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Project 85998.01
30 August 2017
85998.01.R.002.Rev0
CB:jlb

Attention: Mr Michael Abbott

Email: Michael.abbott@ghd.com

Dear Sirs

Addendum Letter: Updated Detailed Site Investigation
Proposed North Kellyville New Primary School
120-126 Hezlett Road, North Kellyville

1. Introduction

Douglas Partners Pty Ltd (DP) was previously engaged by GHD Pty Ltd to complete a detailed site investigation (DSI) for contamination for a proposed primary school at the above address. The boundaries of the investigation area for the original DSI (Lot 101 in D.P. 1216659) are shown on the attached Drawing 1. The objectives, scope and outcomes of the DSI were reported under DP *Report on Detailed Site (Contamination) Investigation, Proposed North Kellyville New Primary School, 56 - 58 Hezlett Road, North Kellyville* (Reference 85998.01.R.001.Rev0.DSI) dated July 2017 (DP, 2017).

Subsequent to the preparation of DP (2017) DP was requested to extend the DSI to incorporate the adjoining Lot 100 in D.P. 1216659 (Lot 100), as shown on the attached Drawing 1. This letter report has been prepared to outline the objective, scope and outcomes of the investigation undertaken in Lot 100, which for the purpose of this letter report, is referred to as “the site”.

DP understands that the site is proposed for inclusion in the development of a new primary school. The objectives of this investigation were to:

- Assess the risk of contamination based on historical site use;
- Assess the nature of potential contamination at the site;
- Develop a conceptual site model identifying potential contamination sources, receptors and pathways;
- Provide recommendations for further investigations (if necessary) and/ or remediation and/ or management; and
- Comment on the suitability of the site for the proposed land use.

A preliminary waste classification has been included to inform the disposal requirements for excess spoil which could be generated from excavations.

The investigation was conducted with reference to guidelines listed in DP (2017).

This investigation was undertaken in conjunction with a geotechnical investigation reported separately.

2. Scope of Works

The scope of works for this investigation was as follows:

- Review of DP (2017), particularly in relation to historical site uses and a conceptual site model (CSM);
- Excavation of eight (8) test pits in Lot 100 to at least 0.5 m into natural soils or prior refusal;
- All test pits incorporated soil sampling at regular intervals and upon signs of contamination for potential chemical testing;
- All fill samples were screened for volatiles using a calibrated photo-ionisation detector (PID);
- Laboratory analysis was conducted on selected soil (including replicate QA/QC samples) at a NATA accredited laboratory for combinations of the following potential contaminants:
  - Heavy metals - As, Cd, Cr, Cu, Pb, Hg, Ni, Zn;
  - Total recoverable hydrocarbons (TRH);
  - Monocyclic aromatic hydrocarbons (Benzene, Toluene, Ethylbenzene and Xylene – BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Polychlorinated biphenyls (PCB);
  - Organochlorine pesticides (OCP);
  - Organophosphate pesticides (OPP);
  - Phenols;
  - and
  - Asbestos.
- Analysis of QA/QC samples;
- Analysis of cation exchange capacity (CEC) and pH analysis for calculation of environmental investigation levels;
- Analysis of toxicity characteristic leaching procedures (TCLP) for preliminary waste classification; and
- Preparation of this letter report.

3. Site History

This report section discusses the history of land uses and features at the site using information presented in DP (2017) as well as a review of historical aerial photographs specific to the site, It is noted that Lot 100 essentially has the same history of land use as Lot 101.

Historical information indicated that the site has been primary used as farming and market garden space from *circa* 1888 prior to becoming vacant land in 2013. Section 149 certificates indicated the land is zoned as R1 General Residential and R2 Low Density Residential with the Hills Shire Council and has no known contamination or auditor orders standing.

EPA data base searches did not identify the land having any licenses under the POEO Act or being listed on the contamination register as part of Part 3 of the Contaminated Land Management Act 1997.

Aerial photographs reveal no significant changes to the site apart from the clearing of bushland and construction of two residential buildings, sheds and market gardens between 1961 and 1986. Comparison of the latest aerial images (2005 and 2017) reveal no significant changes however it is clear the market gardening ceased some time before and there appears to be a spread of general debris prominent in the southern portion of the site.

4. Conceptual Site Model

Given the similarities in historical land uses, it is considered that the conceptual site model (CSM) for Lot 101 presented in DP (2017) remains the same for Lot 100. The CSM is presented in the following Table 1.

Table 1: Potential Complete Pathways (CSM)

Source	Transport Pathway	Receptor	Risk Management Action Recommended
S1: Uncontrolled Filling Metals, TRH, BTEX, PAH, PCB, OCP, phenols, and asbestos	P1: Ingestion and dermal contact	R1: Construction and maintenance workers R2: Site users (School) R6: Terrestrial Ecology	An intrusive investigation should be conducted to assess possible contamination including chemical testing of the soils as addressed in this report. If the contamination source is found on site, a groundwater assessment is recommended to assess potential for offsite migration. If the site soils or groundwater are contaminated, mitigation / remediation measures will need to be implemented to manage the risk to the identified receptors.
S2: Former Farm and Market Gardens Metals, OCP, OPP	P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Site users (School) R3: Adjacent users (residential) R6: Terrestrial Ecology	
	P3 – Leaching of contaminants and vertical migration into groundwater	R5: Groundwater (freshwater)	
	P4: Lateral migration of groundwater providing base flow to water bodies P5: Surface Water Runoff	R4: Surface water (Smalls Creek/Cattai Creek) R6: Terrestrial Ecology	
S3: Former buildings Asbestos, lead, PCB and SMF	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapours	R1: Construction and maintenance workers R2: Site users (residential) R6: Terrestrial Ecology	A hazardous building materials assessment is recommended. If found, hazardous materials would need to be removed in accordance with relevant legislation and guidelines prior to demolition, with the footprint of the buildings validated upon completion of demolition.

5. Fieldwork

5.1 Soil Sampling Locations and Rationale

Lot 100 occupies a total land area of approximately 0.3 hectares (ha). In accordance with NSW EPA *Sampling Design Guidelines* (1995), for an investigation area of 0.3 Ha, a minimum of 9 sampling locations is recommended for site characterisation based on the detection of a circular "hot spot" of contamination of at least 32 m diameter. However, as required under the project brief, and given that the investigation is an extension to the original DSI reported in DP (2017), sampling for the investigation was undertaken on a pre-determined 20 m x 20 m grid, as shown on Drawing 2, attached.

The sampling locations were labelled as TP72 to TP79. Environmental fieldwork was conducted on the 27 July 2017 under the full time supervision of an experienced Environmental Scientist. Soil samples were collected from all test locations, from the surface and at regular depth intervals.

5.2 Test Pit Excavation Methods

The test pits were excavated using a 5T Yanmar ViO55 excavator with a 400 mm sized bucket. Test pit excavation depths ranged from 0.8 m to 1.1 m below ground level (bgl), as shown on the test pit logs attached.

5.3 Soil Sampling Procedures

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

- Use of disposable sampling equipment including disposal nitrile gloves;
- Recovery of soil samples from the excavator bucket or side walls of the test pit, avoiding soils coming into contact with the excavator bucket;
- Transfer of samples into laboratory-prepared glass jars and capping immediately with Teflon lined lids;
- Labelling of sampling containers with individual and unique identification, including project number, sample location and sample depth;
- Field screening of replicate soil samples collected in sealed plastic bags for Total Photoionisable Compounds (TOPIC) using a calibrated photo-ionisation detector (PID); and
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory.

