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Integrated Practical Solutions

Report on
Additional Contamination Investigation

Picton High School Redevelopment
Picton High School, Picton, NSW

Prepared for
Billard Leece Partnership Pty Ltd

Project 92254.00
February 2018

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Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	92254.00	Document No.	R.001 Rev0
Document title	Report on Additional Contamination Investigation Picton High School Redevelopment		
Site address	Picton High School, Picton, NSW		
Report prepared for	Billard Leece Partnership Pty Ltd		
File name	92254.00.R.001 Rev0		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Emily McGinty	J M Nash	12 February 2018

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Billard Leece Partnership Pty Ltd - Mr Shane Wood

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

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Report on Additional Contamination Investigation
Picton High School Redevelopment
Picton High School, Picton, NSW

1. Introduction

Douglas Partners Pty Ltd (DP) was engaged by Billard Leece Partnership Pty Ltd (BLP) on behalf of NSW Department of Education (DoE) to undertake an additional contamination investigation (CI) for the proposed redevelopment (upgrade) of Picton High School, located at 480 Argyle Street, Picton, NSW ('the site'). DP undertook previous investigations in 2010 and 2017 (see Section 4). Drawing 1 (Appendix A) shows the site layout including the extent of the site that will be subject to redevelopment.

DP understands that the proposed redevelopment at the site includes removal of demountable buildings and construction of new teaching blocks and associated facilities. DP further understands DoE require more information on the ground conditions from a contamination perspective across the site.

2. Scope of Works

DP carried out the following scope of works as part of the CI:

- Review of previous investigation including logs for boreholes carried out in the proximity of the proposed redevelopment;
- Using direct push soil coring (Geoprobe 7822DT and Miniprobe T038[1]), fourteen boreholes[2] were carried out across the site, outside of current structure footprint areas. Each borehole was completed 0.5 m into natural or prior refusal;
- Collection of soil samples from the surface or representative depths;
- Laboratory analysis of selected soil samples for the following contaminants of potential concern (COPC):
  - Heavy metals;
  - Total recoverable hydrocarbons (TRH);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Total phenols;
  - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and total xylenes - BTEX); and
  - Asbestos.

[1] Drilling method selected to allow access to spatially limited portions of the site.
[2] DP originally allowed for ten soil cores to be completed at the site, however owing to access restrictions it was necessary to engage the driller for an additional day. In agreement with BLP, DP conducted an additional four soil cores to observe soil conditions. Of the fourteen soil cores completed, ten were scheduled for analysis.

- Screening of laboratory results against current NSW EPA endorsed guidelines for a secondary school; and
- Preparation of this report.

3. Site Background

3.1 Site Identification and Description

The site is located at 480 Argyle Street, Picton and is identified as Lot 2 Deposited Plan 520158 within the local government area of Wollondilly Shire Council.

The site is roughly rectangular and comprises an area of approximately 5.8 hectares (ha), of which approximately 2.4 ha will be subject to the proposed redevelopment. The site location and boundaries are shown on Drawing 1, Appendix A.

The site improvements consist predominantly of single and multi-storey school buildings and associated classrooms. Multiple demountable single storey building/sheds are present at the northwest and the centre of the site. There is a car park area along the western-most part of the site, adjacent to Argyle Street. The eastern portion of the site includes a grassed playground area/open space, and asphalt basketball courts are located within the south-western portion of the site. There is partial tree cover along the northern and eastern site boundary as well as scattered trees throughout, mainly within the northern half of the site. Access roads around the buildings at the front of the site and parking area are mainly bitumen paved.

The site is bounded by residential land use to the north; Wonga Road to the east, beyond which is vacant rural land; rural / commercial land use to the south and Argyle Road to the west, beyond which is rural / residential land. Remondis Australia Pty Ltd, a recycling centre, is located to the south east of the site.

Overall topographic relief is approximately 8 m from the highest part (approximately RL218 m, relative to the Australian height datum - AHD) within the eastern and western portions of the site to the lowest part (approximately RL 210 m) within the mid northern portion of the site.

3.2 Geology, Hydrogeology and Hydrology

Reference to the Geological Survey of New South Wales (1985), *Wollongong-Port Hacking 1: 100 000 Geological Sheet 9029-9129* indicates the following:

- The majority of the site is underlain by Ashfield Shale (mapping unit Rwa) of the Triassic age. Ashfield Shale typically comprises dark grey to black shale, siltstone and laminite which weathers to a residual clay profile of medium to high plasticity; and
- A small area within the eastern portion of the site is underlain by Hawkesbury Sandstone (mapping unit Rh) of the Triassic period, which typically comprise medium to coarse grained quartz sandstone with minor shale and laminate lenses.

Reference to the Soil Conservation Service of NSW (1990) *Soil Landscapes of the Wollongong - Port Hacking 1:100,000 Sheet* indicates that the site is underlain by the Blacktown soil landscape (mapping unit bt), characterised by gently undulating rises on Wianamatta Group shales and Hawkesbury sandstone, with local relief to 30 m and slopes usually less than 5%. The landscape is typically represented by broad rounded crests and ridges with gently inclined slopes. Soils range from shallow (<1 m) red-brown podzolic soils - comprising mostly clayey soils on crests and upper slopes - to deep (1.5 - 3 m) yellow-brown clay soils on lower slopes and areas of poor drainage. These soils are typically moderately reactive with low fertility, poor soil drainage and highly plastic subsoil.

The site drains towards Redbank Creek located approximately 250 m north east of the site. Redbank Creek joins Stonequarry Creek, approximately 350 m to the east of the site. There is a small dam located approximately 350 m south of the site, and a larger dam further south. It is anticipated that local groundwater will flow in conjunction with the dominant local topography and surface water flow direction, i.e. towards the north east

4. Summary of Previous Investigations

DP has prepared the following reports of relevance to the current investigation:

- DP (2010) *Report on Phase 1 Contamination Assessment, Picton High School Proposed Metals Fabrication Trade School, Argyle Street, Picton.* Ref 34252.01 Rev 1 dated August 2010 ('the PCA'); and
- DP (2017) *Report on Preliminary Site Investigation with Limited Sampling, Proposed Picton High School Redevelopment, 480 Argyle Street, Picton, NSW,* Ref. 34252.02.R.002.Rev0, dated 11 April 2017 ('the PSI').

The scope of the PCA focused on the proposed Metals Fabrication Trade School at the site, which incorporates the south western portion of the current site. The scope of works comprised a review of site history information, a site walkover, limited soil sampling and laboratory testing. Field work was undertaken on 9 August 2010, which included completion of four test bores to depths ranging from 1.2 m to 1.9 m using a mini-excavator auger and sampling rig, with 110 mm spiral flight augers. Due to the presence of the fenced basketball court, a significant proportion of the site could not be accessed with the mini-excavator drilling rig.

A total of four samples were analysed for metals, petroleum hydrocarbons, monocyclic aromatic hydrocarbons, polycyclic aromatic hydrocarbons, phenols, polychlorinated biphenyls, organochlorine pesticides and asbestos. Concentrations of all contaminants analysed were below the adopted site assessment criteria (SAC). DP (2010) concluded that "the site was considered suitable for the proposed development, from a contamination standpoint, subject to the following:

- Should any visual or olfactory indicators of contamination (including asbestos) be identified during initial earthworks, DP should be contacted for assessment;
- Prior to the off-site disposal of any excavated surplus material, an appropriate material classification assessment must be conducted by a qualified environmental consultant in accordance with NSW EPA current Waste Classification Guidelines; and

- No soils are to be imported to the site without prior approval from DP. Any imported materials are to be accompanied by a validation certificate / report stating the suitability of materials for use on a secondary school site."

The metal fabrication building was subsequently constructed at the site in approximately 2009 / 2010.

