile organic compounds;
- Floating product was not detected in any of the wells (i.e. <1.2 mm).

7.7 Contaminant Observations

Observations of potential contamination within the boreholes / test pits are summarised in Table 3 below:

Table 3: Potential Contamination Observations within Boreholes / Test Pits

Potential Contamination Observation	Locations and Depths (m)
Ash	Pits 103, 107 and 111
Asphalt lenses	Pit 106
Fibro fragment[2]	Surface of Pit 111
Filling[1]	All bores / pits – refer to logs in Appendix A for details (except Pits 113, 114 and 115.

Notes to Table 3:

1 - Potential presence of a range of contaminants (source unknown)

2 – Possible Asbestos Containing Material (ACM)

The results of PID screening on soil samples are shown on the borehole / test pit logs in Appendix A. PID screening generally suggested the absence of gross volatile hydrocarbon impact in majority of samples tested (i.e. <1 ppm).

No observations of gross contamination (i.e. staining or odours) were observed within groundwater during drilling or during purging and sampling of groundwater wells (refer Table 2 above).

8. Data Quality Objectives

8.1 Data Quality Objectives (DQOs)

Table 4 summarises the data quality indicators (DQIs) and the procedures designed to enable achievement of the data quality objective (DQOs).

Table 4: Data Quality Indicators

DQI	Achievement Evaluation Procedure
Documentation completeness	Completion of field and laboratory chain of custody documentation, completion of borehole / test pit logs.
Data completeness	Sampling density comparison with Table A, NSW EPA Sampling Design Guidelines 1995, and analysis of appropriate determinants based on site history and on-site observation.
Data comparability	Use of National Association of Testing Authorities, Australia (NATA) certified laboratory, use of consistent sampling technique.
Data Representativeness	Completion of logs describing conditions encountered, collection of samples representative of materials encountered at the site, appropriate sampling methodology, analysis of a range of materials encountered, appropriate collection, handling, storage and preservation.
Precision and accuracy for sampling and analysis	Achievement of 50% RPD for replicate analysis, acceptable levels for laboratory QC criteria.

8.2 Sampling and Analysis

8.2.1 Soil Sample Collection, Decontamination and Preservation

Soil samples for contamination testing were collected with reference to environmental sampling protocols and C-O-C documentation.

Samples for environmental purposes were generally collected from the near surface, and at regular depth intervals or changes in strata within each bore /pit. Soil samples were collected directly from within the tube liners or test pits walls using stainless steel sampling equipment and / or disposable gloves. Care was taken to remove any extraneous material deposited on the sample.

All sampling data was recorded on DP C-O-C. The general sampling procedure comprised:

- Decontamination of sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and tap water prior to collecting each sample;
- The use of new disposable gloves for each sampling event;
- Transfer of samples into laboratory-prepared jars and capping immediately;
- Collection of replicate soil samples in zip-lock plastic bags at each depth for screening by PID;
- Collection of replicate samples for QA / QC purposes;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth;
- Placement of the sample containers and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory.

The process of obtaining samples and their transportation, storage and delivery to laboratories for analysis was documented on a DP standard C-O-C. Copies of completed forms are provided in Appendix C.

Replicate samples for each soil sample were screened for the presence of VOCs, using a MiniRAE LITE PID or MiniRAE 3000 with a 10.6 eV lamp, calibrated to 100 ppm Isobutylene.

8.2.2 Laboratory QA / QC

The NATA accredited chemical laboratory undertook in-house QA / QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;
- Laboratory duplicate analysis;
- Analysis of control standards;
- Calibration standards and blanks; and
- Statistical analysis of QC data.

9. Laboratory Testing

9.1 Analytical Programme

Laboratory testing for the DSI was undertaken by Envirolab Services Pty Ltd, a NATA registered laboratory. Analytical methods used are shown in the laboratory sheets in Appendix B.

Soil

A total of 18 soil samples (including one QA/QC soil samples) and one fibro material sample were selected to provide an assessment of soil / fill conditions. The samples were selected to target the previously identified contaminants (i.e. PAHs and hydrocarbons) while also assessing the broader suite of potential contaminants identified (see Sections 6). The fill/soil samples were analysed for a range of the following potential contaminants:

- Metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Iron (Fe), Lead (Pb); Mercury (Hg), Manganese (Mn), Nickel (Ni), Zinc (Zn);
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl Benzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Polychlorinated Biphenyls (PCBs);
- Organochlorine (OC) and Organophosphate (OP) Pesticides;
- Asbestos Identification.

Groundwater

A total of three groundwater samples (including 1 QA/QC sample) were collected and analysed to provide an assessment of groundwater conditions.

The groundwater samples were analysed for the following potential contaminants:

- Lead (Pb);
- Total Recoverable Hydrocarbons (TRH);
- Polycyclic Aromatic Hydrocarbons (PAH) (Low Level); and
- Benzene, Toluene, Ethyl Benzene, Xylene (BTEX);

QA/QC comprised analysis of one replicate soil sample ('D1). A brief review of laboratory quality control test results was undertaken. In summary, the accuracy and precision of the soil testing procedures, as inferred by the QA/QC data, is generally considered to be of sufficient standard to allow the data reported to be used to interpret contamination conditions.

The laboratory report sheets are provided in Appendix B.

9.2 Analytical Results

9.2.1 Contamination Testing

The results of chemical analysis undertaken on soil samples are summarised in Table 5.

The results of chemical analysis undertaken on groundwater samples are summarised in Table 6.