Envirolab Services Pty Ltd (Envirolab), accredited by NATA, was employed to conduct the primary sample analysis and ALS, accredited by NATA, was employed to conduct analysis of inter-laboratory duplicates. The laboratories are required to carry out in-house QC procedures.

5.4 Analytical Rationale

The analytical scheme for soil samples was designed to obtain an indication of the potential presence and possible distribution of potential contaminants of concern identified in the CSM, being metals, TRH, BTEX, PAH, OCP, OPP, PCB, phenols, and asbestos. For calculation of site specific ecological investigation levels (Section 9 of DP, 2017), three soil samples were selected for analysis for pH and CEC from the upper 2 m soil profile.

The results of the analytical testing were compared with the adopted site assessment criteria (SAC) discussed in Section 6.

6. Site Assessment Criteria

The site assessment criteria (SAC) adopted for this investigation were the same as those listed in Section 9 of DP (2017). The adopted SAC are shown on Table R1 attached. For a discussion on the derivation of the SAC refer to Section 9 of DP (2017).

NOTE: EILs were calculated with a CEC of 8.2 $cmol_c/kg$, pH of 5.26 and an assumed clay content of 10%.

7. Preliminary Waste Classification

The preliminary waste classification was generally conducted with reference to the six step process as set out in NSW EPA *Waste Classification Guidelines* 2014 (EPA, 2014) which is summarised in Table 2 below.

Table 2: Six Step Classification

Step	Classification	Rationale
1. Is it special waste?	No	Asbestos was not encountered during the fieldwork. Waste generally not considered to be clinical, asbestos or tyre waste.
2. Is it liquid waste?	No	Waste composed of soil matrix (*i.e.* no liquids)
3. Is the waste "pre-classified"?	No	Waste not observed to contain coal tar, batteries, lead paint or dangerous goods containers.

Step	Classification	Rationale
4. Does the waste have hazardous waste characteristics?	No	Waste not observed to/ or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances.
5. Chemical Assessment	Undertaken	Refer to Section 10.2 and Table R2, attached.
6. Is the waste putrescible?	No	All observed components of material were composed of materials pre-classified as non-putrescible (*i.e.* soils). Organic content is assessed to be minor.

Contaminant threshold (CT1, CT2, SCC1 and SCC2) values for the preliminary waste classification are presented in Table R2, attached.

8. Fieldwork Observations

At the time of the fieldwork the site was vacant with structures on Lot 101 having been demolished prior to DP attending the site. It was noted that fencing had been erected around the entire site (combined Lots 100 and 101). No signs of gross contamination including asbestos were observed on the ground surface of Lot 100.

Details of the subsurface conditions encountered in each test pit are provided in the attached test pit logs, together with notes defining classification methods and descriptive terms.

Based on observations, the subsurface profile can be broadly summarised as:

TOPSOIL: Brown silty and/or shaly clay filling with some fine igneous gravel and rootlets. May be shallow fill in part. Disturbance due to demolition is widespread across both Lot 100 and Lot 101;

RESIDUAL CLAY: Orange yellow mottled clay; and

SHALE: Light grey and yellow shale.

No asbestos was observed during field work.

9. Results Summary

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

Table R1: Soil Results;

Table R2: Preliminary Waste Classification.

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

10. Analysis and Discussion of Results

10.1 Data Quality Assessment

This investigation has been devised broadly in accordance with the seven step data quality objective (DQO) process as specified in Schedule B2 of the National Environment Protection Measure 1999, as amended 2013 (NEPC, 2013). The DQO process is attached. Field and laboratory procedures were assessed against data quality indicators (DQIs) which are also attached.

Based on the results of the above processes, it is concluded that the field and laboratory test data obtained are reliable and useable for this current investigation.

10.2 Soils

All concentrations for soil samples analysed for metals, TRH, PAH, BTEX, phenols, OCP, OPP, PCB and asbestos were below laboratory limits of reporting (LOR) and/or the adopted SAC.

No asbestos was detected above the 0.1g/kg laboratory reporting limit.

10.3 Preliminary Waste Classification

As shown on Table R2, contaminant concentrations for the analysed fill (or topsoil) samples were within the contaminant thresholds (CT1s) for General Solid Waste (GSW).

Based on the observations at the time of sampling and the reported analytical results, the surface and fill soils at the site can be preliminarily classified as General Solid Waste (non-putrescible) as defined in EPA (2014).

Given the low concentrations of chemical contaminants in the fill and surface soils, and the typical background concentrations of chemical contaminants in the natural soil samples analysed, it is considered that the natural soils and bedrock at the site have a preliminary classification of virgin excavated natural material (VENM).

The handling, transport and disposal of the materials should be conducted in accordance with regulatory and statutory requirements.

11. Conclusions and Recommendations

Based on the results of this investigation, it is concluded that the site (Lot 100) is suitable, from a contamination perspective, for the proposed primary school development. This report must be read in conjunction with DP (2017).

As noted in DP (2017) it is recommended that a Construction Environmental Management Plan (CEMP), incorporating an unexpected finds protocol, be prepared and initiated during the planned civil and construction works, to inform the appropriate management of any asbestos or other potential contaminants encountered during the works.

12. Limitations

This report presents the results of an addendum to the DSI reported in DP (2017) to include Lot 100, undertaken for a new primary school at 120-126 Hezlett Road, North Kellyville. The investigation was commissioned by Mike Warren of GHD Pty Ltd and was undertaken in accordance with Douglas Partners Pty Ltd (DP) email to Mike Dean dated 12 July 2017.

The work was carried out as a variation to the QA22 contract dated 21 March 2017, reference 2126108 – 7 schools for the Department of Education. This report is provided for the exclusive use of GHD Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

Although the sampling plan adopted for these investigations 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 conditions, budget constraints, parts of the stockpile being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that hazardous building materials, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that hazardous building materials are not present in the fill or surface soils at the site.

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.