The scope of the PSI focused on portion of the site that will be affected by the proposed redevelopment (i.e. the site). Key conclusions and recommendations as presented in the PSI are provided below:

- "A bonded asbestos-containing material (ACM) fragment was observed near the northern site boundary, which should be managed as per The NSW Department of Education (2015), *Asbestos Management Plan for NSW Government Schools*. Given the presence of ACM in structures at the site, DP recommends that the northern site boundary area and the balance of the site (including identified Potential Areas of Environmental Concern) are subject to a detailed site inspection after demolition of existing structures is completed[3];
- A hazardous material survey should be conducted on the site prior to demolition works and a clearance certificate should be issued by a licenced asbestos assessor once demolition is complete;
- All demolition waste should be disposed of at a suitably licenced waste facility;
- The areas under the demountable buildings could not be inspected during the PSI due to access constraints. Following removal of the demountable buildings, a detailed site walkover should be completed across the footprint areas (and undertake sampling as required) to determine if any fill material is present;
- The site is considered to have a generally low potential for contamination and is considered suitable, from an environmental perspective, for the proposed development with the exception of hazardous building materials (HBM) which may have impacted the site surface as a result of wear and tear of existing structure, previous onsite demolition activities and/or fill import. Any HBM and/or surface soils containing similar materials has the potential to be spread during the demolition process if not managed appropriately; and
- Notwithstanding the above, the potential remains for isolated pockets of contamination to be present in areas of the site. To appropriately manage unexpected potential contamination issues encountered during development works, DP recommends the development and implementation of an unexpected finds protocol prior to the commencement demolition and future construction works at the site."

DP understands that the design of the current proposed development is identical to the design at the time of the PSI.

5. Preliminary Conceptual Site Model

A review of potential sources, pathways and receptors associated with the proposed development was conducted as part of the PSI (DP, 2017) and a preliminary conceptual site model (CSM) was developed (see Table 1 below).

[3] The inspection should be completed with reference to NSW EPA endorsed guidelines: Western Australia Department of Health (DoH) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, May 2009

Table 2: Preliminary Conceptual Site Model

Source	Exposure Pathway	Receptor	Requirement for Additional Data and/or Management
S1: Building Demolition Materials; and S2: Fill	P1 – Ingestion and dermal contact; P2 – Inhalation of fibres and/or dust and/or vapours	R1 - Construction and maintenance workers. R2 – Current and Future site users	The demolition of existing structures containing hazardous materials at the site should be carried out by a suitably licensed demolition contractor. An unexpected finds protocol (UXF) should be developed should suspected contamination (including ACM) be observed during demolition and construction works. A limited (i.e. targeted) intrusive investigation is required to quantify and assess possible contamination including chemical testing of soil (and groundwater if deemed necessary).
	P2 – Inhalation of fibres and/or dust and/or vapours	R3 – Land users in adjacent areas.	

6. Field Investigation

6.1 Field Work Rationale

Field investigations were undertaken between 9 and 11 January 2018 by a DP environmental scientist. The field investigation was designed in accordance with the seven step data quality objective (DQO) process provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC, 2013). The DQO adopted for this PSI is provided in Appendix B.

Fourteen borehole (BH101 to BH114) were excavated to a minimum depth of 0.5 m into natural material across the site, outside of the current building footprints. Soil samples were generally collected from the surface (0 - 0.1 m) and at depth (0.4 - 0.8 m) or targeting fill layers and/or any change in the soil profile. The geological profile observed within each test bore was logged. The borehole logs are provided in Appendix C. The borehole locations are shown on Drawing 1, Appendix A.

6.2 Field Sampling Procedure

Sampling data was recorded to comply with routine chain-of-custody requirements and DP's standard operating procedures. The general sampling, handling, transport and tracking procedures are detailed below:

- Sample locations were pre-determined using global information system (GIS) prior to field work and were located in the field using a handheld Garmin global positioning system (GPS);
- Disposable nitrile gloves were used to collect all samples. Gloves were replaced prior to the collection of each sample in order to prevent cross-contamination;

- A Geoprobe 7822DT direct push rig was used to conduct the majority of boreholes with the exception of BH101 BH102, BH112 and BH113 which owing to access (available space) restrictions were conducted using Miniprobe T038. A disposable PVC core liner was used for each soil core / depth and the soil samples were obtained from the cut PVC liner;
- Samples collected for laboratory analysis were transferred into a new laboratory prepared glass jar, with minimal headspace, and sealed with a Teflon lined lid. Each jar was individually sealed to reduce the potential for cross contamination during transportation to the laboratory;
- Sample containers were labelled with individual and unique identification including project number, sample ID, depth and date of sampling; and
- Logs were completed for all test bores. Test bore logs included, where relevant, sample identification, coordinates, date of collection, a description of the substrate conditions encountered, visual or olfactory evidence of contamination, the depth of samples collected, QA/QC samples collected, the sampler and equipment used.

6.3 Analytical Rationale

Laboratory analysis of primary and intra-laboratory samples was conducted by Envirolab Services Pty Ltd (Envirolab). Envirolab is accredited by the National Association of Testing Authorities (NATA) and are required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include assessment of reagent blanks, spike recovery, surrogate recovery and laboratory duplicates.

Based on the field observations and the results of the PID screening, samples were selected for analysis of COPC. Not all samples collected were analysed. Additional soil samples were kept 'on hold' pending details of initial analysis so that they could be analysed if required. The rationale for sample selection for laboratory analysis is provided below:

- Samples collected from fill (where present) were analysed; and
- Where fill was not present, samples collected from the surface (0.0 - 0.1 m) were analysed.

Bore locations were positioned so as to target the extent of the proposed development as much as practicable.

7. Site Assessment Criteria

The SAC applied in this PSI have been informed by the CSM - which identified human receptors to potential contamination on the site (refer to Section 7). Analytical results were assessed (as a Tier 1 assessment) against the investigation and screening levels as per Schedule B1 of NEPC (2013).

Taking into account the current and proposed land use of the site (i.e. secondary school), the investigation and screening levels adopted in the first instance are consistent with a generic residential land use scenario with access to soils. If exceedances are observed, these shall be assessed individually in context of the associated compound and the applicable site use (secondary school). The derivation of the SAC is included in Appendix B and the adopted SAC are listed on the analytical results tables in Appendix D.

8. Results

8.1 Field Work Results

The borehole logs are included in Appendix C, together with notes defining classification methods and descriptive terms.

Relatively uniform conditions were encountered across most of the site, with filling observed in the majority of test pit locations. The general strata across the site is summarised as follows (in order):

- FILLING: Generally comprised silty clay with gravel and trace rootlets to typical depths of 0.2 - 0.85 m bgl, excluding BH 107 where filling was observed to the base of the hole (2 m +). Where surfacing was present, the surface of the filling comprised road base asphaltic concrete, concrete and/or brick at the surface. Trace anthropogenic material (plastic only) was visible in filling from BH 109 only;
- SILTY CLAY: Light / medium red / orange / brown silty clay mottled orange in places with gravels was observed in all locations excluding BH 104 at depths of 0.2 - 1.2 m + (i.e. base of hole);
- SILTSTONE: Low strength orange / brown / red siltstone was observed below silty clay in soils from BH 102, 103 and 106 only;
- SHALE: Low strength grey shale with some orange / brown colouration towards the top was observed in two locations (BH 101 and 102); and
- SANDSTONE: Low strength orange / grey sandstone was observed at the base of the hole in BH 104, 108 and 112.

8.2 Laboratory Results

The analytical results for the soil samples collected during this PSI are summarised in Appendix D, together with the adopted SAC. The laboratory certificates of analysis for this PSI are provided in Appendix E.

All analytical results were below the laboratory limit of reporting (LOR) and/or the corresponding human health and ecological criteria.