Table 5: Laboratory Results of Chemical Analysis of Soil

Analyte		Units	PQL	CRC Care Direct Contact HSL-A	CRC Care Direct Contact Intrusive Maintenance Worker	NEPM 2013 EILs Res/Open Space Aged	NEPM 2013 Table 1A(1) HILs Res A Soil	NSW EPA 2014 - General Solid Waste CT1 (No TCLP)	NSW EPA 2014 - Restricted Solid Waste CT2 (No TCLP)	NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand				NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil	NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil	Field_ID	101	102	103	D1	104	105	106	106	107	107	108	109	110	111	113	114	115	116
										0-1m	1-2m	2-4m	>4m			Sample_Depth_Range	0.2	0.05	0.05	0.05	1	0.1	0.26	0.5	0.1	0.22	0.3	1	0.1	0-0.1	0.05	0.05	0.3	0.05
																Sampled_Date-Time	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019	1/07/2019
Acid Extractable metals in soil	Aluminium	mg/kg	1														9800	6700	7400	8000	13,000	5400	3900	13,000	3600	4100	9200	19,000	10,000	9400	12,000	8800	9800	11,000
	Arsenic	mg/kg	4			100	100	100	400								<4	<4	<4	<4	4	<4	7	<4	6	5	<4	<4	<4	<4	<4	4	<4	<4
	Cadmium	mg/kg	0.4				20	20	80								<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
	Chromium (III+VI)	mg/kg	1			230		100	400								17	14	11	12	12	13	6	12	5	6	12	20	17	15	17	18	16	18
	Copper	mg/kg	1			120	6000										9	6	35	42	12	14	8	10	3	10	12	11	11	27	11	11	12	13
	Iron	mg/kg	1														18,000	11,000	11,000	11,000	20,000	15,000	9800	17,000	14,000	15,000	24,000	25,000	18,000	19,000	19,000	22,000	19,000	19,000
	Lead	mg/kg	1			1100	300	100	400								13	10	10	10	9	5	5	9	7	6	3	8	14	9	12	40	26	11
	Manganese	mg/kg	1				3800										430	270	170	180	440	200	140	350	120	170	220	220	540	260	340	210	350	320
	Mercury	mg/kg	0.1				40	4	16								0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nickel	mg/kg	1			95	400	40	160								10	6	21	21	11	15	8	10	4	24	21	14	12	22	16	12	11	14
	Selenium	mg/kg	2				200	20	80								<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Zinc	mg/kg	1			190	7400										26	15	65	82	32	53	81	23	20	15	32	20	28	100	36	39	38	42
Asbestos ID - soils	Asbestos fires	-															-	-	-	-	-	-	-	-	-	-	-	-	-	Non Detect	-	-	-	-
Organochlorine Pesticides in soil	4,4-DDE	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	a-BHC	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Aldrin	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	b-BHC	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Chlordane (cis)	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Chlordane (trans)	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	d-BHC	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	DDD	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	DDT	mg/kg	0.1			180											<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	DDT+DDE+DDD	mg/kg	0.1				240										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Dieldrin	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endosulfan I	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endosulfan II	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endosulfan sulphate	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endrin	mg/kg	0.1				10										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Endrin aldehyde	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	g-BHC (Lindane)	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Heptachlor	mg/kg	0.1				6										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Heptachlor epoxide	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Hexachlorobenzene	mg/kg	0.1				10										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Methoxychlor	mg/kg	0.1				300										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Organophosphorus Pesticides	Azinophos methyl	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Bromophos-ethyl	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Chlorpyrifos	mg/kg	0.1				160	4	16								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Chlorpyrifos-methyl	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Diazinon	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Dichlorvos	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Dimethoate	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Ethion	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Fenitrothion	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Malathion	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Parathion	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Ronnel	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAHs in Soil	Total Positive PAHs	mg/kg	0.05				300	200	800								<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	340	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	7.4	7.1	<0.05
	Acenaphthene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Acenaphthylene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1
	Anthracene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	<0.1
	Benz(a)anthracene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	0.8	<0.1
	Benzo(a) pyrene	mg/kg	0.05					0.8	3.2					0.7			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**62**	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.9**	**0.83**	<0.05
	Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5				3										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	80	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	1	<0.5
	Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5				3										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	80	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.1	<0.5
	Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5				3										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	80	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.1	<0.5
	Benzo(b,j+k)fluoranthene	mg/kg	0.2														<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	49	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	0.8	<0.2
	Benzo(g,h,i)perylene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	43	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.4	<0.1
	Chrysene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	32	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	1	<0.1
	Dibenz(a,h)anthracene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Fluoranthene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	36	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	1.2	<0.1
	Fluorene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.4	<0.1
	Naphthalene	mg/kg	0.1	1400	29000	170				3	NL	NL	NL				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Phenanthrene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.4	<0.1
	Pyrene	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	40	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	1.1	<0.1
PCBs in Soil	PCBs (Sum of total)	mg/kg	0.1				1	49.9999	49.9999								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1016	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1221	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1232	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1242	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1248	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1254	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Arochlor 1260	mg/kg	0.1														<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
svTRH (C10-C40) in Soil	C10-C16	mg/kg	50	3300	62000											1000	<50	<50	<50	<50	<50	<50	62	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100	4500	85000									300	2500		<100	<100	<100	<100	<100	<100	2300	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C34-C40	mg/kg	100	6300	120000									2800	10000		<100	<100	<100	<100	<100	<100	600	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	F2-NAPHTHALENE	mg/kg	50							110	240	440	NL	120			<50	<50	<50	<50	<50	<50	62	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C10 - C14	mg/kg	50														<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C15 - C28	mg/kg	100														<100	<100	<100	<100	<100	<100	1300	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C29-C36	mg/kg	100														<100	<100	<100	<100	<100	<100	1200	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	C10 - C40 (Sum of total)	mg/kg	50														<50	<50	<50	<50	<50	<50	2900	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
vTRH(C6-C10)/BTEXN in Soil	Benzene	mg/kg	0.2	100	1100			10	40	0.5	0.5	0.5	0.5	50			<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
	Ethylbenzene	mg/kg	1	4500	85000			600	2400	55	NL	NL	NL	70			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Naphthalene	mg/kg	1	1400	29000	170				3	NL	NL	NL				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	mg/kg	0.5	14000	120000			288	1152	160	220	310	540	85			<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
	C6 - C9	mg/kg	25					650	2600								<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	Xylene (m & p)	mg/kg	2														<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (o)	mg/kg	1														<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Xylene Total	mg/kg	3	12000	130000			1000	4000	40	60	95	170	105			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
	C6-C10 less BTEX (F1)	mg/kg	25							45	70	110	200	180			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	C6-C10	mg/kg	25	4400	82000											700	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

Notes to Table 5:
Sample D1 id duplicate sample of Pit 103 at 0.05 m

Table 6: Laboratory Results of Chemical Analysis of Groundwater

Analyte		Units	PQL	NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion			NEPM 2013 Table 1C GILs, Fresh Waters	Field_ID	201	202	D1
								LocCode	201	202	202
								WellCode			
								~~Sampled_Date-Time~~	8/07/2019	8/07/2019	8/07/2019
								NEPM 2013 Table 1C GILs, Drinking Water			
				2-4m	4-8m	>8m					
HM in water -	Lead (Filtered)	mg/L	0.001				0.0034	0.01	<0.001	<0.001	<0.001
PAHs in Water - Low Level	Total Positive PAHs	mg/L							0	0	0
	Acenaphthene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Acenaphthylene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Anthracene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Benz(a)anthracene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Benzo(a) pyrene	mg/L	0.0001					0.00001	<0.0001	<0.0001	<0.0001
	Benzo(a)pyrene TEQ	ug/L	0.5						<0.5	<0.5	<0.5
	Benzo(b,j+k)fluoranthene	mg/kg	0.0002						<0.0002	<0.0002	<0.0002
	Benzo(g,h,i)perylene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Chrysene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Dibenz(a,h)anthracene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Fluoranthene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Fluorene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Indeno(1,2,3-c,d)pyrene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Naphthalene	mg/L	0.0002	NL	NL	NL	0.016		<0.0002	<0.0002	<0.0002
	Phenanthrene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
	Pyrene	mg/L	0.0001						<0.0001	<0.0001	<0.0001
svTRH (C10-C40) in Water	C10-C16	mg/L	0.05						<0.05	<0.05	<0.05
	C16-C34	mg/L	0.1						<0.1	<0.1	<0.1
	C34-C40	mg/L	0.1						<0.1	<0.1	<0.1
	F2-NAPHTHALENE	mg/L	0.05	NL|1	NL|1	NL|1			<0.05	<0.05	<0.05
	C10 - C14	mg/L	0.05						<0.05	<0.05	<0.05
	C15 - C28	mg/L	0.1						<0.1	<0.1	<0.1
	C29-C36	mg/L	0.1						<0.1	<0.1	<0.1
vTRH(C6-C10)/BTEXN in Water	Benzene	mg/L	0.001	0.8|4|5	0.8|5	0.9|5	0.95	0.001	<0.001	<0.001	<0.001
	Ethylbenzene	mg/L	0.001	NL	NL	NL		0.3	<0.001	<0.001	<0.001
	Naphthalene	mg/L	0.001	NL	NL	NL	0.016		<0.001	<0.001	<0.001
	Toluene	mg/L	0.001	NL	NL	NL		0.8	<0.001	<0.001	<0.001
	C6 - C9	mg/L	0.01						<0.01	<0.01	<0.01
	Xylene (m & p)	mg/L	0.002						<0.002	<0.002	<0.002
	Xylene (o)	mg/L	0.001				0.35		0.001	<0.001	<0.001
	C6-C10 less BTEX (F1)	mg/L	0.01	NL|1|6	NL|1|6	NL|1|6			<0.01	<0.01	<0.01
	C6-C10	mg/L	0.01						<0.01	<0.01	<0.01

Notes to Table 6:
Sample D1 id duplicate sample of 202

10. Site Assessment Criteria (SAC)

10.1 Introduction

It is understood that the proposed development at Lot 100 DP1261496, Maitland Street, Muswellbrook NSW will comprise a primary or secondary school facility.

The Site Assessment Criteria (SAC) applied in the current investigation is informed by the CSM which identified human and ecological receptors to potential contamination on the site (refer to Section 6). Analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013). The NEPC guidelines are endorsed by the NSW EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

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

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic low density residential landuse which also applies to primary schools.

10.2 Soils

10.2.1 Health Investigation and Screening Levels

The generic HIL and HSL for residential landuse (HIL A and HSL A) are considered to be appropriate for the assessment of contamination at the site. The adopted soil HIL and HSL for the potential contaminants of concern are presented in Table 7.