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

Yours faithfully
Douglas Partners Pty Ltd

Christopher Bagia
Environmental Scientist

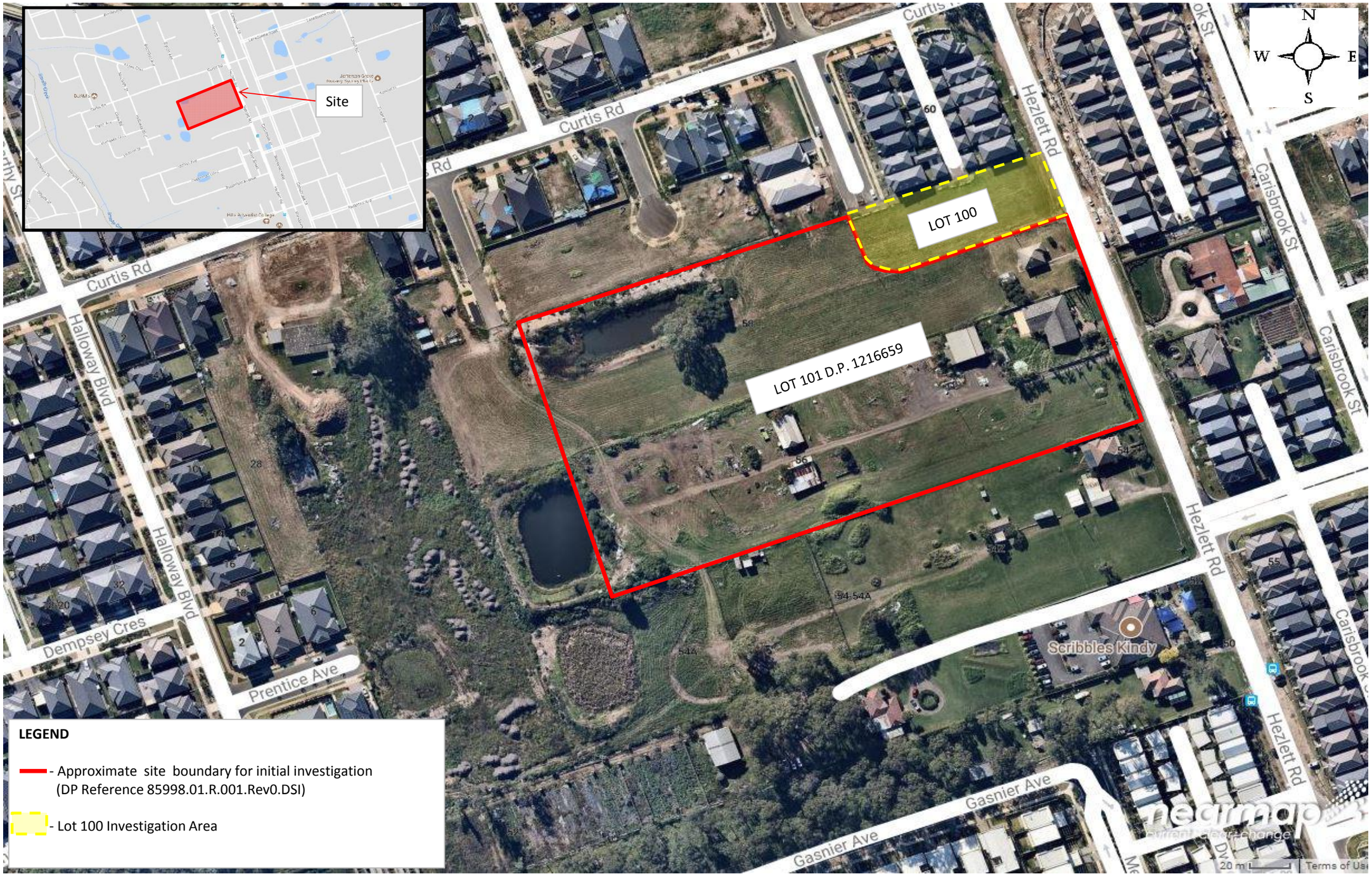
Reviewed by

Paul Gorman
Principal

Attachments: Drawings
Test Pit Log Results and Notes About this Report
Laboratory Report and Chain of Custody
Tables R1 and R2
Quality Assurance/Quality Control Documentation

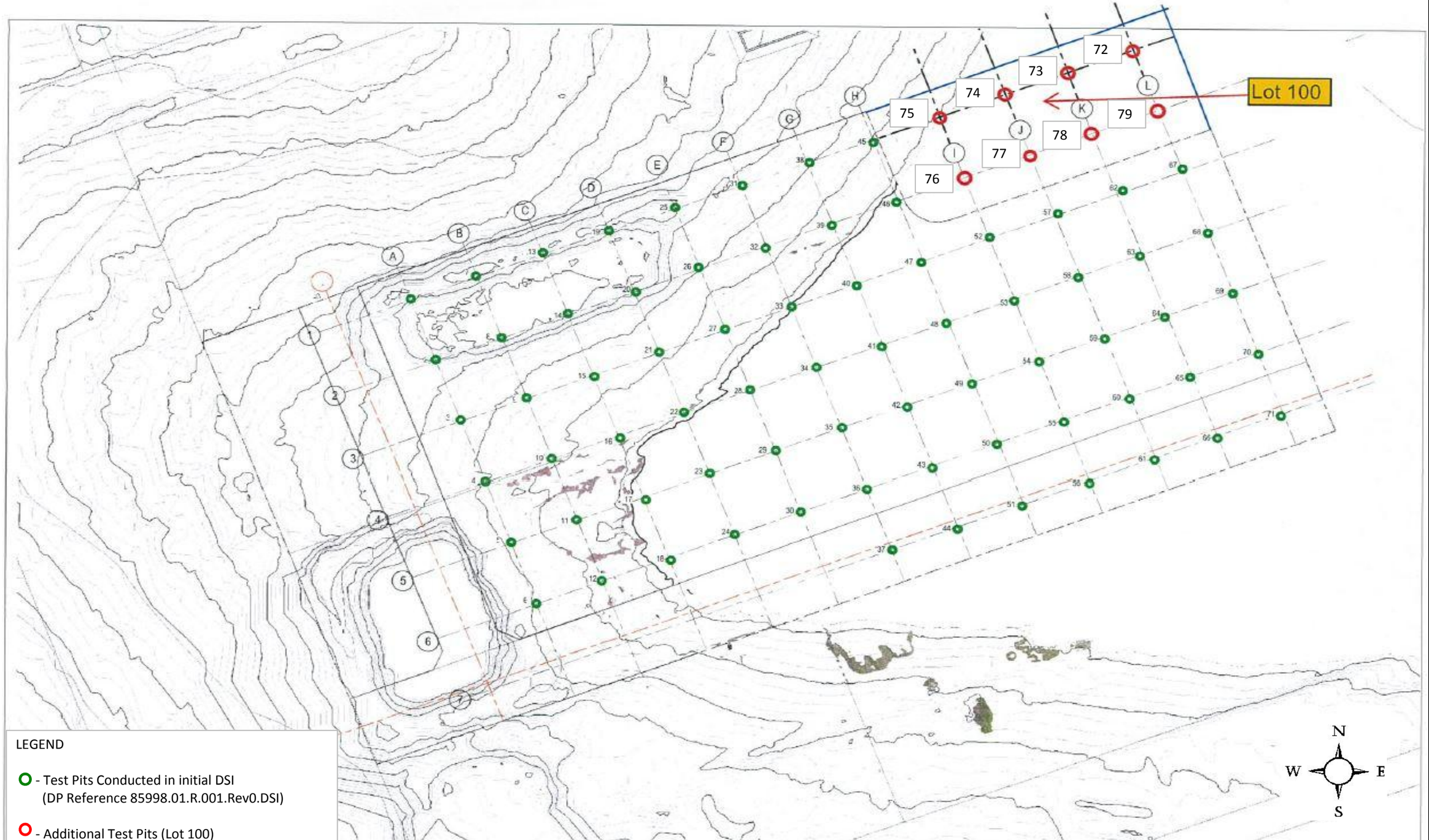
Attachment A

Drawings



Source: Nearmap

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: GHD Pty Ltd		TITLE: **Site Locality and Boundary Map**	PROJECT No:	85998.01
	OFFICE: SYDNEY	DRAWN BY: CB	**Proposed New Primary School**	DRAWING No:	1
	SCALE: As Shown	DATE: 4 Aug 2017	**120 - 126 Hezlett Road, North Kellyville**	REVISION:	A



Source: GHD

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: GHD Pty Ltd		TITLE: **Sample Location Map**	PROJECT No:	85998.01
	OFFICE: SYDNEY	DRAWN BY: CB	**Proposed New Primary School**	DRAWING No:	2
	SCALE: No Scale	DATE: 4 Aug 2017	**120 - 126 Hezlett Road, North Kellyville**	REVISION:	A

Attachment B

Test Log Results

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

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Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

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

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

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

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

The proportions of secondary constituents of soils are described as:

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

Definitions of grading terms used are:

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

Cohesive Soils

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

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

Cohesionless Soils

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

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

Soil Descriptions

Soil Origin

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

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

Transported soils may be further subdivided into:

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

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

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

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

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

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

Rock Descriptions

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Symbols & Abbreviations

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

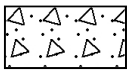
Symbols & Abbreviations

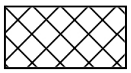
Graphic Symbols for Soil and Rock

General

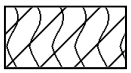

Asphalt

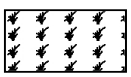

Road base

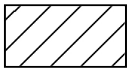

Concrete

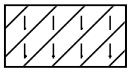

Filling

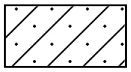
Soils


Topsoil

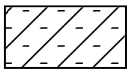

Peat

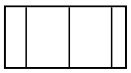

Clay

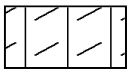

Silty clay

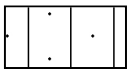

Sandy clay

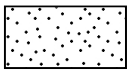

Gravelly clay

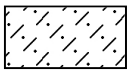

Shaly clay

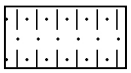

Silt


Clayey silt


Sandy silt

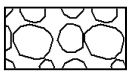

Sand

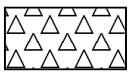

Clayey sand


Silty sand


Gravel

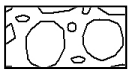

Sandy gravel


Cobbles, boulders

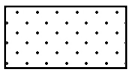

Talus

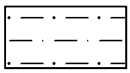
Sedimentary Rocks

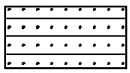

Boulder conglomerate

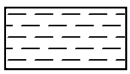

Conglomerate


Conglomeratic sandstone

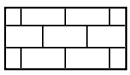

Sandstone


Siltstone

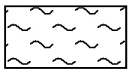

Laminite

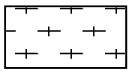

Mudstone, claystone, shale

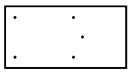

Coal


Limestone

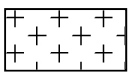
Metamorphic Rocks

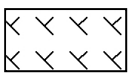

Slate, phyllite, schist

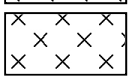

Gneiss

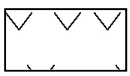

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

TEST PIT LOG

CLIENT: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 79.4 AHD
EASTING: 310426
NORTHING: 6270236.6

PIT No: TP72
PROJECT No: 85998.01
DATE: 27/7/2017
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)
79	0.0	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D*	0.0		PID<1		
	0.2				0.2				
	0.3	CLAY - stiff, mottled orange and yellow clay and some fine charcoal fragments (2-5mm)			0.4		PID<1		
	0.4			D					
	0.5	SHALE - extremely low strength, extremely weathered, orange and light grey shale (soil properties)			0.5				
	0.9				0.9		PID<1		
	1.0			D	1.0				1
	1.1	SHALE - low strength, extremely weathered, light grey and yellow shale							
		Pit discontinued at 1.1m - target depth reached							
78	2								2
77	3								3
76	4								4
75									

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD1/270717, AF/FA sample taken at 0.0-0.2m

☐ 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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 78.8 AHD
EASTING: 310411.6
NORTHING: 6270230.5

PIT No: TP73
PROJECT No: 85998.01
DATE: 27/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D	0.0		PID<1		
	0.2	CLAY - stiff, mottled orange and yellow clay			0.2				
				D	0.4		PID<1		
	0.6	SHALE - extremely low strength, extremely weathered, light grey and yellow shale (soil properties)			0.5				
78	0.8	Pit discontinued at 0.8m - target depth reached							
	1								1
77									
	2								2
76									
	3								3
75									
	4								4
74									

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 78.1 AHD
EASTING: 310398
NORTHING: 6270225.4

PIT No: TP74
PROJECT No: 85998.01
DATE: 27/7/2017
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)
78	0.0	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D	0.0		PID<1		
	0.2	CLAY - stiff, mottled orange and yellow clay			0.2				
				D	0.4		PID<1		
					0.5				
	0.8	Pit discontinued at 0.8m - target depth reached							
77	1								1
76	2								2
75	3								3
74	4								4

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

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 77.0 AHD
EASTING: 310378.4
NORTHING: 6270217.9

PIT No: TP75
PROJECT No: 85998.01
DATE: 27/7/2017
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)
77	0.2	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D*	0.0		PID<1		
		CLAY - stiff, mottled orange and yellow clay			0.2				
				D	0.4		PID<1		
					0.5				
	0.7	SHALE - extremely low strength, extremely weathered, light grey and yellow shale (soil properties)		D	0.9		PID<1		
76	1 1.0	Pit discontinued at 1.0m - target depth reached			1.0				1
75	2								2
74	3								3
73	4								4

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

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *AF/FA sample taken at 0.0-0.2m

☐ 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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 78.2 AHD
EASTING: 310383.9
NORTHING: 6270201.8

PIT No: TP76
PROJECT No: 85998.01
DATE: 27/7/2017
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)
78	0.0	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D*	0.0		PID<1		
	0.2	CLAY - stiff, mottled orange and yellow clay			0.2				
				D	0.4		PID<1		
		0.7m: becoming light grey mottled red and orange			0.5				
				D	0.9		PID<1		
	1.0	Pit discontinued at 1.0m - target depth reached			1.0				

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

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *AF/FA sample taken at 0.0-0.2m

☐ 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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 79.3 AHD
EASTING: 310405.1
NORTHING: 6270208.3

PIT No: TP77
PROJECT No: 85998.01
DATE: 27/7/2017
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)
79	0.0	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D	0.0		PID<1		
	0.2	CLAY - stiff, mottled orange and yellow clay			0.2				
				D	0.4		PID<1		
					0.5				
	0.6	SHALE - extremely low strength, extremely weathered, light grey and yellow shale							
				D	0.9		PID<1		
78	1.0	Pit discontinued at 1.0m - target depth reached			1.0				
77	2								
76	3								
75	4								

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

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 79.8 AHD
EASTING: 310418.2
NORTHING: 6270213.8

PIT No: TP78
PROJECT No: 85998.01
DATE: 27/7/2017
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)
79.8	0.0	FILLING - brown silty clay with some fine igneous gravel and rootlets (topsoil)		D	0.0		PID<1		
					0.2				
	0.3	CLAY - stiff, mottled orange and yellow clay							
				D	0.4		PID<1		
					0.5				
79	0.7	SHALE - extremely low strength, extremely weathered, light grey and yellow shale							
	0.9	Pit discontinued at 0.9m - target depth reached							
	1								1
78									
	2								2
77									
	3								3
76									
	4								4
75									

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

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

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: GHD Pty Ltd
PROJECT: Proposed New School
LOCATION: 120-126 Hezlett Road, North Kellyville

SURFACE LEVEL: 80.4 AHD
EASTING: 310435.7
NORTHING: 6270219.8

PIT No: TP79
PROJECT No: 85998.01
DATE: 27/7/2017
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)
80	0.25	FILLING - brown silty clay filling with some fine igneous gravel and rootlets (topsoil)		D	0.0 0.2		PID<1		
		CLAY - stiff, mottled orange and yellow clay		D*	0.4 0.5		PID<1		
	0.7	SHALE - extremely low strength, extremely weathered, light grey and yellow shale (soil properties)		D	0.9				
79	1.0	Pit discontinued at 1.0m - target depth reached			1.0				
78									
77									
76									

RIG: Yanmar ViO 55 - 400mm bucket

LOGGED: CB

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *BD2/270717, AF/FA taken at 0.0-0.2m

☐ 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

Attachment C

Laboratory Reports

and Chain of Custody Documentation

Envirolab Services Pty Ltd
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 172252

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman, Chris Bagia
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85998.01, New Primary School**
Number of Samples	15 soils
Date samples received	27/07/2017
Date completed instructions received	27/07/2017

Analysis Details

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

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

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

Report Details

Date results requested by	03/08/2017
Date of Issue	03/08/2017

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Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 172252-1, 3 to 5, 7, 8, 10, 11 were sub-sampled from jars provided by the client.