8.3 Quality Assurance and Quality Control

Owing to a communication error, field duplicates were not subject to analysis for compounds as scheduled for their corresponding primary sample. DP conducted a review of the laboratory analytical report and concluded that the reproducibility of the laboratory dataset was within acceptable limits. DP conducted sampling in accordance with the Douglas Partners *Field Procedures Manual*. As such, DP considers it unlikely that the omission of the analysis of field duplicated will impact on the quality of the dataset as a whole.

In summary, the sampling and laboratory methods used during the investigation were found to meet DQOs for this project.

9. Discussion

A total of fourteen test bores were completed across the site as part of the current investigation. Minor filling comprising silty clay and gravel with trace rootlets was encountered in all boreholes. No anthropogenic material was observed in the filling. Reported concentrations of contaminants of concern in the soil samples analysed were within the adopted SAC.

Based on the findings of this and previous investigations at the site, impacts to groundwater and soil vapour are considered to be unlikely.

9.1 Revised CSM

Based on the findings of the investigation, DP considers the likelihood of significant contamination at the site is low. As such, no significant pollutant linkages of relevance to the proposed development have been observed at the site.

10. Conclusions and Recommendations

Based on the findings of this investigation and the previous PSI, DP concludes that the potential for contamination constraints to the proposed development is low. As a AC fragment was observed near the northern site boundary during the PSI and ACM is known to be present in current structures at the site (refer to Section 4), DP recommends that the northern site boundary area and the balance of the site is subject to a detailed site inspection after demolition of existing structures is completed

A hazardous building materials survey should be conducted prior to demolition of the former sports centre. Demolition of structures containing hazardous building materials should be carried out by a licenced asbestos removal contractor. After removal of the former sports centre, an inspection of the footprint should be conducted by a suitably qualified environmental consultant, including targeted soil sampling and analysis to confirm the contamination status of the footprint. The environmental consultant should provide a 'clearance certificate' or similar once it is considered that the hazardous building materials have been satisfactorily removed.

As recommended in the PSI, once the demountable buildings have been removed, a detailed site walkover and targeted sampling (if deemed to be required) should be completed across the footprint areas.

10.1 Unexpected Finds

There is the potential that concealed, below ground structures (such as fuel tanks, septic tanks, filled gullies, ACM pipes and ACM fence footings) may be present at the site and accordingly this should be considered both prior to (planning) and during bulk earthworks for the proposed development. An Unexpected Finds Protocol will therefore need to be established prior to earthworks commencement and for implementation during redevelopment in order to deal with any unexpected soil contamination.

11. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report (or services) for this project at 480 Argyle Street, Picton in accordance with DP's proposal MAC170336 dated 6 October 2017 and acceptance received from Billard Leece Partnership Pty Ltd dated 24 November 2017. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

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

Appendix A

About This Report
Drawing 1

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

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

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Rock Strength

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

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

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

Rock Descriptions

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

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.

Symbols & Abbreviations

Douglas Partners

Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General

- Asphalt
- Road base
- Concrete
- Filling

Soils

- Topsoil
- Peat
- Clay
- Silty clay
- Sandy clay
- Gravelly clay
- Shaly clay
- Silt
- Clayey silt
- Sandy silt
- Sand
- Clayey sand
- Silty sand
- Gravel
- Sandy gravel
- Cobbles, boulders
- Talus

Sedimentary Rocks

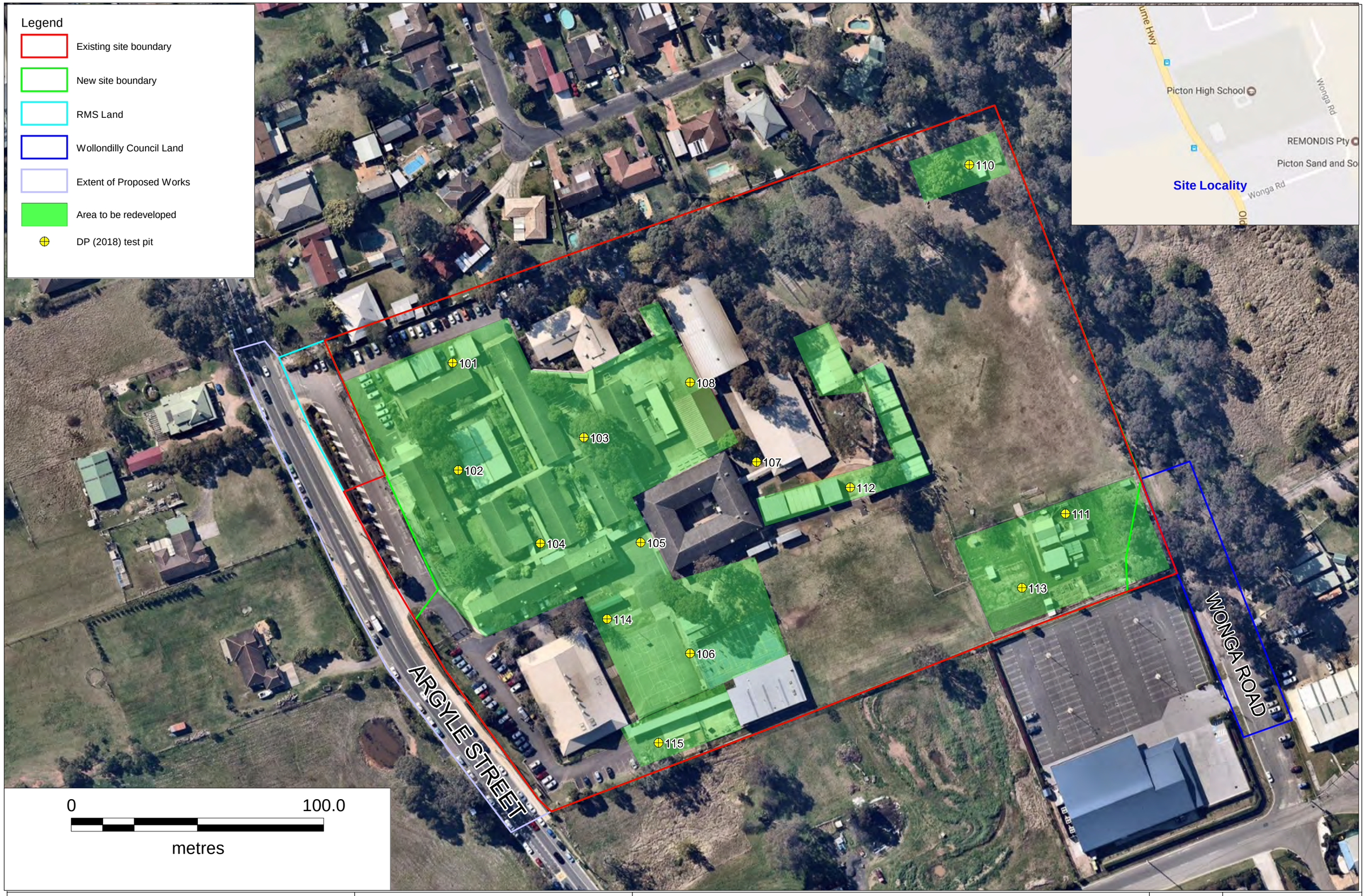
- Boulder conglomerate
- Conglomerate
- Conglomeratic sandstone
- Sandstone
- Siltstone
- Laminite
- Mudstone, claystone, shale
- Coal
- Limestone

Metamorphic Rocks

- Slate, phyllite, schist
- Gneiss
- Quartzite

Igneous Rocks

- Granite
- Dolerite, basalt, andesite
- Dacite, epidote
- Tuff, breccia
- Porphyry



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Geotechnics / Environment / Groundwater

CLIENT: Billard Leece Partnership Pty Ltd		TITLE: **Site Layout and Test Pit Locations**	PROJECT No: 92254.00
OFFICE: Macarthur	DRAWN BY: EMG	**Proposed Picton High School Redevelopment**	DRAWING No: 1
SCALE: As shown	DATE: 04.04.18	**480 Argyle Street, Picton, NSW**	REVISION: A

N
MGA

Appendix B

Data Quality Objectives

Appendix B - 1 Data Quality Objectives

The CI has been devised broadly in accordance with 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:

B1.1 State the Problem

Existing buildings at the site will be demolished and new buildings erected in their place – the site will continue to be used as a secondary school. The "problem" to be addressed is the extent and nature of potential contamination at the site which is unknown, and as such, it is unclear whether the site is suitable for the proposed redevelopment.