Table 7: HIL and HSL in mg/kg Unless Otherwise Indicated

Contaminants		HIL- A	HSL- A[3]
Metals	Arsenic	100	NC
	Cadmium	20	NC
	Chromium (VI)	100	NC
	Copper	6000	NC
	Lead	300	NC
	Manganese	3800	NC
	Mercury (inorganic)	40	NC
	Nickel	400	NC
	Zinc	7400	NC
PAH	Benzo(a)pyrene TEQ[1]	3	NC
	Naphthalene	NC	3
	Total PAH	300	NC
TRH	C6 – C10 (less BTEX) [F1]	NC	45
	>C10-C16 (less Naphthalene) [F2]	NC	110
	>C16-C34 [F3]	NC	NC
	>C34-C40 [F4]	NC	NC
BTEX	Benzene	NC	0.5
	Toluene	NC	160
	Ethylbenzene	NC	55
	Xylenes	NC	40
OCP/ OPP	Aldrin + Dieldrin	6	NC
	Chlordane	50	NC
	DDT+DDE+DDD	240	NC
	Endosulfan	270	NC
	Endrin	10	NC
	Heptachlor	6	NC
	Methoxychlor	300	NC
	Chlorpyrifos	160	NC
PCB[4]		1	NC

Notes to Table 7:

1 Sum of carcinogenic PAH

2 The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.

3 The HSL have been calculated for a potential vapour intrusion pathway, a sand soil (conservative approach based on a mix of sandy and clayey fill encountered) and an assumed depth to contamination of 0 m to <1 m.

4 non dioxin-like PCBs only

As shown in Table 7, the adopted HSLs are predicated on a potential vapour intrusion pathway, as identified in the Conceptual Site Model (CSM). Although the CSM also identifies a direct contact pathway, and construction worker receptors, the corresponding HSLs are significantly higher than those for the vapour intrusion pathway and are therefore not drivers for further assessment and / or remediation. As such the direct contact and intrusive maintenance worker HSLs have not been listed.

10.2.2 Ecological Investigation Levels

EIL and Added Contaminant Limits (ACLs), where appropriate, have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. The adopted EILs, derived using the *Interactive (Excel) Calculation Spreadsheet* (Standing Council on Environment and Water (SCEW) website (http://www.scew.gov.au/node/941)) are shown in the following Table 8.

Table 8: EIL in mg/kg

Analyte		EIL	Comments
Metals	Arsenic	100	**Adopted parameters** pH = 6 (conservative value in the absence of lab testing) CEC = 5 $cmol_c$/kg (conservative value in the absence of lab testing) assumed clay content 5% in filling (conservative) "Aged" (>2 years) source of contamination high for traffic volumes in NSW
	Copper	110	
	Nickel	35	
	Chromium III	320	
	Lead	1100	
	Zinc	310	
PAH	Naphthalene	170	

10.2.3 Ecological Screening Levels

ESL are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in the following Table 9.

Table 9: ESL in mg/kg

Analyte		ESL[1]	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

Notes to Table 9:

[1] The ESL have been calculated for a coarse soil based on the upper silty sandy filling being the predominant contaminated soil type and Urban residential and public open space land use

10.2.4 Management Limits

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

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

The adopted management limits from Schedule B1 of NEPC (2013) are shown in the following Table 10.

Table 10: Management Limits in mg/kg

Analyte		Management Limit	
TRH	$C_6 – C_{10}$ (F1) #	700	The management limits have been calculated for a coarse soil based on sandy fill being the predominant soil type at surface and residential landuse. This assumption is conservative due to the mix of sandy and clayey soils present within the stockpiles.
	$>C_{10}-C_{16}$ (F2) #	1000	
	$>C_{16}-C_{34}$ (F3)	2500	
	$>C_{34}-C_{40}$ (F4)	10000	

Notes to Table 10:

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

10.2.5 Asbestos in Soil

Bonded ACM is the most common form of asbestos contamination across Australia, generally arising from:

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

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

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

Schedule B2 of NEPC (2013) describes the recommended assessment process for asbestos in soil, commencing with a preliminary assessment, looking into the site history and conditions and therefore the propensity for asbestos to be present. The preliminary assessment may or may not include sampling and testing. A detailed assessment of asbestos contamination is recommended in NEPC (2013) under the following circumstances:

- To resolve uncertain findings from the preliminary assessment (eg the extent, quality and quantity of asbestos in soil is not known and the potential for asbestos is identified); and / or
- The remediation and management approach requires asbestos contamination to be fully delineated and assessed (eg asbestos contamination is to be relocated and contained); and / or
- To assist in assessing the likely effectiveness of alternative remediation and management strategies; and / or
- Land uses are to be determined and delineated according to the extent and nature of the asbestos contamination.

The previous assessment findings are used as a tool to assess the likelihood of finding asbestos in soil at the site, and the form of asbestos that may occur. The lack of reported asbestos at a sample location does not necessarily mean that asbestos is not present at the location.

The health screening levels for asbestos for this assessment are presented in Table 11 below:

Table 11: Health Screening Levels (HSLs) in mg/kg

Form of Asbestos	Health Screening Level – Residential A (including day care centres) (w/w)
Bonded ACM	0.01%
AF	0.001%

10.2.6 Waste Classification

The results of chemical testing were also compared against NSW EPA Waste Classification Guidelines (EPA, 2014) to assess possible off-site disposal options to a licenced facility (if required).

10.2.7 Groundwater

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

- ANZAST (2018), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' (Ref 0), formerly ANZECC (2000), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality'; and
- NHMRC (2015), 'Australian Drinking Water Guidelines 6, 2011', updated March 2015.

The potential receptors of impacted groundwater from the site include:

- Current occupiers of the site (i.e. employees, contractors, visitors);
- Future occupiers of the site (e.g. workers, visitors, students);
- Workers conducting excavations, construction or maintenance works within the site or nearby the site (impacted groundwater);
- Workers and users from surrounding properties (vapours associated with groundwater impacts);
- Workers and users of down gradient properties which may utilise abstracted groundwater; and
- The fresh water ecosystems of Muscle Creek.

10.3 Groundwater

The potential receptors of impacted groundwater from an up gradient source (service station) include:

- Workers conducting excavations, construction or maintenance works within the site or nearby the site (impacted groundwater);
- Down-gradient groundwater users (if any). It is noted that there is no registered groundwater bores between the site and the service station.

10.3.1 Groundwater Investigation Levels

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

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

The adopted GIL for the analytes included in the assessment (where applicable), and the corresponding source documents, are shown in Table 13.

Table 12: GIL (in µg/L unless otherwise stated)

Analyte		NEPC (2013) Fresh Waters [2]	NEPC (2013) Drinking Water
Metals	Lead	3.4	10
PAH	Naphthalene	16	NC
	Benzo(a)pyrene	0.1	0.01
	Anthracene	0.01	NC
	Fluoranthene	1	NC
	Phenanthrene	0.6	NC
TRH	TRH	NC	NC
BTEX	Benzene	950	1
	Toluene	NC	800
	Xylene (o)	350	NC

Notes to Table 12:

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

2 Investigation levels apply to typically slightly-moderately disturbed systems

NC – No Criteria

10.3.2 Health Screening Levels

The generic HSL are considered to be appropriate for the assessment of contamination at the site. Given the proposed land use the adopted HSLs are HSL-A and B – low density residential (primary school).

The adopted groundwater HSL for vapour intrusion, from Table 1A(4), Schedule B1 of NEPC (2013) are shown in the following Table 13.

Table 13: HSL (µg/L)

Analyte		HSL-A	
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	1000	The HSL have been calculated for a sand soil based on sands being the predominant soil type (conservative) and an assumed depth to contamination of 4 m to <8 m.
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	1000	
BTEX	Benzene	800	
	Toluene	NL	
	Ethylbenzene	NL	
	Xylene	NL	
PAH	Naphthalene	NL	

Note to Table 13:

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

It is noted that the generic HSL are not appropriate when the depth to groundwater impact is less than 2 m. Under these circumstances a site specific risk assessment may be needed. The adopted HSLs have therefore been used for preliminary assessment purposes only.

11. Assessment of Contamination

The results of chemical analysis indicate the following:

Soil

The results of chemical analysis from the current investigation indicated the soil samples tested were generally within the health investigation levels for low density residential land use (primary schools) (HIL-A/EIL), with the exception of one exceedance of the landuse criteria (ecological and human health health). This sample was taken within a gravel path in the north eastern portion of the site, and may be associated with a former asphalt seal layer within the path.

The results of chemical analysis on soils also indicated the majority of soil samples tested were within the NSW EPA “General Solid Waste” criteria (EPA, 2014) based on total contaminant concentrations with the exception of two samples in the upper materials (Pits 106 and 114) and one sample in the silty clay at Pit 115 at 0.3 m. It is noted that leachability testing was not conducted on the samples which exceeded GSW to confirm waste classification.

Testing of the localised fibro fragment encountered onsite and surrounding soils indicated the absence of asbestos containing materials (ACM).

Groundwater

The results of groundwater testing indicated the absence of detectable concentrations of hydrocarbons and lead in the samples tested with the exception of a trace xylene concentration in Bore 201 equal to the laboratory detection limit but below the criteria.