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lulu Scott

Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Lulu Scott, Asbestos Supervisor
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		172252-1	172252-2	172252-3	172252-4	172252-5
Your Reference	UNITS	TP72	TP72	TP73	TP74	TP75
Depth		0.0-0.2	0.4-0.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	110	101	103	101	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		172252-6	172252-7	172252-8	172252-9	172252-10
Your Reference	UNITS	TP75	TP76	TP77	TP77	TP78
Depth		0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	104	101	102	106

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		172252-11	172252-12	172252-13	172252-14	172252-15
Your Reference	UNITS	TP79	TP79	BD1/270717	Trip Spike	Trip Blank
Depth		0.0-0.2	0.4-0.5	-	-	-
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
TRH C_6 - C_9	mg/kg	<25	<25	<25	[NA]	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	[NA]	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	[NA]	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	113%	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	115%	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	126%	<1
m+p-xylene	mg/kg	<2	<2	<2	125%	<2
o-Xylene	mg/kg	<1	<1	<1	124%	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	[NA]	[NA]
naphthalene	mg/kg	<1	<1	<1	[NA]	[NA]
Surrogate aaa-Trifluorotoluene	%	102	110	107	89	111

svTRH (C10-C40) in Soil						
Our Reference		172252-1	172252-2	172252-3	172252-4	172252-5
Your Reference	UNITS	TP72	TP72	TP73	TP74	TP75
Depth		0.0-0.2	0.4-0.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	29/07/2017	29/07/2017	29/07/2017	29/07/2017	29/07/2017
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	%	95	89	90	88	85

svTRH (C10-C40) in Soil						
Our Reference		172252-6	172252-7	172252-8	172252-9	172252-10
Your Reference	UNITS	TP75	TP76	TP77	TP77	TP78
Depth		0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	29/07/2017	29/07/2017	29/07/2017	29/07/2017	29/07/2017
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	%	83	92	87	84	86

svTRH (C10-C40) in Soil				
Our Reference		172252-11	172252-12	172252-13
Your Reference	UNITS	TP79	TP79	BD1/270717
Depth		0.0-0.2	0.4-0.5	-
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	29/07/2017	29/07/2017	29/07/2017
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	%	91	83	84

PAHs in Soil						
Our Reference		172252-1	172252-2	172252-3	172252-4	172252-5
Your Reference	UNITS	TP72	TP72	TP73	TP74	TP75
Depth		0.0-0.2	0.4-0.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<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
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	97	99	96	96	95

PAHs in Soil						
Our Reference		172252-6	172252-7	172252-8	172252-9	172252-10
Your Reference	UNITS	TP75	TP76	TP77	TP77	TP78
Depth		0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<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
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	94	92	94	95	95

PAHs in Soil				
Our Reference		172252-11	172252-12	172252-13
Your Reference	UNITS	TP79	TP79	BD1/270717
Depth		0.0-0.2	0.4-0.5	-
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017
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	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Surrogate p-Terphenyl-d14	%	95	94	95

Organochlorine Pesticides in soil						
Our Reference		172252-1	172252-3	172252-4	172252-5	172252-7
Your Reference	UNITS	TP72	TP73	TP74	TP75	TP76
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	0.1	<0.1	0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	0.1	<0.1	0.1
Surrogate TCMX	%	84	87	83	84	84

Organochlorine Pesticides in soil				
Our Reference		172252-8	172252-10	172252-11
Your Reference	UNITS	TP77	TP78	TP79
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	0.1	0.1	0.2
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	0.2
Surrogate TCMX	%	84	83	83

Organophosphorus Pesticides						
Our Reference		172252-1	172252-3	172252-4	172252-5	172252-7
Your Reference	UNITS	TP72	TP73	TP74	TP75	TP76
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	87	83	84	84

Organophosphorus Pesticides				
Our Reference		172252-8	172252-10	172252-11
Your Reference	UNITS	TP77	TP78	TP79
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	84	83	83

PCBs in Soil						
Our Reference		172252-1	172252-3	172252-4	172252-5	172252-7
Your Reference	UNITS	TP72	TP73	TP74	TP75	TP76
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	87	83	84	84

PCBs in Soil				
Our Reference		172252-8	172252-10	172252-11
Your Reference	UNITS	TP77	TP78	TP79
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	84	83	83

Acid Extractable metals in soil						
Our Reference		172252-1	172252-2	172252-3	172252-4	172252-5
Your Reference	UNITS	TP72	TP72	TP73	TP74	TP75
Depth		0.0-0.2	0.4-0.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Arsenic	mg/kg	11	6	11	9	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	21	17	24	23	27
Copper	mg/kg	35	12	34	29	27
Lead	mg/kg	24	17	22	23	22
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	4	10	8	8
Zinc	mg/kg	93	23	100	68	71

Acid Extractable metals in soil						
Our Reference		172252-6	172252-7	172252-8	172252-9	172252-10
Your Reference	UNITS	TP75	TP76	TP77	TP77	TP78
Depth		0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Arsenic	mg/kg	4	11	12	9	12
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.8
Chromium	mg/kg	14	23	21	14	22
Copper	mg/kg	26	32	39	21	48
Lead	mg/kg	18	21	23	20	31
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	8	9	2	11
Zinc	mg/kg	18	87	99	18	190

Acid Extractable metals in soil				
Our Reference		172252-11	172252-12	172252-13
Your Reference	UNITS	TP79	TP79	BD1/270717
Depth		0.0-0.2	0.4-0.5	-
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	28/07/2017	28/07/2017	28/07/2017
Arsenic	mg/kg	13	12	11
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	20	19	22
Copper	mg/kg	34	17	30
Lead	mg/kg	22	21	22
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	8	3	8
Zinc	mg/kg	92	21	95

Moisture						
Our Reference		172252-1	172252-2	172252-3	172252-4	172252-5
Your Reference	UNITS	TP72	TP72	TP73	TP74	TP75
Depth		0.0-0.2	0.4-0.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	31/07/2017	31/07/2017	31/07/2017	31/07/2017	31/07/2017
Moisture	%	14	19	15	14	14

Moisture						
Our Reference		172252-6	172252-7	172252-8	172252-9	172252-10
Your Reference	UNITS	TP75	TP76	TP77	TP77	TP78
Depth		0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	31/07/2017	31/07/2017	31/07/2017	31/07/2017	31/07/2017
Moisture	%	20	12	14	18	13

Moisture				
Our Reference		172252-11	172252-12	172252-13
Your Reference	UNITS	TP79	TP79	BD1/270717
Depth		0.0-0.2	0.4-0.5	-
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	28/07/2017	28/07/2017	28/07/2017
Date analysed	-	31/07/2017	31/07/2017	31/07/2017
Moisture	%	13	18	14

Asbestos ID - soils						
Our Reference		172252-1	172252-3	172252-4	172252-5	172252-7
Your Reference	UNITS	TP72	TP73	TP74	TP75	TP76
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	3/08/2017	3/08/2017	3/08/2017	3/08/2017	3/08/2017
Sample mass tested	g	Approx. 40g	Approx. 40g	Approx. 35g	Approx. 40g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		172252-8	172252-10	172252-11
Your Reference	UNITS	TP77	TP78	TP79
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date analysed	-	3/08/2017	3/08/2017	3/08/2017
Sample mass tested	g	Approx. 40g	Approx. 35g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