The objectives of the investigation are as follows:

- Undertake intrusive investigations of the site to assess and describe the nature and extent of contamination;
- Determine the suitability of the site for the proposed recreational land use; and
- Recommend further investigation where the investigation found the site to be unsuitable for the proposed land use.

B1.2 Identify the Decision / Goal of the Study

The suitability of the site for the proposed continued use as a secondary school was assessed based on a comparison of the analytical results for all COPC with the adopted site assessment criteria (SAC) as detailed in the report.

The site has an area of approximately 2.4 ha. Given the presence of buildings across much of the building footprint areas, DP has proposed to conduct contamination investigations in portions of the site located outside of the building footprints. DP initially proposed to conduct ten soil bores, however an additional four were conducted with extra drilling time available so to provide additional information on the ground conditions at the site. Of the 14 soil cores conducted, ten were subject to soil sampling and analysis.

The main COPC are expected to be total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals and asbestos. Other commonly found contaminants which may be present include phenols, organochlorine pesticides (OCP), organophosphate pesticides (OPP) and polychlorinated biphenyls (PCB).

The following specific decisions were considered as part of the PSI:

- Did field observation and analytical results identify potential contamination sources which were not included in the preliminary CSM?
- Were COPC present in soil at concentrations that pose a potential risk to identified receptors?
- Were COPC present in background areas of the site at concentrations that are above expected background ranges?

- Does concentration of COPC in soil present a risk to groundwater beneath the site?
- Is the data sufficient to make a decision regarding the abovementioned risks, the suitability of the site for the proposed development, or are additional investigations required?
- Does contamination at the site, if encountered, trigger the Duty to Report requirements under the CLM Act 1997?
- Are there any off-site migration issues that need to be considered?
- Is the data sufficient to enable the preparation of a Remediation Action Plan (RAP) and / or Environmental Management Plan (EMP) should the data suggest these are required?

B1.3 Identify Information Inputs

Inputs into the decisions are as follows:

- Review of regional geology, topography and hydrogeology information;
- Review of site history information;
- Completion of a site walkover;
- 14 soil cores were completed and select samples analysed for COPC;
- The lithology of the site as described in the test pit logs (Appendix C);
- Laboratory QA / QC data to assess the suitability of the environmental data for the PSI (Appendix F);
- All analysis was undertaken at a NATA accredited laboratory; and
- Laboratory reported concentrations of contaminants of concern were compared with the NEPC (2013) criteria as discussed in the main report.

B1.4 Define the Study Boundaries

The site is located at 480 Argyle Street, Picton and is identified as Lot 2 Deposited Plan 520158 within the local government area of Wollondilly Shire Council (refer Drawing 1, Appendix A). The site is roughly rectangular shaped and comprises an area of approximately 5.8 hectares (ha), of which approximately 2.4 ha shall be subject to the proposed redevelopment. The site consists predominately of single and multi-storey school buildings and associated classrooms. Multiple demountable single storey building/sheds are present at the northwest and the centre of the site. There is a car park area along the western-most part of the site, adjacent to Argyle Street. The eastern portion of the site includes a grassed playground area/open space, and asphalt basketball courts are located within the south-western portion of the site. There is partial tree cover along the northern and eastern site boundary as well as scattered trees throughout, mainly within the northern half of the site. Access roads around the buildings at the front of the site and parking area are mainly bitumen paved.

Field investigations were undertaken in January 2018 by a DP Environmental Engineer.

B1.5 Develop the Analytical Approach (or decision rule)

The information obtained during the assessment was used to characterise the site in terms of contamination issues and risk to human health and the environment. The decision rules used in characterising the site were as follows:

- The adopted SAC comprised NSW Environment Protection Authority (EPA) endorsed criteria; and
- The contaminant concentrations in soil were compared to the adopted SAC to determine whether further investigation or remedial action was required.

Field and laboratory test results were considered useable for the assessment after evaluation against the following data quality indicators (DQIs):

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

The specific limits are outlined in the data QA/QC procedures and results (Appendix F).

B1.6 Specify the Performance or Acceptable Criteria

Decision errors for the respective COPC for fill and natural soils are:

1. Deciding that fill and natural soil at the site exceeds the adopted SAC when they truly do not; and
2. Deciding that fill and natural soil at the site is within the adopted SAC when they truly are not.

Decision errors for the PSI were minimised and measured by the following:

- The sampling regime targeted each stratum identified to account for site variability;
- Sample collection and handling techniques were in accordance with DP's *Field Procedures Manual*;
- Samples were prepared and analysed by a NATA-accredited laboratory with the acceptance limits for laboratory QA/QC parameters based on the laboratory reported acceptance limits and those stated in NEPC (2013);
- The analyte selection is based on the available site history, past site activities and site features. The potential for contaminants other than those proposed to be analysed is considered to be low;
- The SAC were adopted from established and NSW EPA endorsed guidelines. The SAC have risk probabilities already incorporated; and
- A NATA accredited laboratory using NATA endorsed methods are used to perform laboratory analysis. Where NATA endorsed methods are not used, the reasons are stated. The effect of using non – NATA methods on the decision making process are explained.

B1.7 Optimise the design for obtaining data

Sampling design and procedures that were implemented to optimise data collection for achieving the DQOs included the following;

- A NATA accredited laboratory using NATA endorsed methods were used to perform laboratory analysis;
- Additional soil samples were collected but kept 'on hold' pending details of initial analysis so that they could be analysed if further delineation was required; and
- Adequately experienced environmental scientists/engineers were chosen to conduct field work and sample analysis interpretation.

Appendix C

Borehole Logs

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 215 mAHD
EASTING: 279503
NORTHING: 6213733
DIP/AZIMUTH: 90°/--

BORE No: 101
PROJECT No: 92254.00
DATE: 11/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
215		FILLING - dark brown silty clay with rootlets and grey roadbase gravel		C	0.0 0.1				
	0.25	SILTY CLAY - stiff, light brown silty clay with a trace of gravel, ironstone gravel and rootlets, MC<PL		C	0.4 0.5				
	0.6	SILTY CLAY - very stiff, red brown mottled grey silty clay, MC<PL							
	0.85	SHALE - low strength, highly weathered, orange brown shale - becoming grey below 1.0m							
214	1								1
	1.1	Bore discontinued at 1.1m - limit of investigation							
213	2								2
212	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 216 mAHD
EASTING: 279506
NORTHING: 6213691
DIP/AZIMUTH: 90°/--

BORE No: 102
PROJECT No: 92254.00
DATE: 11/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
216		ASPHALTIC CONCRETE - dark grey gravel							
	0.25	FILLING - brown silty clay with small grey gravel		C	0.4 0.5				
	0.6	SILTY CLAY - stiff, red brown silty clay with very low strength, red brown siltstone/shale - becoming yellow brown below 0.65m		C	0.6 0.7				
	0.7	SILTSTONE - very low to low strength, moderately weathered, orange siltstone							
215	0.95 1	SHALE - very low strength, highly weathered, orange and grey shale - becoming grey below 1.0m							1
	1.2	Bore discontinued at 1.2m - limit of investigation							
214	2								2
213	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 214 mAHD
EASTING: 279555
NORTHING: 6213704
DIP/AZIMUTH: 90°/--