12. Comments / Recommendations

The results of the DSI have identified the following:

- Presence of shallow filling within majority of test pits / bores;
- Presence of ash within the upper fill materials in Pits 103, 107 and 111;
- Presence of asphalt lenses in Pit 106 exceeding landuse criteria;
- Fill materials generally meet the criteria for classification as 'General Solid Waste' based on total concentrations;
- Elevated PAH, associated with asphalt lenses within the upper fill materials with the gravel path (Pit 106);
- General absence of impacts from the nearby petrol station to groundwater quality along the south-east site boundary.

In summary, development of the site will required localised remediation of PAH impacted soils associated with the asphalt lenses within the gravel path. The extent of impact has also not been confirmed, however, it is likely to be associated with the gravel path within the site.

The site is considered to be suitable for the proposed development, subject to localised remediation / of contamination and regulatory approvals.

13. References

J K Environments (2019), Preliminary Contamination Assessment, Lot 62, Maitland Street, Muswellbrook, NSW, 30 April 2019.

ANZECC (2000), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality', Australian and New Zealand Environment and Conservation Council, October 2000.

ANZAST (2018), 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality', Australian Government Initiative, August 2018.

Contaminated Land Management Act 1997 (NSW).

National Environment Protection Council (2013), 'National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013', 11 April 2013.

NSW EPA Contaminated Sites (2011), 'Guidelines for Consultants Reporting on Contaminated Sites', August 2011.

NHMRC/NRMMC (2015), 'Australian Drinking Water Guidelines 6, 2011', National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra, Version 3.1, Updated March 2015.

NSW EPA (2014) 'Waste Classification Guidelines, Part 1: Classifying Waste', November 2014.

14. Limitations

Douglas Partners (DP) has prepared this report for this project at Lot 100 DP1261496, Maitland Street, Muswellbrook NSW with reference to DP's email proposal NCL190331 dated 5 June 2019 and acceptance received from Pacific Brook Christian School Ltd. The work was carried out under an agreed Professional Services Contract Agreement. This report is provided for the exclusive use of Pacific Brook Christian School Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

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

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report
Sampling Methods
Soil Descriptions
Symbols and Abbreviations
Borehole Logs (Bores 201 to 202)
Test Pit Logs (Pits 101 to 116)

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Sampling Methods

Douglas Partners

Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

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

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

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

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

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

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

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

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

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

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

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

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Symbols & Abbreviations

Douglas Partners

Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

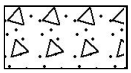
Symbols & Abbreviations

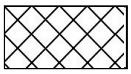
Graphic Symbols for Soil and Rock

General

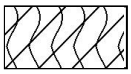

Asphalt

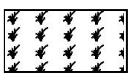

Road base

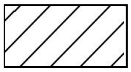

Concrete

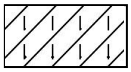

Filling

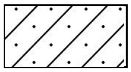
Soils


Topsoil

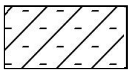

Peat

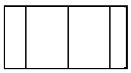

Clay

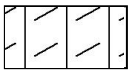

Silty clay

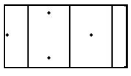

Sandy clay

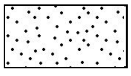

Gravelly clay

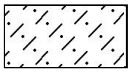

Shaly clay

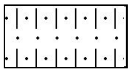

Silt


Clayey silt


Sandy silt

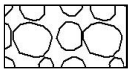

Sand

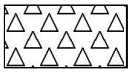

Clayey sand


Silty sand


Gravel

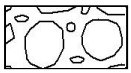

Sandy gravel


Cobbles, boulders

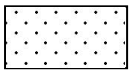

Talus

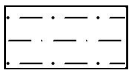
Sedimentary Rocks

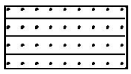

Boulder conglomerate

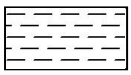

Conglomerate


Conglomeratic sandstone

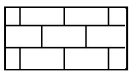

Sandstone


Siltstone

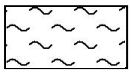

Laminite

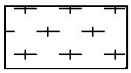

Mudstone, claystone, shale

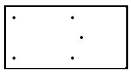

Coal


Limestone

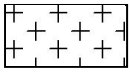
Metamorphic Rocks

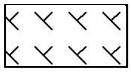

Slate, phyllite, schist

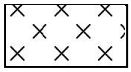

Gneiss

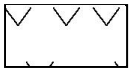

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301989
NORTHING: 6426905
DIP/AZIMUTH: 90°/--

BORE No: 201
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	TOPSOIL - Brown clayey silt topsoil with trace rootlets		D	0.2	E			Stickup = 1m From 0m to 0.1m, bentonite plug
	0.3	SILTY CLAY - Very stiff brown silty clay, M<Wp		D	0.5	E			
	1	At 0.9m some fine sized gravel From 1.0m dark brown		D	1.0	E			
				D	1.5	E			From 0.1m to 3m, backfill
	2			D	2.0	E			From 0m to 4m, 50mm diameter Class 18 PVC blank casing
	2.1	SANDY GRAVEL - (Loose) brown fine to medium grained sandy fine to coarse sized gravel, dry							
	2.3	CLAY - (Stiff) brown clay with trace fine grained sand, M<Wp		D	2.5	E			
	3			D	3.0	E			From 3m to 3.5m, bentonite plug
	3.4	CLAYEY SAND - (Medium dense) brown clayey fine grained sand, with trace fine sized gravel		D	3.5	E			
	4			D	4.0	E			
				D	4.5	E			
	5			D	5.0	E			From 3.5m to 7m, gravel From 4m to 7m, 50mm diameter Class 18 PVC machine slotted screen
				D	5.5	E			
	5.7	CLAY - (Stiff) pale grey mottled orange brown clay, M<Wp							
	6			D	6.0	E			
				D	6.5	E			
	7			D	7.0	E			End cap at 7m
	7.2	Bore discontinued at 7.2m, refusal							
	8								
	9								

RIG: Geoprobe **DRILLER:** Terratest **LOGGED:** Lambert **CASING:** Nil
TYPE OF BORING: Push tube rig
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 302015
NORTHING: 6426934
DIP/AZIMUTH: 90°/--

BORE No: 202
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	TOPSOIL - Brown clayey silt topsoil with some rootlets		D	0.2	E			Stickup = 0.6m From 0m to 0.1m, bentonite plug
	0.3	SILTY CLAY - (Very stiff) brown silty clay, M<Wp		D	0.5	E			
	1			D	1.0	E			From 0.1m to 2.4m, backfill
				D	1.5	E			
	2			D	2.0	E			From 0m to 3.8m, 50mm diameter Class 18 PVC blank casing
		From 2.5m trace fine sized gravel		D	2.5	E			From 2.4m to 3m, bentonite plug
	2.9	SANDY GRAVEL - (Medium dense) fine to medium grained sandy fine to coarse sized gravel, moist		D	3.0	E			
	3			D	3.5	E			
	4			D	4.0	E			
				D	4.5	E			
	5			D	5.0	E			
				D	5.5	E			
	6			D	6.0	E			
	6.6	CLAY - (Stiff) ple grey mottled orange brown clay, with trace fine sized gravel, M<Wp		D	6.5	E			From 3m to 9.8m, 5mm washed sand
	7			D	7.0	E			From 3.8 to 9.8m, 50mm diameter Class 18 PVC machine slotted screen
		From 7.4m brown		D	7.5	E			
	8			D	8.0	E			
				D	8.5	E			
	9			D	9.0	E			
				D	9.5	E			End cap at 9.8m
	10.0			D	10.0	E			

Bore discontinued at 10.0m, limit of investigation

RIG: Geoprobe **DRILLER:** Terratest **LOGGED:** Lambert **CASING:** Nil

TYPE OF BORING: Auger (TC)

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301973
NORTHING: 6426907

PIT No: 101
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILLING - Generally comprising pale brown sandy silty topsoil filling, trace rootlets and fine subangular gravel, dry							
		SILTY CLAY - Medium plasticity pale brown silty clay, trace fine gravel, w>PL		D	0.2	E	PID<1		
		From 0.4m red brown silty clay w>PL		D	0.6	E	PID<1		
1	1.0	Pit discontinued at 1.0m, limit of investigtion							1
2									2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301983
NORTHING: 6426951