CEC				
Our Reference		172252-1	172252-6	172252-12
Your Reference	UNITS	TP72	TP75	TP79
Depth		0.0-0.2	0.9-1.0	0.4-0.5
Date Sampled		27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	31/07/2017	31/07/2017	31/07/2017
Date analysed	-	31/07/2017	31/07/2017	31/07/2017
Exchangeable Ca	meq/100g	12	1.4	6.0
Exchangeable K	meq/100g	0.3	0.2	0.2
Exchangeable Mg	meq/100g	1.0	2.9	0.73
Exchangeable Na	meq/100g	0.17	<0.1	<0.1
Cation Exchange Capacity	meq/100g	13	4.6	7.0

Misc Inorg - Soil						
Our Reference		172252-1	172252-6	172252-7	172252-10	172252-12
Your Reference	UNITS	TP72	TP75	TP76	TP78	TP79
Depth		0.0-0.2	0.9-1.0	0.0-0.2	0.0-0.2	0.4-0.5
Date Sampled		27/07/2017	27/07/2017	27/07/2017	27/07/2017	27/07/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/07/2017	31/07/2017	31/07/2017	31/07/2017	31/07/2017
Date analysed	-	31/07/2017	31/07/2017	31/07/2017	31/07/2017	31/07/2017
pH 1:5 soil:water	pH Units	6.4	4.4	[NA]	[NA]	5.0
Total Organic Carbon (Walkley Black)	mg/kg	28,000	[NA]	27,000	45,000	[NA]

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-036	Total Organic Carbon or Matter - A titrimetric method that measures the oxidisable organic content of soils.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	109	103
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	109	103
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	121	114
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	111	102
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	102	96
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	105	101
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	103	98
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	1	110	100	10	113	101

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	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[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	102	106	4	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	29/07/2017	29/07/2017		28/07/2017	29/07/2017
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	104	96
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	103	86
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	87	101
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	104	96
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	103	86
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	87	101
Surrogate o-Terphenyl	%		Org-003	101	1	95	90	5	96	90

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	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	29/07/2017	29/07/2017		[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	91	85	7	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	83	77
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	96	88
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	94	87
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	95	86
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	94	86
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	88	82
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	97	89
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	96	1	97	94	3	99	115

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[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	95	95	0	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
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	75	72
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	95	90
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	81
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	89	84
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	84	79
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	94	91
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	85
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	78	72
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	89	84
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	73	65
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	84	1	84	85	1	105	100

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[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	0.2	0.2	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	83	83	0	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
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	95	98
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	95	105
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	92	102
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	96	97
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	75	66
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	100
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	103
Surrogate TCMX	%		Org-008	84	1	84	85	1	84	82

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[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	83	83	0	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date extracted	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
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	101	102
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	84	1	84	85	1	84	82

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[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	83	83	0	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	172252-3
Date prepared	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Date analysed	-			28/07/2017	1	28/07/2017	28/07/2017		28/07/2017	28/07/2017
Arsenic	mg/kg	4	Metals-020	<4	1	11	11	0	111	93
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	105	87
Chromium	mg/kg	1	Metals-020	<1	1	21	22	5	107	90
Copper	mg/kg	1	Metals-020	<1	1	35	34	3	108	106
Lead	mg/kg	1	Metals-020	<1	1	24	23	4	102	83
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	119	120
Nickel	mg/kg	1	Metals-020	<1	1	9	9	0	101	88
Zinc	mg/kg	1	Metals-020	<1	1	93	110	17	104	89

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	28/07/2017	28/07/2017		[NT]	[NT]
Date analysed	-			[NT]	11	28/07/2017	28/07/2017		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	13	14	7	[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	23	14	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	34	35	3	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	22	25	13	[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	8	8	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	92	98	6	[NT]	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			31/07/2017	1	31/07/2017	31/07/2017		31/07/2017	[NT]
Date analysed	-			31/07/2017	1	31/07/2017	31/07/2017		31/07/2017	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	1	12	11	9	100	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	1	0.3	0.2	40	108	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	1	1.0	0.91	9	96	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	1	0.17	0.13	27	101	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			31/07/2017	[NT]	[NT]	[NT]	[NT]	31/07/2017	[NT]
Date analysed	-			31/07/2017	[NT]	[NT]	[NT]	[NT]	31/07/2017	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
Total Organic Carbon (Walkley Black)	mg/kg	1000	Inorg-036	<1000	[NT]	[NT]	[NT]	[NT]	97	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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CHAIN OF CUSTODY DESPATCH SHEET

Project No:	85998.01	**Suburb:**	North Kellyville	**To:**	ELS
Project Name:	Proposed New Primary School	**Order Number**			
Project Manager:	Paul Gorman	**Sampler:**	CB	**Attn:**	Aileen Hie
Emails:	paul.gorman@douglaspartners.com.au	chris.bagia@douglaspartners.com.au		**Phone:**	
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☒			**Email:**	Ahie@envirolab.com.au
Prior Storage:	☐ Esky ☒ Fridge ☐ Shelved	Do samples contain 'potential' HBM?	Yes ☐ No ☒ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	Sample Depth	Lab ID	Date Sampled	Sample Type (S - soil W - water)	Container Type (G - glass P - plastic)	Analytes: Combo 6a	TOC	CEC	pH	Combo 3	BTEX				Notes/preservation
TP72	0.0 - 0.2	1	27/07/17	S	G	X	X	X	X						
TP72	0.4 - 0.5	2	27/07/17	S	G					X					
TP73	0.0 - 0.2	3	27/07/17	S	G	X									
TP74	0.0 - 0.2	4	27/07/17	S	G	X									
TP75	0.0 - 0.2	5	27/07/17	S	G	X									
TP75	0.9 - 1.0	6	27/07/17	S	G			X	X	X					
TP76	0.0 - 0.2	7	27/07/17	S	G	X	X								
TP77	0.0 - 0.2	8	27/07/17	S	G	X									
TP77	0.4 - 0.5	9	27/07/17	S	G					X					
TP78	0.0 - 0.2	10	27/07/17	S	G	X	X								
TP79	0.0 - 0.2	11	27/07/17	S	G	X									
TP79	0.4 - 0.5	12	27/07/17	S	G			X	X	X					
BD1/270717	-	13	27/07/17	S	G					X					
Trip Spike		14									X				
Trip Blank		15									X				
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐	

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

Job No: 172252
Date Received: 27.07.17
Time Received: 15:40
Received by: JE
Temp: Cool/Ambient 10.6
Cooling: Ice/Icepack
Security: Intact/Broken/None