BORE No: 103
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
214	0.03	PAVERS - brick (paved area)		C	0.0				
	0.1	ROADBASE			0.1				
		FILLING - dark brown gravelly silty clay		C	0.2				
	0.3	SILTY CLAY - stiff, orange brown silty clay with gravel, MC<PL			0.3				
	0.5	SILTSTONE - extremely low strength, extremely weathered, red siltstone							
	0.75	SILTSTONE - low strength, highly weathered, yellow and grey siltstone							
213	1								1
	1.1	Bore discontinued at 1.1m - limit of investigation							
212	2								2
211	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 212 mAHD
EASTING: 279597
NORTHING: 6213726
DIP/AZIMUTH: 90°/--

BORE No: 104
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
212		ASPHALTIC CONCRETE							
	0.1	FILLING - dark brown silty clay with orange sandstone gravel and some sand		C	0.1 0.2				
		- with increasing sandstone below 0.4m							
	0.65	SANDSTONE - low strength, moderately weathered, orange and grey sandstone with siltstone band							
211	1								1
	1.2	Bore discontinued at 1.2m - limit of investigation							
210	2								2
209	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 216 mAHD
EASTING: 279538
NORTHING: 6213662
DIP/AZIMUTH: 90°/--

BORE No: 105
PROJECT No: 92254.00
DATE: 11/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
216		FILLING - dark brown silty clay with gravel and a trace of rootlets		C	0.0 0.1				
		- with orange sandstone below 0.3m		C	0.4 0.5				
		- with shale gravel below 0.55m							
	0.85	SILTY CLAY - stiff, orange mottled grey silty clay, MC<PL							
215	1								1
	1.2	Bore discontinued at 1.2m - limit of investigation							
214	2								2
213	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 214 mAHD
EASTING: 279578
NORTHING: 6213662
DIP/AZIMUTH: 90°/--

BORE No: 106
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
214	0.08	ASPHALTIC CONCRETE		C	0.0				
	0.2	ROADBASE - dark grey gravel with some sand and gravelly clay			0.1				
		SILTY CLAY - very stiff, red brown silty clay with a trace of ironstone gravel, MC<PL							
				C	0.4				
					0.5				
		- becoming orange mottled grey below 0.7m							
	0.95								
213	1	SILTSTONE - low strength, highly weathered, orange brown siltstone							1
	1.1	Bore discontinued at 1.1m - limit of investigation							
212	2								2
211	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 213 mAHD
EASTING: 279623
NORTHING: 6213694
DIP/AZIMUTH: 90°/--

BORE No: 107
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
213		CONCRETE		C	0.0 0.1				
	0.2	FILLING - orange brown gravelly sandy silty clay		C	0.4 0.5				
212	1 1.0	FILLING - brown, orange and grey silty clay							1
	1.1	FILLING - orange brown sand							
	1.2	FILLING - grey sand and grey gravel							
211	2 2.0	Bore discontinued at 2.0m - refusal on possible sandstone							2
210	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 214 mAHD
EASTING: 279660
NORTHING: 6213684
DIP/AZIMUTH: 90°/--

BORE No: 108
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
214		FILLING - brown sandy silty clay with rootlets and gravel		D*	0.0 0.1				
	0.4	SILTY CLAY - stiff, brown gravelly silty clay with sandstone/siltstone gravel, MC<PL		C	0.4 0.5				
	0.6	SANDSTONE - low strength, moderately weathered, orange brown sandstone							
213	1	- becoming grey below 1.0m							1
	1.2	Bore discontinued at 1.2m - limit of investigation							
212	2								2
211	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. * Duplicate sample BD1/110118 collected; All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 216 mAHD
EASTING: 279564
NORTHING: 6213632
DIP/AZIMUTH: 90°/--

BORE No: 109
PROJECT No: 92254.00
DATE: 11/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
216		FILLING - dark brown silty clay with some sand and a trace of rootlets, gravel and plastic		C	0.0 0.1				
	0.2	FILLING - brown slightly gravelly silty clay with a trace of rootlets - becoming orange brown mottled grey below 0.3m		C	0.4 0.5				
	0.7	SILTY CLAY - stiff, grey brown silty clay with ironstone gravel, MC<PL - becoming orange mottled grey below 0.85							
215	1								1
	1.2	Bore discontinued at 1.2m - limit of investigation							
214	2								2
213	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 215 mAHD
EASTING: 279597
NORTHING: 6213619
DIP/AZIMUTH: 90°/--

BORE No: 110
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
215		FILLING - brown gravelly silty clay with dark grey shale gravel and rootlets		C	0.0 0.1				
	0.25	SILTY CLAY - hard, brown and orange silty clay with ironstone gravel, MC<PL		C	0.4 0.5				
		- becoming light brown below 0.75m							
214	1								1
	1.1	Bore discontinued at 1.1m - limit of investigation							
213	2								2
212	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 216 mAHD
EASTING: 279585
NORTHING: 6213583
DIP/AZIMUTH: 90°/--

BORE No: 111
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
216	0.07	ASPHALTIC CONCRETE		C	0.0				
		ROADBASE - grey silty gravel			0.1				
	0.3	FILLING - light brown gravelly sand with sandstone gravel							
				C	0.4				
	0.5	SILTY CLAY - hard, red mottled brown silty clay, MC<PL		C	0.5				
					0.6				
		- becoming red mottled grey below 0.9m							
215	1								1
	1.1	Bore discontinued at 1.1m - limit of investigation							
214	2								2
213	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 216 mAHD
EASTING: 279707
NORTHING: 6213812
DIP/AZIMUTH: 90°/--

BORE No: 112
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
216		FILLING - dark brown clayey silt with some gravel and a trace of rootlets		D*	0.0 0.1				
	0.2	FILLING - light brown gravelly clayey silt with siltstone and sandstone gravel			0.4				
	0.45	GRAVELLY SILT - orange brown gravelly silt with sandstone gravel (possible filling)		C	0.5				
	0.7	SANDSTONE - low strength, moderately weathered, orange and grey sandstone - becoming more orange below 0.8m							
215	1								1
	1.1	Bore discontinued at 1.1m - limit of investigation							
214	2								2
213	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. * Duplicate sample BD2/110118 collected; All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 217 mAHD
EASTING: 279745
NORTHING: 6213674
DIP/AZIMUTH: 90°/--

BORE No: 113
PROJECT No: 92254.00
DATE: 10/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
217		FILLING - brown silty clay with gravel and rootlets, moist		C	0.0 0.1				
	0.4	SILTY CLAY - very stiff, orange brown silty clay with very low strength shale gravel and a trace of rootlets, MC~PL		C	0.4 0.5				
216	1								1
	1.1	- with increasing siltstone below 1.0m Bore discontinued at 1.1m - limit of investigation							
215	2								2
214	3								3

RIG: Miniprobe T038 direct push **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Billard Leece Partnership Pty Ltd
PROJECT: Additional Contamination Investigation
LOCATION: Picton High School
480 Argyle Street, Picton, NSW

SURFACE LEVEL: 217 mAHD
EASTING: 279728
NORTHING: 6213644
DIP/AZIMUTH: 90°/--

BORE No: 114
PROJECT No: 92254.00
DATE: 11/1/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
217		FILLING - dark brown silty clay with some sand and a trace of rootlets and gravel		C	0.0 0.1				
	0.25	SILTY CLAY - hard, red brown silty clay with ironstone gravel, MC<PL - with black staining at 0.45m - becoming orange brown with shale gravel below 0.55m		C	0.4 0.5				
216	1	- with increasing siltstone below 1.0m							1
	1.2	Bore discontinued at 1.2m - limit of investigation							
215	2								2
214	3								3