PIT No: 102
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - Generally comprising brown sandy silty filling, trace fine gravel and some rootlets, dry		D	0.05	E	PID<1		
		CLAYEY SILT - Medium to low plasticity pale grey and brown w<PL		D	0.3	E	PID<1		
	0.4	SILTY CLAY - Medium to high plastcity brown and red with rootlets, w>PL		D	0.7	E	PID<1		
	1.0	Pit discontinued at 1.0m, limit of investigtion							

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 302001
NORTHING: 6426950

PIT No: 103
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILLING - Generally comprising dark brown sandy silty topsoil filling with ash, and some rootlets, dry		D	0.05	E	PID<1		
		SILTY CLAY - Medium plasticity, pale brown, w<PL		D	0.3	E	PID<1		
		From 0.6m dark brown silty clay		D	0.7	E	PID<1		
1	1.0	Pit discontinued at 1.0m, limit of investigtion							1
2									2

RIG: 6.5 tonne excavator with 450mm bucket teeth
LOGGED: Sebastian
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 302021
NORTHING: 6426911

PIT No: 104
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - Generally comprising brown sandy silty filling, trace fine gravel and some rootlets, dry		D	0.05	E	PID<1		
		CLAYEY SILT - Medium to low plasticity pale grey and brown w<PL		D	0.3	E	PID<1		
	0.5	SILTY CLAY - Medium plasticity brown silt trace rootlets, w>PL		D	1.0	E	PID<1		
	1.2	Pit discontinued at 1.2m, limit of investigtion							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20; 1; 2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301999
NORTHING: 6426982

PIT No: 105
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - Generally comprising brown subrounded and subangular gravelly silty sand filling, dry		D	0.1	E	PID<1		
	0.2	CLAYEY SILT - Medium to low plasticity pale grey and brown w<PL		D	0.5	E	PID<1		
	0.6	SILTY CLAY - Medium to high plasticity brown and red with rootlets, w>PL		D	1.0	E	PID<1		1
	1								
	1.2	Pit discontinued at 1.2m, limit of investigtion							
	2								2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301930
NORTHING: 6426981

PIT No: 106
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - Generally comprising brown gravelly silty sand filling with clay, dry		D	0.1	E	PID<1		
		From 0.25m to 0.28m asphalt lens		D	0.26	E	PID<1		
		From 0.35m to 0.37m asphalt lens							
	0.4	CLAYEY SILT - Medium to low plasticity pale grey and brown w<PL		D	0.5	E	PID<1		
	0.6	SILTY CLAY - Medium plasticity, dark brown, w>PL							
	1								1
	1.2	Pit discontinued at 1.2m, limit of investigtion		D	1.2	E	PID<1		
	2								2

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301964
NORTHING: 6426981

PIT No: 107
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - Generally comprising silty sand sub base filling, trace coal, dry		D	0.1	E	PID<1		
		From 0.2m dark grey ash lens		D	0.22	E	PID<1		
	0.25	SILTY CLAY - Low plasticity, brown, w<PL							
		From 0.5m brown mottled red, w>PL		D	0.6	E	PID<1		
	1 1.0	Pit discontinued at 1.0m, limit of investigtion							1
	2								2

5 10 15 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301909
NORTHING: 6427013

PIT No: 108
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - Generally comprising brown fine to medium grained sand filling, trace fine gravel and silt, dry		D	0.3	E	PID<1		
	0.5	SILTY CLAY - Medium plasticity brown bottled red, w>PL		D	0.8	E	PID<1		
	1								1
	1.2	Pit discontinued at 1.2m, limit of investigtion							
	2								2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301926
NORTHING: 6427025

PIT No: 109
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - Generally comprising brown sandy silt filling with subrounded gravel, dry		D	0.3	E	PID<1		
	0.4	SILTY CLAY - Medium plasticity, brown, w>PL		D	1.0	E	PID<1		
				D	1.4	E	PID<1		
	1.5	Pit discontinued at 1.5m, limit of investigtion							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301901
NORTHING: 6426995

PIT No: 110
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - Brown sandy silt filling with subrounded gravel, dry		D	0.1	E	PID<1		
	0.2	SILTY CLAY - Low plasticity, pale brown, w<PL		D	0.4	E	PID<1		
		From 0.6m dark brown silty clay, w>PL							
	1.0	Pit discontinued at 1.0m, limit of investigtion							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20; 1; 2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301996
NORTHING: 6426991

PIT No: 111
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - Generally comprising sandy silty topsoil with, some general refuse and ACM fragments on surface, ash lens from 0.2m to 0.21m		D	0.0	E	PID<1		
	0.2	CLAYEY SILT - Low plasticity, pale brown and grey, w<PL			0.1				
	0.4	Pit discontinued at 0.4m, limit of investigtion							
	1								
	2								

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301837
NORTHING: 6427065

PIT No: 112
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	FILLING - Generally comprising sandy silty topsoil filling, with subrounded to subangular gravel, rootlets, W<PL		D	0.05	E	PID<1		
		FILLING - Generally comprising brown silty fine grained gravel, dry		D	0.3	E	PID<1		
	0.5	SILTY CLAY - Medium plasticity, brown, w>PL		D	0.7	E	PID<1		
	0.8	Pit discontinued at 0.8m, limit of investigtion							
	1								1
	2								2

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301888
NORTHING: 6427052

PIT No: 113
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.1	SILTY TOPSOIL - Brown with rootlets, w<PL		D	0.05	E	PID<1		
		SILTY CLAY - Medium plasticity, brown, w>PL							
				D	0.4	E	PID<1		
	0.5	Pit discontinued at 0.5m, limit of investigtion							
	1								1
	2								2

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301827
NORTHING: 6427073

PIT No: 114
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	SANDY SILTY TOPSOIL - Brown with rootlets, W<PL		D	0.05	E	PID<1		
		CLAYEY SILT - Low plasticity, pale brown, w<PL		D	0.3	E	PID<1		
	0.4	SILTY CLAY - Medium plasticity, brown mottled red, w>PL							
	0.6	Pit discontinued at 0.6m, limit of investigtion							
	1								1
	2								2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301782
NORTHING: 6427121

PIT No: 115
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	SANDY SILTY TOPSOIL - Brown with rootlets, w<PL		D	0.05	E	PID<1		
		CLAYEY SILT - Low plasticity, pale brown, w<PL		D	0.3	E	PID<1		
	0.4	SILTY CLAY - Medium plasticity, brown mottled red, w>PL							
	0.5	Pit discontinued at 0.5m, limit of investigtion							
	1								1
	2								2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Pacific Brook Christian School Ltd
PROJECT: Detailed Site Investigation
LOCATION: Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW

SURFACE LEVEL: --
EASTING: 301777
NORTHING: 6427160

PIT No: 116
PROJECT No: 91601.00
DATE: 1/7/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
	0.1	FILLING - Generally comprising silty sandy clay, trace metal, w<PL		D	0.05	E	PID<1		
		SILTY CLAY - Medium plasticity, brown and red, w<PL		D	0.3	E	PID<1		
	0.4	Pit discontinued at 0.4m, limit of investigtion							
	1								1
	2								2

RIG: 6.5 tonne excavator with 450mm bucket teeth

LOGGED: Sebastian

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix B

Laboratory Report Sheets

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

CERTIFICATE OF ANALYSIS 220893

Client Details

Client	Douglas Partners Newcastle
Attention	Chris Bozinovski, Paulo Sebastian
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91601**
Number of Samples	18 Soil, 1 Material
Date samples received	03/07/2019
Date completed instructions received	03/07/2019

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	10/07/2019
Date of Issue	10/07/2019

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Aida Marner
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Giovanni Agosti, Group Technical Manager
Jaimie Loa-Kum-Cheung, Metals Supervisor
Lucy Zhu, Senior Asbestos Analyst
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	72	90	87	81	92

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	88	69	88	88	72

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	84	90	76	88	86

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	74	82	90

svTRH (C10-C40) in Soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	105	89	90	86	92

svTRH (C10-C40) in Soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	1,300	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	1,200	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	62	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	62	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	2,300	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	600	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	2,900	<50	<50	<50	<50
Surrogate o-Terphenyl	%	#	88	90	86	85

svTRH (C10-C40) in Soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	04/07/2019	04/07/2019	05/07/2019	05/07/2019	05/07/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	88	88	88	90	89

svTRH (C10-C40) in Soil				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	90	91	90

PAHs in Soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	95	96	92	96	92

PAHs in Soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Naphthalene	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	7.5	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	3.4	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	2.8	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	36	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	40	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	21	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	32	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	49	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	62	<0.05	0.09	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	35	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	6.2	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	43	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	340	<0.05	0.09	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	80	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	80	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	80	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	134	95	95	92	90