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

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

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

Send Results to: Douglas Partners Pty Ltd **Address** **Phone:** **Fax:**

Signed: **Received by:** JE. ELS **Date & Time:** 27.07.17 15.40

Attachment D

Summary of Results Tables

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Table R1: Soil Results

					Inorganics		Metals								TPH										BTEX						Halogenated Benzenes
					Moisture	TOC	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	Hexachlorobenzene
					%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.1	1000	4	0.4	1	1	1	0.1	1	1	50	100	100	50	25	50	100	100		50	25	25	0.2	1	0.5	2	1	1	0.1
CRC Care Direct Contact HSL-A															3300	4500	6300									4400	100	4500	14000			12000	
NEPM 2013 EILs Res/Open Space Aged							100		410	130	1100		110	340																			
NEPM 2013 Table 1A(1) HILs Res A Soil							100	20		6000	300	40	400	7400																			10
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																																	
0-1m																		280							50		0.7	NL	480			110	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2 m																1300	5600	120							180		65	125	105			45	
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil															1000	3500	10000									800							
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																													
BD1/270717	TP72	0-0.2	27/07/2017	Filling	14	-	11	<0.4	22	30	22	<0.1	8	95	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	-
TP72	TP72	0-0.2	27/07/2017	Filling	14	28,000	11	<0.4	21	35	24	<0.1	9	93	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP72	TP72	0.4-0.5	27/07/2017	Natural	19	-	6	<0.4	17	12	17	<0.1	4	23	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	-
TP73	TP73	0-0.2	27/07/2017	Filling	15	-	11	<0.4	24	34	22	<0.1	10	100	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP74	TP74	0-0.2	27/07/2017	Filling	14	-	9	<0.4	23	29	23	<0.1	8	68	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP75	TP75	0-0.2	27/07/2017	Filling	14	-	11	<0.4	27	27	22	<0.1	8	71	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP75	TP75	0.9-1	27/07/2017	Natural	20	-	4	<0.4	14	26	18	<0.1	2	18	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	-
TP76	TP76	0-0.2	27/07/2017	Filling	12	27,000	11	<0.4	23	32	21	<0.1	8	87	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP77	TP77	0-0.2	27/07/2017	Filling	14	-	12	<0.4	21	39	23	<0.1	9	99	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP77	TP77	0.4-0.5	27/07/2017	Natural	18	-	9	<0.4	14	21	20	<0.1	2	18	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	-
TP78	TP78	0-0.2	27/07/2017	Filling	13	45,000	12	0.8	22	48	31	<0.1	11	190	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP79	TP79	0-0.2	27/07/2017	Filling	13	-	13	<0.4	20	34	22	<0.1	8	92	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	<0.1
TP79	TP79	0.4-0.5	27/07/2017	Natural	18	-	12	<0.4	19	17	21	<0.1	3	21	<50	<100	<100	<50	<25	<50	<100	<100	<250	<50	<25	<25	<0.2	<1	<0.5	<2	<1	<1	-

Field_ID	LocCode	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a)pyrene TEQ calc(half)	Benzo(b,j+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Total +ve PAHs	Pyrene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.1	0.1	0.1	0.1	0.05	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.1
CRC Care Direct Contact HSL-A																		1400			
NEPM 2013 EILs Res/Open Space Aged																		170			
NEPM 2013 Table 1A(1) HILs Res A Soil																					
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																					
0-1m																		5			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2 m									0.7												
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil																					
BD1/270717	TP72	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP72	TP72	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP72	TP72	0.4-0.5	27/07/2017	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP73	TP73	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP74	TP74	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP75	TP75	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP75	TP75	0.9-1	27/07/2017	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP76	TP76	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP77	TP77	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP77	TP77	0.4-0.5	27/07/2017	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP78	TP78	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP79	TP79	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
TP79	TP79	0.4-0.5	27/07/2017	Natural	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1

Field_ID	LocCode	Sample_Depth_Range	Sampled_Date-Time	Matrix_Description	Polychlorinated Biphenyls														
					Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1
CRC Care Direct Contact HSL-A																			
NEPM 2013 EILs Res/Open Space Aged																			
NEPM 2013 Table 1A(1) HILs Res A Soil												1				6			
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																			
0-1m																			
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2 m																			
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil																			
BD1/270717	TP72	0-0.2	27/07/2017	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP72	TP72	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP72	TP72	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP73	TP73	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP74	TP74	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP75	TP75	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP75	TP75	0.9-1	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP76	TP76	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP77	TP77	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP77	TP77	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP78	TP78	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP79	TP79	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1
TP79	TP79	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table R1: Soil Results

					Organochlorine Pesticides														Organophosphorous Pesticides												Asbestos
					d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Parathion	Asbestos fibres
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
EQL					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
CRC Care Direct Contact HSL-A																															
NEPM 2013 EILs Res/Open Space Aged							180																								
NEPM 2013 Table 1A(1) HILs Res A Soil								240					10			6		300			160										
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay																															
0-1m																															
NEPM 2013 Table 1B(6) ESLs for Urban Res, Fine Soil 0-2 m																															
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Fine Soil																															
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																											
BD1/270717	TP72	0-0.2	27/07/2017	Filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP72	TP72	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP72	TP72	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP73	TP73	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP74	TP74	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP75	TP75	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP75	TP75	0.9-1	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP76	TP76	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP77	TP77	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP77	TP77	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP78	TP78	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP79	TP79	0-0.2	27/07/2017	Filling	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0
TP79	TP79	0.4-0.5	27/07/2017	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Table R2: Summary of Waste Classification

		Metals								TPH										BTEX					Halogenated Benzenes	PAH/Phenols																				Polychlorinated B			
	Moisture	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	C6-C10 less BTEX (F1)	C6-C10	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Hexachlorobenzene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	B(a)P Total Potency Equivalent	Benzo(b)&(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	PAHs (Sum of total)	Phenanthrene	Phenolics Total	Pyrene	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242
PQL		4	0.4	1	1	1	1	1	50	100	100	25	50	100	100	25	0.2	1	0.5	2	1	0.05	0.005			0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Unit		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EPA (2014) General Solid Waste (CT1)	-	100	20	-	-	100	4	40	-	-	-	-	-	650	10,000			-	-	10	600	288	1000		-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA (2014) General Solid Waste (SCC1, TCLP1)	-	500	100	-	-	1500	50	1050	-	-	-	-	-	650	10,000			-	-	18	1080	518	1800		-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA (2014) Restricted Solid Waste (CT2)	-	400	80	-	-	400	16	160	-	-	-	-	-	2600	40,000			-	-	40	2400	1152	4000		-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPA (2014) Restricted Solid Waste (SCC2, TCLP2)	-	2000	400	-	-	6000	200	4200	-	-	-	-	-	2600	40,000			-	-	72	4320	2073	7200		-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPC 1999		1-50	1	5-1000	2-100	2-200	0.03	5-500	10-300																																						
ANZECC 2000		0.2-30	0.04-2	0.5-110	1-190	<2-200	0.001-0.1	2-400	2-180											0.05-1		0.1-1																	0.95-5							

Field_ID	Sample_Depth_Range	Matrix Description	Sampled_Date-Time																																															
TP72	0-0.2	Filling	27/07/2017	14	11	<0.4	21	35	24	<0.1	9	93	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP72	0.4-0.5	Natural	27/07/2017	19	6	<0.4	17	12	17	<0.1	4	23	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	-	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	-	-	-	-
TP73	0-0.2	Filling	27/07/2017	15	11	<0.4	24	34	22	<0.1	10	100	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP74	0-0.2	Filling	27/07/2017	14	9	<0.4	23	29	23	<0.1	8	68	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP75	0-0.2	Filling	27/07/2017	14	11	<0.4	27	27	22	<0.1	8	71	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP75	0.9-1	Natural	27/07/2017	20	4	<0.4	14	26	18	<0.1	2	18	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	-	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	-	-	-	-
TP76	0-0.2	Filling	27/07/2017	12	11	<0.4	23	32	21	<0.1	8	87	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP77	0-0.2	Filling	27/07/2017	14	12	<0.4	21	39	23	<0.1	9	99	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP77	0.4-0.5	Natural	27/07/2017	18	9	<0.4	14	21	20	<0.1	2	18	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	-	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	-	-	-	-
TP78	0-0.2	Filling	27/07/2017	13	12	0.8	22	48	31	<0.1	11	190	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP79	0-0.2	Filling	27/07/2017	13	13	<0.4	20	34	22	<0.1	8	92	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	<0.1	<0.1	<0.1	<0.1
TP79	0.4-0.5	Natural	27/07/2017	18	12	<0.4	19	17	21	<0.1	3	21	<50	<100	<100	<50	<25	<50	<100	<100	<25	<25	<0.2	<1	<0.5	<2	<1	-	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<5	<0.1	-	-	-	-