RIG: Geoprobe **DRILLER:** **LOGGED:** CLN **CASING:**

TYPE OF BORING: 50mm diameter direct push

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. All strengths based on tactile assessment

SAMPLING & IN SITU TESTING LEGEND

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

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Appendix D

Summary Tables 1 and 2

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Table 1: Summary of Laboratory Results – Metals, TRH, BTEX

			Metals								TRH						BTEX			
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Ethylbenzene	Toluene	Total Xylenes
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Depth	Sampled date																		
BD1 100118	0m	10/01/2018	NT	NT	NT	NT	NT	NT	NT	NT	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			- -	- -	- -	- -	- -	- -	- -	- -	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH101	0 - 0.1m	11/01/2018	**6**	<0.4	**22**	**20**	**28**	<0.1	**16**	**96**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH102	0.4 - 0.5m	11/01/2018	**12**	<0.4	**23**	**18**	**22**	<0.1	**9**	**18**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH103	0.2 - 0.3m	10/01/2018	**10**	<0.4	**18**	**17**	**16**	<0.1	**6**	**18**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH104	0.4 - 0.5m	10/01/2018	**8**	<0.4	**22**	**10**	**16**	<0.1	**8**	**21**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH105	0 - 0.1m	11/01/2018	**5**	<0.4	**21**	**25**	**27**	**0.1**	**14**	**57**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH107	0.4 - 0.5m	10/01/2018	**6**	<0.4	**19**	**68**	**35**	**4.8**	**9**	**91**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH108	0 - 0.1m	10/01/2018	**7**	<0.4	**20**	**14**	**19**	<0.1	**9**	**37**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH109	0.4 - 0.5m	11/01/2017	**7**	<0.4	**21**	**27**	**28**	<0.1	**17**	**46**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH111	0.4 - 0.5m	10/01/2018	<4	<0.4	**8**	**10**	**11**	<0.1	**4**	**21**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH113	0 - 0.1m	10/01/2018	**9**	<0.4	**28**	**16**	**25**	<0.1	**13**	**77**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45
BH115	0 - 0.1m	11/01/2018	<4	<0.4	**8**	**8**	**14**	<0.1	**6**	**34**	<25	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<2
			100 100	20 NC	100 410	6000 220	300 1100	40 NC	400 200	7400 560	NC NC	NC NC	40 180	230 120	NC 1300	NC 5600	0.6 65	NL 125	390 105	95 45

HIL / HSL exceedance
EIL / ESL exceedance
ML exceedance
NT Not tested
NL Not limited
HIL/HSL and EIL/ESL exceedance
ML and HIL/HSL/EIL/ESL exceedance
NC No criteria

Key: Lab result (HIL/HSL value | EIL/ESL value)

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Table 2: Summary of Laboratory Results – PAH, Phenol, OCP, OPP, PCB

			PAH				Phenol	OCP								OPP	PCB
			Naphthalene	Benzo(a)pyrene (BaP)	Total PAHs	Benzo(a)pyrene TEQ	Phenol	Endrin	HCB	Heptachlor	Methoxychlor	DDT+DDE+DDD	Aldrin & Dieldrin	Chlordane	Total Endosulfan	Chlorpyriphos	Total PCB
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Depth	Sampled date															
BD1 100118	0m	10/01/2018	<1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			4 170	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH101	0 - 0.1m	11/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH102	0.4 - 0.5m	11/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH103	0.2 - 0.3m	10/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH104	0.4 - 0.5m	10/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH105	0 - 0.1m	11/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH107	0.4 - 0.5m	10/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH109	0.4 - 0.5m	11/01/2017	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH111	0.4 - 0.5m	10/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH113	0 - 0.1m	10/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC
BH115	0 - 0.1m	11/01/2018	<1	<0.05	<0.05	<0.5	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			4 170	NC 0.7	300 NC	3 NC	100 NC	10 NC	10 NC	6 NC	300 NC	240 180	6 NC	50 NC	270 NC	160 NC	1 NC

HIL / HSL exceedance
EIL / ESL exceedance
ML exceedance
NT Not tested
NL Not limited
HIL/HSL and EIL/ESL exceedance
ML and HIL/HSL/EIL/ESL exceedance
NC No criteria

Key: Lab result (HIL/HSL value | EIL/ESL value)

Table A1: Derivation Table

Sample Id	Applied depth	Soil Type	Soil Texture	Clay Content	CEC	pH
BD1 100118	0m	Silt	Fine	10.00	12.60	6.70
BH101	0m	Silt	Fine	10.00	12.60	6.70
BH102	0.4m	Silt	Fine	10.00	12.60	6.70
BH103	0.2m	Silt	Fine	10.00	12.60	6.70
BH104	0.4m	Silt	Fine	10.00	12.60	6.70
BH105	0m	Silt	Fine	10.00	12.60	6.70
BH107	0.4m	Silt	Fine	10.00	12.60	6.70
BH108	0m	Silt	Fine	10.00	12.60	6.70
BH109	0.4m	Silt	Fine	10.00	12.60	6.70
BH111	0.4m	Silt	Fine	10.00	12.60	6.70
BH113	0m	Silt	Fine	10.00	12.60	6.70
BH115	0m	Silt	Fine	10.00	12.60	6.70

Appendix E

Laboratory Analytical Reports

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 183240

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	accounts email, Chamali Nagodavithane
Address	18 Waler Crescent, Smeaton Grange, NSW, 2567

Sample Details

Your Reference	**92254.00, Additional Contamination Investigation**
Number of Samples	21 Soil
Date samples received	12/01/2018
Date completed instructions received	12/01/2018

Analysis Details

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

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

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

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	19/01/2018
Date of Issue	19/01/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
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Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Lulu Scott, Asbestos Supervisor
Nick Sarlamis, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	16/01/2018	16/01/2018	16/01/2018	16/01/2018	18/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	94	90	98	95	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		183240-7	183240-11	183240-13	183240-15	183240-17
Your Reference	UNITS	BH107	BH111	BH113	BD1 100118	BH115
Depth		0.4-0.5	0.4-0.5	0-0.1	-	0-0.1
Date Sampled		10/01/2018	10/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	18/01/2018	16/01/2018	16/01/2018	16/01/2018	18/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	90	100	84	95	93

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		183240-19	183240-20	183240-21
Your Reference	UNITS	BH109	TB	TS
Depth		0.4-0.5	-	-
Date Sampled		11/01/2017	11/01/2017	11/01/2017
Type of sample		Soil	Soil	Soil
Date extracted	-	17/01/2018	17/01/2018	17/01/2018
Date analysed	-	18/01/2018	18/01/2018	18/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	88%
Toluene	mg/kg	<0.5	<0.5	83%
Ethylbenzene	mg/kg	<1	<1	78%
m+p-xylene	mg/kg	<2	<2	79%
o-Xylene	mg/kg	<1	<1	79%
naphthalene	mg/kg	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	97	100	77

svTRH (C10-C40) in Soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	18/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	84	82	83	86	87

svTRH (C10-C40) in Soil						
Our Reference		183240-7	183240-11	183240-13	183240-15	183240-17
Your Reference	UNITS	BH107	BH111	BH113	BD1 100118	BH115
Depth		0.4-0.5	0.4-0.5	0-0.1	-	0-0.1
Date Sampled		10/01/2018	10/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	18/01/2018	16/01/2018	16/01/2018	16/01/2018	18/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	87	82	81	78	87

svTRH (C10-C40) in Soil		
Our Reference		183240-19
Your Reference	UNITS	BH109
Depth		0.4-0.5
Date Sampled		11/01/2017
Type of sample		Soil
Date extracted	-	17/01/2018
Date analysed	-	18/01/2018
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	88