PAHs in Soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.2
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.0
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.8
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.90
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	7.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.2
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	1.2
Surrogate p-Terphenyl-d14	%	97	96	95	94	91

PAHs in Soil				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.4	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.2	<0.1	<0.1
Pyrene	mg/kg	1.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.8	<0.1	<0.1
Chrysene	mg/kg	1.0	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.8	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.83	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.4	<0.1	<0.1
Total +ve PAH's	mg/kg	7.1	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.0	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.1	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.1	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	92	92	86

Organochlorine Pesticides in soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	84	87	81	86

Organochlorine Pesticides in soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
HCB	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	123	87	83	88	82

Organochlorine Pesticides in soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	84	87	87	88

Organochlorine Pesticides in soil				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	87	86

Organophosphorus Pesticides						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	84	87	81	86

Organophosphorus Pesticides						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Azinphos-methyl (Guthion)	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	123	87	83	88	82

Organophosphorus Pesticides						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	86	84	87	87	88

Organophosphorus Pesticides				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	87	87	86

PCBs in Soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	84	87	81	86

PCBs in Soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Aroclor 1016	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	123	87	83	88	82

PCBs in Soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	86	84	87	87	88

PCBs in Soil				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date extracted	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	87	87	86

Acid Extractable metals in soil						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Arsenic	mg/kg	<4	<4	<4	4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	17	14	11	12	13
Copper	mg/kg	9	6	35	12	14
Lead	mg/kg	13	10	10	9	5
Mercury	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	6	21	11	15
Zinc	mg/kg	26	15	65	32	53
Iron	mg/kg	18,000	11,000	11,000	20,000	15,000
Aluminium	mg/kg	9,800	6,700	7,400	13,000	5,400
Selenium	mg/kg	<2	<2	<2	<2	<2
Manganese	mg/kg	430	270	170	440	200

Acid Extractable metals in soil						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Arsenic	mg/kg	7	<4	6	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	6	12	5	6	12
Copper	mg/kg	8	10	3	10	12
Lead	mg/kg	5	9	7	6	3
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	10	4	24	21
Zinc	mg/kg	81	23	20	15	32
Iron	mg/kg	9,800	17,000	14,000	15,000	24,000
Aluminium	mg/kg	3,900	13,000	3,600	4,100	9,200
Selenium	mg/kg	<2	<2	<2	<2	<2
Manganese	mg/kg	140	350	120	170	220

Acid Extractable metals in soil						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Arsenic	mg/kg	<4	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	17	15	17	18
Copper	mg/kg	11	11	27	11	11
Lead	mg/kg	8	14	9	12	40
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	14	12	22	16	12
Zinc	mg/kg	20	28	100	36	39
Iron	mg/kg	25,000	18,000	19,000	19,000	22,000
Aluminium	mg/kg	19,000	10,000	9,400	12,000	8,800
Selenium	mg/kg	<2	<2	<2	<2	<2
Manganese	mg/kg	220	540	260	340	210

Acid Extractable metals in soil					
Our Reference		220893-17	220893-18	220893-19	220893-20
Your Reference	UNITS	115	116	D1	109 - [TRIPLICATE]
Depth		0.3	0.05	-	1.0
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Arsenic	mg/kg	<4	<4	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	18	12	21
Copper	mg/kg	12	13	42	11
Lead	mg/kg	26	11	10	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	11	14	21	16
Zinc	mg/kg	38	42	82	23
Iron	mg/kg	19,000	19,000	11,000	26,000
Aluminium	mg/kg	9,800	11,000	8,000	19,000
Selenium	mg/kg	<2	<2	<2	<2
Manganese	mg/kg	350	320	180	230

Moisture						
Our Reference		220893-1	220893-2	220893-3	220893-4	220893-5
Your Reference	UNITS	101	102	103	104	105
Depth		0.2	0.05	0.05	1.0	0.1
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Moisture	%	10	7.8	15	17	2.9

Moisture						
Our Reference		220893-6	220893-7	220893-8	220893-9	220893-10
Your Reference	UNITS	106	106	107	107	108
Depth		0.26	0.5	0.1	0.22	0.3
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Moisture	%	5.3	12	7.2	13	15

Moisture						
Our Reference		220893-11	220893-12	220893-13	220893-15	220893-16
Your Reference	UNITS	109	110	111	113	114
Depth		1.0	0.1	0-0.1	0.05	0.05
Date Sampled		01/07/2019	01/07/2019	01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019	05/07/2019	05/07/2019
Moisture	%	17	11	14	14	8.8

Moisture				
Our Reference		220893-17	220893-18	220893-19
Your Reference	UNITS	115	116	D1
Depth		0.3	0.05	-
Date Sampled		01/07/2019	01/07/2019	01/07/2019
Type of sample		Soil	Soil	Soil
Date prepared	-	04/07/2019	04/07/2019	04/07/2019
Date analysed	-	05/07/2019	05/07/2019	05/07/2019
Moisture	%	8.8	11	9.7

Asbestos ID - soils		
Our Reference		220893-13
Your Reference	UNITS	111
Depth		0-0.1
Date Sampled		01/07/2019
Type of sample		Soil
Date analysed	-	05/07/2019
Sample mass tested	g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Asbestos ID - materials		
Our Reference		220893-14
Your Reference	UNITS	111/F
Depth		-
Date Sampled		01/07/2019
Type of sample		Material
Date analysed	-	04/07/2019
Mass / Dimension of Sample	-	75x45x6mm
Sample Description	-	Beige compressed fibre cement material
Asbestos ID in materials	-	No asbestos detected Organic fibres detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	77	75
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	77	75
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	75	76
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	79	81
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	79	74
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	77	72
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	80	75
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	93	1	72	78	8	82	88

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	84	90	7	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	100	101
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	115	120
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	86	81
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	100	101
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	115	120
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	86	81
Surrogate o-Terphenyl	%		Org-003	84	1	105	90	15	116	108

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	6	04/07/2019	10/07/2019		[NT]	[NT]
Date analysed	-			[NT]	6	04/07/2019	10/07/2019		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	6	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	6	1300	1200	8	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	6	1200	1000	18	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	6	62	<50	21	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	6	2300	2000	14	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	6	600	670	11	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	6	#	110		[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	88	88	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	118	101
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	104	101
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	90
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	106	97
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	108	105
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	134	122
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	110	96
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	99	1	95	100	5	101	97

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	97	101	4	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	106	101
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	110	105
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	84	94
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	110	122
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	118	112
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	110	116
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	128	127
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	85	86
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	88	92
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	104	105
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	88	1	84	91	8	98	90

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	11	86	88	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	94	88
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	100	81
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	96	94
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	68	66
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	120	114
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	96	89
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	100	97
Surrogate TCMX	%		Org-008	88	1	84	91	8	98	90

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	11	86	88	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date extracted	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	120	80
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	88	1	84	91	8	98	90

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	11	86	88	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	220893-2
Date prepared	-			04/07/2019	1	04/07/2019	04/07/2019		04/07/2019	04/07/2019
Date analysed	-			05/07/2019	1	05/07/2019	05/07/2019		05/07/2019	05/07/2019
Arsenic	mg/kg	4	Metals-020	<4	1	<4	4	0	111	89
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	108	93
Chromium	mg/kg	1	Metals-020	<1	1	17	19	11	114	95
Copper	mg/kg	1	Metals-020	<1	1	9	9	0	109	101
Lead	mg/kg	1	Metals-020	<1	1	13	14	7	109	90
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.2	<0.1	67	105	103
Nickel	mg/kg	1	Metals-020	<1	1	10	10	0	106	90
Zinc	mg/kg	1	Metals-020	<1	1	26	22	17	109	93
Iron	mg/kg	1	Metals-020	<1	1	18000	19000	5	105	#
Aluminium	mg/kg	1	Metals-020	<1	1	9800	9900	1	117	#
Selenium	mg/kg	2	Metals-020	<2	1	<2	<2	0	103	92
Manganese	mg/kg	1	Metals-020	<1	1	430	570	28	129	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	04/07/2019	04/07/2019		[NT]	[NT]
Date analysed	-			[NT]	11	05/07/2019	05/07/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	20	15	29	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	11	8	32	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	8	8	0	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	14	13	7	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	20	15	29	[NT]	[NT]
Iron	mg/kg	1	Metals-020	[NT]	11	25000	17000	38	[NT]	[NT]
Aluminium	mg/kg	1	Metals-020	[NT]	11	19000	11000	53	[NT]	[NT]
Selenium	mg/kg	2	Metals-020	[NT]	11	<2	<2	0	[NT]	[NT]
Manganese	mg/kg	1	Metals-020	[NT]	11	220	220	0	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Report Comments

Samples received in good order: No
Samples 112/0.3 and D2 received broken unable to salvage for analysis

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

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 220893-11 for Al. Therefore a triplicate result has been issued as laboratory sample number 220893-20.