NOTES: EPA (2014) - Waste Classification Guidelines - Part 1: Classification of Waste
ND - Not Detected
* Scheduled Chemicals; Note 11 to Table 1 of EPA (2014)
** Moderately harmful pesticides; Note 6 to Table 1 of EPA (2014)

Table R2: Summary of Waste Classification

	Biphenyls			Organochlorine Pesticides																					Organophosphorous Pesticides										Pesticides	Asbestos
	Arochlor 1248	Arochlor 1254	Arochlor 1260	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Ronnel	Parathion	
PQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
EPA (2014) General Solid Waste (CT1)	-	-	-	<50*												60					<50*			-	-	-	4	-	-	250**				-	-	ND
EPA (2014) General Solid Waste (SCC1, TCLP1)	-	-	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	7.5	-	-	-	-	-	-	-	-	ND
EPA (2014) Restricted Solid Waste (CT2)	-	-	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	ND
EPA (2014) Restricted Solid Waste (SCC2, TCLP2)	-	-	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	-	ND
NEPC 1999										none	none																									
ANZECC 2000										none	none																									

Field_ID	Sample_Depth_Range	Matrix Description	Sampled_Date-Time																																	
TP72	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP72	0.4-0.5	Natural	27/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP73	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP74	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP75	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP75	0.9-1	Natural	27/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP76	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP77	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP77	0.4-0.5	Natural	27/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP78	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP79	0-0.2	Filling	27/07/2017	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
TP79	0.4-0.5	Natural	27/07/2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES: EPA (2014) - Waste Classification Guidelines - Part 1: Classification of Waste
ND - Not Detected
* Scheduled Chemicals; Note 11 to Table 1 of EPA (2014)
** Moderately harmful pesticides; Note 6 to Table 1 of EPA (2014)

Attachment E

QA/QC Documentation

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

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

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

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

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S1 Introduction S10 Analysis and Discussion of Results S11 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S3 Site History S4 Conceptual Site Model S9 Fieldwork Results S10 Analysis and Discussion of Results
Define the Boundary of the Assessment	S3 Site History Drawings 1 and 2 – Attachment A
Develop a Decision Rule	S6 Assessment Criteria
Specify Acceptable Limits on Decision Errors	S5 and S10 Fieldwork and Analysis S6 Site Assessment Criteria QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S5 Fieldwork QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork and analysis procedures in Section 7 and the laboratory results certificates in Attachment C for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	5% primary samples	RPD <30% (inorganics), <50% (organics)	yes[1]

Notes: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics);	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics);	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics);	yes

Notes: 1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD
Mgt: <10xPQL – any RPD; 10-20xPQL – 0-50%RDP; >20xPQL – 0-30%RPD

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

Q2.1 Intra-Laboratory Replicates

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

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

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

Field Duplicates (SOIL)

Filter: SDG in('ENVIROLAB 2017-07-27T00:00:00')

SDG	ENVIROLAB 2017-07-27T00:00:00	ENVIROLAB 2017-07-27T00:00:00	
Field ID	TP72	BD1/270717	**RPD**
Sampled Date/Time	27/07/2017	27/07/2017	

ChemName	Units	EQL			
PAHs in Soil					
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	<0.5	<0.5	0
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5	<0.5	<0.5	0
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	<0.5	<0.5	0
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2	<0.2	0
Total +ve PAHs	mg/kg	0.05	<0.05	<0.05	0
Inorganics					
Moisture	%	0.1	14.0	14.0	0
Metals					
Arsenic	mg/kg	4	11.0	11.0	0
Cadmium	mg/kg	0.4	<0.4	<0.4	0
Chromium (III+VI)	mg/kg	1	21.0	22.0	5
Copper	mg/kg	1	35.0	30.0	15
Lead	mg/kg	1	24.0	22.0	9
Mercury	mg/kg	0.1	<0.1	<0.1	0
Nickel	mg/kg	1	9.0	8.0	12
Zinc	mg/kg	1	93.0	95.0	2
TPH					
C10-C16	mg/kg	50	<50.0	<50.0	0
C16-C34	mg/kg	100	<100.0	<100.0	0
C34-C40	mg/kg	100	<100.0	<100.0	0
F2-NAPHTHALENE	mg/kg	50	<50.0	<50.0	0
C6 - C9	mg/kg	25	<25.0	<25.0	0
C10 - C14	mg/kg	50	<50.0	<50.0	0
C15 - C28	mg/kg	100	<100.0	<100.0	0
C29-C36	mg/kg	100	<100.0	<100.0	0
C10 - C40 (Sum of total)	mg/kg	50	<50.0	<50.0	0
C6-C10 less BTEX (F1)	mg/kg	25	<25.0	<25.0	0
C6-C10	mg/kg	25	<25.0	<25.0	0
BTEX					
Benzene	mg/kg	0.2	<0.2	<0.2	0
Ethylbenzene	mg/kg	1	<1.0	<1.0	0
Toluene	mg/kg	0.5	<0.5	<0.5	0
Xylene (m & p)	mg/kg	2	<2.0	<2.0	0
Xylene (o)	mg/kg	1	<1.0	<1.0	0
Xylene Total	mg/kg	1	<1.0	<1.0	0
PAH/Phenols					
Acenaphthene	mg/kg	0.1	<0.1	<0.1	0
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	0

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

Field Duplicates (SOIL) Filter: SDG in('ENVIROLAB 2017-07-27T00:00:00')		**SDG**	ENVIROLAB 2017-07-27T00:00:00	ENVIROLAB 2017-07-27T00:00:00	
		Field ID	TP72	BD1/270717	**RPD**
		Sampled Date/Time	27/07/2017	27/07/2017	
ChemName	**Units**	**EQL**			
Anthracene	mg/kg	0.1	<0.1	<0.1	0
Benz(a)anthracene	mg/kg	0.1	<0.1	<0.1	0
Benzo(a)pyrene	mg/kg	0.05	<0.05	<0.05	0
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	0
Chrysene	mg/kg	0.1	<0.1	<0.1	0
Dibenz(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	0
Fluoranthene	mg/kg	0.1	<0.1	<0.1	0
Fluorene	mg/kg	0.1	<0.1	<0.1	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	0
Naphthalene	mg/kg	1	<1.0	<1.0	0
Naphthalene	mg/kg	0.1	<0.1	<0.1	0
Phenanthrene	mg/kg	0.1	<0.1	<0.1	0
Pyrene	mg/kg	0.1	<0.1	<0.1	0

* RPDs have only been considered where a concentration is greater than 1 times the EQL.
** High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 80 (1-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
*** Interlab Duplicates are matched on a per compound basis as methods vary between laboratories.
Any methods in the row header relate to those used in the primary laboratory

The calculated RPD values were within the range of ⟨|30 for inorganic analytes and ⟨|50% for organics.

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

Q3. Data Quality Indicators

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

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

The DQIs were assessed as outlined in the following Table Q5.

Table Q5: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

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