PAHs in Soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	18/01/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	95	89	92	94	88

PAHs in Soil						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
Date analysed	-	18/01/2018	15/01/2018	15/01/2018	18/01/2018	18/01/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	88	92	95	84	88

Organochlorine Pesticides in soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
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	%	80	89	96	91	92

Organochlorine Pesticides in soil						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
Date analysed	-	17/01/2018	17/01/2018	17/01/2018	17/01/2018	17/01/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	91	89	95	96

Organophosphorus Pesticides						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
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	%	80	89	96	91	92

Organophosphorus Pesticides						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
Date analysed	-	17/01/2018	17/01/2018	17/01/2018	17/01/2018	17/01/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	91	89	95	96

PCBs in Soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
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	%	80	89	96	91	92

PCBs in Soil						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/01/2018	15/01/2018	15/01/2018	17/01/2018	17/01/2018
Date analysed	-	17/01/2018	17/01/2018	17/01/2018	17/01/2018	17/01/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	94	91	89	95	96

Acid Extractable metals in soil						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Arsenic	mg/kg	6	12	10	8	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	22	23	18	22	21
Copper	mg/kg	20	18	17	10	25
Lead	mg/kg	28	22	16	16	27
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	16	9	6	8	14
Zinc	mg/kg	96	18	18	21	57

Acid Extractable metals in soil						
Our Reference		183240-7	183240-8	183240-11	183240-13	183240-17
Your Reference	UNITS	BH107	BH108	BH111	BH113	BH115
Depth		0.4-0.5	0-0.1	0.4-0.5	0-0.1	0-0.1
Date Sampled		10/01/2018	10/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	17/01/2018	15/01/2018	15/01/2018	15/01/2018	17/01/2018
Arsenic	mg/kg	6	7	<4	9	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	20	8	28	8
Copper	mg/kg	68	14	10	16	8
Lead	mg/kg	35	19	11	25	14
Mercury	mg/kg	4.8	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	9	4	13	6
Zinc	mg/kg	91	37	21	77	34

Acid Extractable metals in soil			
Our Reference		183240-19	183240-22
Your Reference	UNITS	BH109	BH107 - [TRIPLICATE]
Depth		0.4-0.5	0.4-0.5
Date Sampled		11/01/2017	10/01/2018
Type of sample		Soil	Soil
Date prepared	-	15/01/2018	15/01/2018
Date analysed	-	17/01/2018	17/01/2018
Arsenic	mg/kg	7	7
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	21	20
Copper	mg/kg	27	58
Lead	mg/kg	28	33
Mercury	mg/kg	<0.1	4.7
Nickel	mg/kg	17	8
Zinc	mg/kg	46	72

Misc Soil - Inorg						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	16/01/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	16/01/2018	15/01/2018	15/01/2018	16/01/2018	15/01/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Moisture						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	16/01/2018	16/01/2018	16/01/2018	16/01/2018	16/01/2018
Moisture	%	7.4	12	12	15	14

Moisture						
Our Reference		183240-7	183240-8	183240-11	183240-13	183240-15
Your Reference	UNITS	BH107	BH108	BH111	BH113	BD1 100118
Depth		0.4-0.5	0-0.1	0.4-0.5	0-0.1	-
Date Sampled		10/01/2018	10/01/2018	10/01/2018	10/01/2018	10/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/01/2018	15/01/2018	15/01/2018	15/01/2018	15/01/2018
Date analysed	-	16/01/2018	16/01/2018	16/01/2018	16/01/2018	16/01/2018
Moisture	%	14	12	2.4	18	11

Moisture			
Our Reference		183240-17	183240-19
Your Reference	UNITS	BH115	BH109
Depth		0-0.1	0.4-0.5
Date Sampled		11/01/2018	11/01/2017
Type of sample		Soil	Soil
Date prepared	-	15/01/2018	15/01/2018
Date analysed	-	16/01/2018	16/01/2018
Moisture	%	13	12

Asbestos ID - soils						
Our Reference		183240-1	183240-2	183240-3	183240-4	183240-5
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.1	0.4-0.5	0.2-0.3	0.4-0.5	0-0.1
Date Sampled		11/01/2018	11/01/2018	10/01/2018	10/01/2018	11/01/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	19/01/2018	19/01/2018	19/01/2018	19/01/2018	19/01/2018
Sample mass tested	g	Approx. 50g	Approx. 45g	Approx. 50g	Approx. 25g	Approx. 25g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown coarse-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		183240-7	183240-11	183240-13	183240-17	183240-19
Your Reference	UNITS	BH107	BH111	BH113	BH115	BH109
Depth		0.4-0.5	0.4-0.5	0-0.1	0-0.1	0.4-0.5
Date Sampled		10/01/2018	10/01/2018	10/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	19/01/2018	19/01/2018	19/01/2018	19/01/2018	19/01/2018
Sample mass tested	g	Approx. 30g	Approx. 50g	Approx. 30g	Approx. 35g	Approx. 40g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Misc Inorg - Soil				
Our Reference		183240-1	183240-5	183240-19
Your Reference	UNITS	BH101	BH105	BH109
Depth		0-0.1	0-0.1	0.4-0.5
Date Sampled		11/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	16/01/2018	16/01/2018	16/01/2018
Date analysed	-	16/01/2018	16/01/2018	16/01/2018
pH 1:5 soil:water	pH Units	7.6	5.9	6.2

CEC				
Our Reference		183240-1	183240-5	183240-19
Your Reference	UNITS	BH101	BH105	BH109
Depth		0-0.1	0-0.1	0.4-0.5
Date Sampled		11/01/2018	11/01/2018	11/01/2017
Type of sample		Soil	Soil	Soil
Date prepared	-	16/01/2018	17/01/2018	17/01/2018
Date analysed	-	16/01/2018	18/01/2018	18/01/2018
Exchangeable Ca	meq/100g	13	6.0	6.7
Exchangeable K	meq/100g	0.8	0.6	0.2
Exchangeable Mg	meq/100g	4.6	2.3	4.0
Exchangeable Na	meq/100g	<0.1	<0.1	0.17
Cation Exchange Capacity	meq/100g	18	9.0	11

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			18/01/2018	1	16/01/2018	16/01/2018		16/01/2018	16/01/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	98	100
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	98	100
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	95	92
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	95	92
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	98	103
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	102	107
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	99	103
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	93	1	94	94	0	100	96

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]	5	17/01/2018	17/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	18/01/2018	18/01/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	5	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	5	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	5	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	5	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	5	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	5	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	5	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	5	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	5	96	92	4	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			17/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			17/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	106	109
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	104	98
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	109
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	106	109
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	104	98
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	108	109
Surrogate o-Terphenyl	%		Org-003	91	1	84	85	1	91	82

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	18/01/2018	18/01/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	5	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	5	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	5	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	5	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	5	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	5	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	5	87	87	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			17/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			18/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	85	75
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	88	81
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	91	78
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	83	69
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	84
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	86	81
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	79	72
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	87	1	95	92	3	113	103

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	72	75
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	89	86
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	82
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	84	81
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	83
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	90	87
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	87	84
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	83	81
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	91
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	75	89
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	93	1	80	88	10	109	107

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	5	92	94	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	80	81
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	88	86
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	90	102
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	87	89
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	73	66
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	92	90
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	89	89
Surrogate TCMX	%		Org-008	93	1	80	88	10	90	87

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	5	92	94	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date extracted	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	103	101
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	93	1	80	88	10	90	87