TRH Soil C10-C40 NEPM - # Percent recovery for the surrogate is not possible to report as the high concentration of analytes in sample 220893-6 has caused interference.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Sample 220893-13 was sub-sampled from a jar provided by the client.

PAHs in Soil - The PQL for sample 220893- 6 has been raised due to the high concentration of analytes in the sample, resulting in the sample requiring a dilution.

OC's, OP and PCB in Soil - The PQL has been raised due to interferences from analytes (other than those being tested) in sample 220893-6.

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CERTIFICATE OF ANALYSIS 221419

Client Details

Client	Douglas Partners Newcastle
Attention	Chris Bozinovski
Address	Box 324 Hunter Region Mail Centre, Newcastle, NSW, 2310

Sample Details

Your Reference	**91601, Muswellbrook**
Number of Samples	3 water
Date samples received	11/07/2019
Date completed instructions received	11/07/2019

Analysis Details

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

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

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

Report Details

Date results requested by	18/07/2019
Date of Issue	17/07/2019

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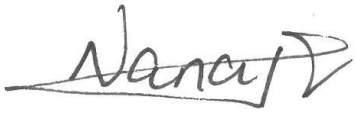
Results Approved By
Loren Bardwell, Senior Chemist
Steven Luong, Organics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water				
Our Reference		221419-1	221419-2	221419-3
Your Reference	UNITS	201	202	D1
Date Sampled		08/07/2019	08/07/2019	08/07/2019
Type of sample		water	water	water
Date extracted	-	12/07/2019	12/07/2019	12/07/2019
Date analysed	-	13/07/2019	13/07/2019	13/07/2019
TRH C_6 - C_9	µg/L	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	132	132	132
Surrogate toluene-d8	%	95	94	94
Surrogate 4-BFB	%	75	73	74

svTRH (C10-C40) in Water				
Our Reference		221419-1	221419-2	221419-3
Your Reference	UNITS	201	202	D1
Date Sampled		08/07/2019	08/07/2019	08/07/2019
Type of sample		water	water	water
Date extracted	-	15/07/2019	15/07/2019	15/07/2019
Date analysed	-	16/07/2019	16/07/2019	16/07/2019
TRH C_{10} - C_{14}	µg/L	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	102	107	104

PAHs in Water - Low Level				
Our Reference	UNITS	221419-1	221419-2	221419-3
Your Reference		201	202	D1
Date Sampled		08/07/2019	08/07/2019	08/07/2019
Type of sample		water	water	water
Date extracted	-	15/07/2019	15/07/2019	15/07/2019
Date analysed	-	16/07/2019	16/07/2019	16/07/2019
Naphthalene	µg/L	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	113	106	99

HM in water - dissolved				
Our Reference		221419-1	221419-2	221419-3
Your Reference	UNITS	201	202	D1
Date Sampled		08/07/2019	08/07/2019	08/07/2019
Type of sample		water	water	water
Date prepared	-	12/07/2019	12/07/2019	12/07/2019
Date analysed	-	12/07/2019	12/07/2019	12/07/2019
Lead-Dissolved	µg/L	<1	<1	<1

Method ID	Methodology Summary
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date extracted	-			12/07/2019	1	12/07/2019	16/07/2019		12/07/2019	[NT]
Date analysed	-			13/07/2019	1	13/07/2019	17/07/2019		13/07/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	1	<10	<10	0	96	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	1	<10	<10	0	96	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	112	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	98	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	85	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	92	[NT]
o-xylene	µg/L	1	Org-016	<1	1	1	1	0	97	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	119	1	132	123	7	106	[NT]
Surrogate toluene-d8	%		Org-016	96	1	95	95	0	96	[NT]
Surrogate 4-BFB	%		Org-016	73	1	75	78	4	102	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			15/07/2019	[NT]	[NT]	[NT]	[NT]	15/07/2019	[NT]
Date analysed	-			16/07/2019	[NT]	[NT]	[NT]	[NT]	16/07/2019	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	89	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	74	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	70	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	89	[NT]
Surrogate o-Terphenyl	%		Org-003	91	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: PAHs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			15/07/2019	[NT]	[NT]	[NT]	[NT]	15/07/2019	[NT]
Date analysed	-			16/07/2019	[NT]	[NT]	[NT]	[NT]	16/07/2019	[NT]
Naphthalene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	92	[NT]
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	70	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	75	[NT]	[NT]	[NT]	[NT]	85	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			12/07/2019	1	12/07/2019	12/07/2019		12/07/2019	[NT]
Date analysed	-			12/07/2019	1	12/07/2019	12/07/2019		12/07/2019	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	99	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

Appendix C

Chain of Custody Sheets (Field and Despatch)
Sample Receipt

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91601	**Client Project Name: Detailed Site Investigation**
Client: Pacific Brook Christian School Ltd	**Location:** Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW
Project Manager: CB	**DP Lab Received** By: JPS Date: 2/7/19
Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviolab 2/7/19			
101	0.2		S	G,P		JPS	1/7/19	8	Bslg/Fridge	✓			
	0.6												
102	0.05									✓			
	0.3												
	0.7												
103	0.05	D1								✓✓			
	0.3												
	0.7												
104	0.05												
	0.3												
	1.0									✓			
105	0.1									✓			
	0.5												
	1.0												
106	0.26									✓			
	0.5									✓			
	0.1												
	1.2							5					

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91601	**Client Project Name: Detailed Site Investigation**
Client: Pacific Brook Christian School Ltd	**Location:** Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW
Project Manager: CB	**DP Lab Received** By: JPS Date: 2/7/19
Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviolab 2/7/19			
107	0.1		S	G, P		JPS	1/7/19	8	Esky/fridge	✓			
	0.22	D2								✓			
	0.6												
SP1	–												
108	0.3									✓			
	0.8												
109	0.3												
	1.0									✓			
	1.4												
110	0.1									✓			
	0.4												
111	0–0.1									✓			
111/F	Surface		Material	P						✓			
112	0.05			G/P									
	0.3									✓			
	0.7												
113	0.05									✓			
	0.4							5					

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CHAIN OF CUSTODY FIELD SHEET

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Project Manager: CB	**DP Lab Received** By: JPS Date: 2/7/19
Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*	Enviolab 2/7/19			
114	0.05		S	G,P		JPS	1/7/19	8	Esky/Esky	✓			
	0.3		↓	↓		↓	↓	↓	↓				
115	0.05												
	0.3									✓			
116	0.05									✓			
	0.3		↓	↓		↓	↓	5	↓				
201	–		W	G,P		JCL	8/7/19	1:00	Esky	Enviolab 10/7/19			
202	–		W	G,P		JCL	8/7/19	4:00	"	10/7/19			

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91601	**Client Project Name: Detailed Site Investigation**
Client: Pacific Brook Christian School Ltd	**Location:** Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW
Project Manager: CB	**DP Lab Received** By: Date:
Do samples contain 'potential' HBM? Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*				
201/0.2	0.2		S	G, P		XL	1/7/19	0000	BAY 2				
201/0.5	0.5		↓	↓		↓	↓	↓	↓				
201/1.0	1.0												
201/1.5	1.5												
201/2.0	2.0												
201/2.5	2.5												
201/3.0	3.0												
201/3.5	3.5												
201/4.0	4.0												
201/4.5	4.5												
201/5.0	5.0												
201/5.5	5.5												
201/6.0	6.0												
201/6.5	6.5												
201/7.0	7.0												
202/0.2	0.2												
202/0.5	0.5							↓					
202/1.0	1.0		↓	↓		↓	↓	1300	↓				