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	5	92	94	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date prepared	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Arsenic	mg/kg	4	Metals-020	<4	1	6	6	0	104	93
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	99	93
Chromium	mg/kg	1	Metals-020	<1	1	22	24	9	102	101
Copper	mg/kg	1	Metals-020	<1	1	20	21	5	100	102
Lead	mg/kg	1	Metals-020	<1	1	28	29	4	97	87
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	114	112
Nickel	mg/kg	1	Metals-020	<1	1	16	18	12	96	90
Zinc	mg/kg	1	Metals-020	<1	1	96	96	0	99	93

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	5	15/01/2018	15/01/2018		[NT]	[NT]
Date analysed	-			[NT]	5	17/01/2018	17/01/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	5	5	5	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	5	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	5	21	23	9	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	5	25	22	13	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	5	27	23	16	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	5	0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	5	14	11	24	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	5	57	50	13	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	7	15/01/2018	15/01/2018		[NT]	[NT]
Date analysed	-			[NT]	7	17/01/2018	17/01/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	7	6	6	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	7	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	7	19	21	10	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	7	68	43	45	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	7	35	24	37	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	7	4.8	3.0	46	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	7	9	15	50	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	7	91	56	48	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	183240-2
Date prepared	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Date analysed	-			15/01/2018	1	15/01/2018	15/01/2018		15/01/2018	15/01/2018
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	103	96

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			18/01/2018	1	16/01/2018	16/01/2018		18/01/2018	[NT]
Date analysed	-			18/01/2018	1	16/01/2018	16/01/2018		18/01/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	7.6	7.1	7	102	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			16/01/2018	[NT]	[NT]	[NT]	[NT]	16/01/2018	[NT]
Date analysed	-			16/01/2018	[NT]	[NT]	[NT]	[NT]	16/01/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	17/01/2018	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	18/01/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	[NT]	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	[NT]	[NT]	[NT]	[NT]	[NT]	95	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: 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 183240-1 to 5, 7, 11, 13, 17, 19 were sub-sampled from jars provided by the client.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 183240-7 for Ni. Therefore a triplicate result has been issued as laboratory sample number 183240-22.

Douglas Partners
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CHAIN OF CUSTODY

Project Name:	Additional Contamination Investigation			**To:**	Envirolab Services
Project No:	92254.00	**Sampler:**	CLN		12 Ashley Street, Chatswood NSW 2067
Project Mgr:	EMG	**Mob. Phone:**	0419 781 366	**Attn:**	Tania Notaras
Email:	chamali.nagodavithane@douglaspartners.com.au			**Phone:**	(02) 9910 6200 **Fax:** (02) 9910 6201
Date Required:	Standard			**Email:**	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: 8 Heavy Metals	OCP/OPP	PCB	TRH	PAH	BTEX	Phenols	Asbestos (50 g)	pH, CEC		Notes/preservation
BH101 / 0 - 0.1	1	11.01.17	S	G	X	X		X	X	X	X	X	X		183240
BH102/ 0.4 - 0.5	2	11.01.17	S	G	X	X		X	X	X	X	X			Revised
BH103/0.2 - 0.3	3	10.01.17	S	G	X	X		X	X	X	X	X			
~~BH104/0.1 - 0.2~~		10.01.17	S	G	HOLD										
BH104/0.4 - 0.5	4	10.01.17	S	G	X	X		X	X	X	X	X			
BH105 / 0 - 0.1	5	11.01.17	S		X	X		X	X	X	X	X	X		Please sub-sample for asbestos from jar sample
BH106 / 0 .4 - 0.5	6	10.01.17	S	G	HOLD										
BH107 / 0.4 - 0.5	7	10.01.17	S	G	X	X		X	X	X	X	X			
BH108 / 0 - 0.1	8	10.01.17	S	G	X										Combo 8A for all except BH108
BH109 / 0 - 0.1	9	11.01.17	S	G	HOLD										
BH109 / 0.4 - 0.5	10	11.01.17	S	G	X	X		X	X	X	X	X	X		
BH110 / 0 - 0.1	10	10.01.17	S	G	HOLD										
BH111 / 0.4 - 0.5	11	10.01.17	S	G	X	X		X	X	X	X	X			
BH112 / 0 - 0.1	12	10.01.17	S	G	HOLD										
BH113 / 0 - 0.1	13	10.01.17	S	G	X	X		X	X	X	X	X			

Lab Report No:					
Send Results to:	Douglas Partners Pty Ltd	**Address** 18 Waler Crescent, Smeaton Grange 2567		**Phone:**	**Fax:** (02) 4646 1886

Douglas Partners
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CHAIN OF CUSTODY

Project Name:	Additional Contamination Investigation			**To:**	Envirolab Services
Project No:	92254.00	**Sampler:**	CLN		12 Ashley Street, Chatswood NSW 2067
Project Mgr:	EMG	**Mob. Phone:**	0419 781 366	**Attn:**	Tania Notaras
Email:	chamali.nagodavithane@douglaspartners.com.au			**Phone:**	(02) 9910 6200 **Fax:** (02) 9910 6201
Date Required:	Standard			**Email:**	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: 8 Heavy Metals	OCP/OPP	PCB	TRH	PAH	BTEX	Phenols	Asbestos (50 g)	pH, CEC		Notes/preservation
BH114 / 0 - 0.1	14	11.01.17	S	G											HOLD
BH115/0-0.1	17	11.01.17	S	G	X	X		X	X	X	X	X			Labelled as sample 12A
TB	20							X		X					
TS	21									X					
BD1 100117	15	10.01.17						X		X					
BD2 110117	16	11.01.17													HOLD

Lab Report No:					
Send Results to:	Douglas Partners Pty Ltd	**Address** 18 Waler Crescent, Smeaton Grange 2567		**Phone:** (02) 4647 0075	**Fax:** (02) 4646 1886
Relinquished by:	CLN		**Transported to laboratory by:**		
Signed:		**Date & Time:** 15.01.2017	**Received by:**		

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY

Project Name:	Additional Contamination Investigation			**To:**	Envirolab Services
Project No:	92254.00	**Sampler:**	CLN		12 Ashley Street, Chatswood NSW 2067
Project Mgr:	EMG	**Mob. Phone:**	0419 781 366	**Attn:**	Tania Notaras
Email:	chamali.nagodavithane@douglaspartners.com.au			**Phone:**	(02) 9910 6200 **Fax:** (02) 9910 6201
Date Required:	Standard			**Email:**	tnotaras@envirolabservices.com.au

Sample ID	Lab ID	Date Sampled	Sample Type	Container Type	Analytes										Notes/preservation
			S - soil W - water	G - glass P - plastic	8 Heavy Metals	OCP/OPP	PCB	TRH	PAH	BTEX	Phenols	Asbestos (50 g)	pH, CEC		

Relinquished by:	CLN	**Transported to laboratory by:**	
Signed:	**Date & Time:** 15.01.2017	**Received by:**	

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	accounts email, Chamali Nagodavithane

Sample Login Details

Your reference	92254.00, Additional Contamination Investigation
Envirolab Reference	183240
Date Sample Received	12/01/2018
Date Instructions Received	12/01/2018
Date Results Expected to be Reported	19/01/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	21 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	2.7
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Didnt receive TS and TB

Received extra sample BH112a

Please direct any queries to:

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

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Total Phenolics (as Phenol)	Asbestos ID - soils	pH1:5 soil:water	CEC	On Hold
BH101-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH102-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH103-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH104-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH105-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH106-0.4-0.5												✓
BH107-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH108-0-0.1							✓					
BH109-0-0.1												✓
BH110-0-0.1												✓
BH111-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH112-0-0.1												✓
BH113-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH114-0-0.1												✓
BD1 100118	✓	✓										
BD2 110118												✓
BH115-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	✓			
-												✓
BH109-0.4-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
TB	✓											
TS	✓											

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.