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY FIELD SHEET

Project No: 91601	**Client Project Name: Detailed Site Investigation**
Client: Pacific Brook Christian School Ltd	**Location:** Lot 100 DP 1261496, Maitland Street, Muswellbrook NSW
Project Manager: CB	**DP Lab Received** By: Date:
Do samples contain 'potential' HBM? Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Field									DP Lab	For Despatch to			Notes
Sample ID	Depth (m)	Duplicate Sample	Sample Type S-soil W water	Container Type G-glass P-plastic	ASS Samples	Sampling By	Sampling Date	Sampling Time	Storage Locn*				
202/1-5	1-5		S	G/P		JCL	1/7/A	0800	BAY 2				
202/2-0	2-0		↓	↓		↓	↓	↓	↓				
202/2-5	2-5												
202/3-0	3-0												
202/3-5	3-5												
202/4-0	4-0												
202/4-5	4-5												
202/5-0	5-0												
202/5-5	5-5												
202/6-0	6-0												
202/6-5	6-5												
202/7-0	7-0												
202/7-5	7-5												
202/8-0	8-0												
202/8-5	8-5												
202/9-0	9-0												
202/9-5	9-5							↓					
202/10-0	10-0		↓	↓		↓	↓	1300	↓				

*Default storage: glass containers in fridge, plastic containers shelved, ASS in freezer, water samples in fridge

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91601	**Suburb/Town: Muswellbrook**	**To: Envirolab Services Pty Ltd** **12 Ashley Street, CHATSWOOD NSW 2067**
DP Order No:	**DP Contact Person:** Paulo Sebastian / Chris Bozinovski	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200** **Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (12)	OPP / OCP / PCB	Asbestos I.D					
101/0.2	1/7/19	S	1	✓	✓	✓	✓						Combo 6
102/0.05	"	"	2	"	"	"	"						"
103/0.05			3										
104/1.0			4										
105/0.1			5										
106/0.26			6										
106/0.5			7										
107/0.1			8										
107/0.22			9										
108/0.3	↓	↓	10	↓	↓	↓	↓						↓
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

ENVIROLAB

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

Job No: 220893

Date Received: 03/07/19

Time Received: 10:30

Received by: SB

Temp: Cool/Ambient

Cooling: Ice/icepack

Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se

Total number of samples in container: 21

Date relinquished: 2/7/19 By: JPS

Results required by:

☐ Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours X Standard

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: SB

Date: 03/07/19

Lab Ref: 220893

Send results to:
Douglas Partners Pty Ltd
Email: paulo.sebastian@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91601	**Suburb/Town: Muswellbrook**	**To: Envirolab Services Pty Ltd**	
DP Order No:	**DP Contact Person:** Paulo Sebastian / Chris Bozinovski	**12 Ashley Street, CHATSWOOD NSW 2067**	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200**	**Attn: Jacinta Hurst**

Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (12)	OPP / OCP / PCB	Asbestos I.D					
109/1.0	1/7/19	S	11	✓	✓	✓	✓						Combo 6
110/0.1	↓	↓	12	↓	↓	↓	↓						↓
111/0-0.1		↓	13					✓					6m6.6A
111/F		Material	14					✓					6m666
112/0.3		S	BIT										
113/0.05		↓	15										
114/0.05			16										
115/0.3			17										
116/0.05			18										
D1	↓	↓	19	↓	↓	↓	↓						↓
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle): As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se

Total number of samples in container: 21

Date relinquished: 1/7/19 By: BPS

Results required by.....

☐ Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours X Standard

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: SBen

Date: 03/07/19

Lab Ref: 220893

Send results to:
Douglas Partners Pty Ltd
Email: paulo.sebastian@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au

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CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91601	**Suburb/Town: Muswellbrook**	**To: Envirolab Services Pty Ltd** **12 Ashley Street, CHATSWOOD NSW 2067**
DP Order No:	**DP Contact Person:** Paulo Sebastian / Chris Bozinovski	
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200** **Attn: Jacinta Hurst**

Do samples contain 'potential' HBM? Yes ☑ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH / BTEX	PAH	Metals (12)	OPP / OCP / PCB	Asbestos I.D					
D2	1/7/19	S	BIT	✓	✓	✓	✓						Combo 6
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se

Total number of samples in container: 21

Date relinquished: 1/7/19 By: JPS

Results required by.....

☐ Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours X Standard

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: .....

Date: 03/07/19

Lab Ref: 220893

Send results to:
Douglas Partners Pty Ltd
Email: paulo.sebastian@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au

CHAIN OF CUSTODY DESPATCH SHEET (2)

Project No: 91601	**Suburb/Town:** Muswellbrook	**To: Envirolab Services Pty Ltd**
DP Order No: 147984	**DP Contact Person:** Paulo Sebastian / Chris Bozinovski Jason Lambert	**12 Ashley Street, CHATSWOOD NSW 2067**
Prior Storage: Esky X Fridge ☐ Shelved ☐		**Ph: (02) 9910 6200** **Attn: Jacinta Hurst**
Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample				Analytes									Notes
DP ID	Date Sampled	Type S-soil W-water	Lab ID	TRH BTEX	PAH (Carcinogenic)	Lead							
201	8/7/19	W	1	✓	✓	✓							Combo 2L
202	11	W	2	✓	✓	✓							11
D1	11	W	3	✓	✓	✓							11
PQL (S) mg/kg													
PQL (W) mg/L	ANZECC PQLs req'd for all water analytes ☐												

ENVIROLAB

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

Job No 221419
Date Received 11-7-19.
Time Received 10.00
Received by:
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

*Metals to Analyse (Please circle) As, Cd, Cr, Cu, Pb, Zn, Hg, Ni, Mn, Fe, Al, Se, Sn, Sb, Mg, Co, B,

Total number of samples in container: 3

Date relinquished: 10/7/19 By: JCL

Results required by.....

☐ Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☒ Standard

SAMPLES RECEIVED BY LAB
Please sign and date to acknowledge receipt of samples and return by email

Signature: .....

Date: 11-7-19. 1000

Lab Ref: 221419

Send results to:
Douglas Partners Pty Ltd

Email: paulo.sebastian@douglaspartners.com.au
chris.bozinovski@douglaspartners.com.au
Jason.Lambert@douglaspartners.com.au

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Newcastle
Attention	Chris Bozinovski, Paulo Sebastian

Sample Login Details

Your reference	91601
Envirolab Reference	220893
Date Sample Received	03/07/2019
Date Instructions Received	03/07/2019
Date Results Expected to be Reported	10/07/2019

Sample Condition

Samples received in appropriate condition for analysis	No
No. of Samples Provided	18 Soil, 1 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	12.2
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Samples 112/0.3 and D2 received broken unable to salvage for analysis

Please contact the laboratory within 24 hours if you wish to cancel the aformentioned testing. Otherwise testing will proceed as per the COC and hence invoice accordingly.

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Asbestos ID - materials
101-0.2	✓	✓	✓	✓	✓	✓	✓		
102-0.05	✓	✓	✓	✓	✓	✓	✓		
103-0.05	✓	✓	✓	✓	✓	✓	✓		
104-1.0	✓	✓	✓	✓	✓	✓	✓		
105-0.1	✓	✓	✓	✓	✓	✓	✓		
106-0.26	✓	✓	✓	✓	✓	✓	✓		
106-0.5	✓	✓	✓	✓	✓	✓	✓		
107-0.1	✓	✓	✓	✓	✓	✓	✓		
107-0.22	✓	✓	✓	✓	✓	✓	✓		
108-0.3	✓	✓	✓	✓	✓	✓	✓		
109-1.0	✓	✓	✓	✓	✓	✓	✓		
110-0.1	✓	✓	✓	✓	✓	✓	✓		
111-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
111/F									✓
113-0.05	✓	✓	✓	✓	✓	✓	✓		
114-0.05	✓	✓	✓	✓	✓	✓	✓		
115-0.3	✓	✓	✓	✓	✓	✓	✓		
116-0.05	✓	✓	✓	✓	✓	✓	✓		
D1	✓	✓	✓	✓	✓	✓	✓		

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

Additional Info

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

Appendix D

Drawing 1 – Test Location Plan

Site Location

0 10 20 30 40 m

Legend

- Groundwater Location
- Test Pit Location
- Approximate Site Boundary
- Previous Borehole Locations (JKEnvironments)

Drawing adapted from Nearmap Image dated 13.1.2019.
Test locations are approximate only and were located using hand-held GPS.

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	Pacific Brook Christian School Ltd	
OFFICE:	Newcastle	DRAWN BY: PLH
SCALE:	1:1500 @ A3	DATE: 25.August.2020

TITLE: **Test Location Plan**
Detailed Site Investigation
Lot 100 DP1261496, Maitland Street, Muswellbrook NSW

N

PROJECT No:	91601.00
DRAWING No:	1
REVISION:	1