Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Detailed Site Investigation

Proposed University Facility Redevelopment
Building J03, Electrical Engineering, Darlington

Prepared for
Laing O'Rourke Australia Construction Pty Ltd

Project 85658.02
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Douglas Partners
Geotechnics / Environment / Groundwater

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

	Signature	Date
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Reviewer	pp	29 March 2018

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1. Introduction

This report presents the results of a detailed site investigation (DSI), undertaken for a proposed university facility redevelopment at Building J03, Electrical Engineering, Darlington. The investigation was commissioned in an email dated 16 March 2018 by James Last of Laing O'Rourke Australia Construction Pty Ltd and was undertaken in accordance with Douglas Partners' proposal SYD180234.P003.Rev0 dated 13 March 2018.

This DSI will support the state significant development application for a ten level building with a single basement level under part of the building envelope. It is understood that the existing infrastructure on the site will be demolished.

The aim of the investigation was to assess the risk and nature of potential contamination at the site, comment on the suitability of the site for the proposed land use, and provide recommendations for further investigations (if necessary) and/ or remediation and management requirements. This DSI has been prepared to address the requirements of *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land*.

The investigation included the hand angering of 9 boreholes and laboratory testing of selected soil and previous information from drilling of two cored bores (Bores 1 to 2) at the locations shown on Drawing 1, in Appendix B. The details of the current field work are presented in this report, together with comments and recommendations on the issues listed above.

Additional information is provided in the three previous reports prepared for the site including:

- Douglas Partners (2016a) *Preliminary In Situ Waste Classification, Building J03 Electrical Engineering, Engineering Faculty Darlington Campus,* Report 85658.00.R002.Rev0 dated 4 November 2016 (DP, 2016a).

- Douglas Partners (2016b) *Report on Geotechnical Investigation Proposed University Facility Redevelopment, Building J03, Electrical Engineering, Darlington* prepared for The University of Sydney, Report 85658.00.R001.Rev0 dated 6 November 2016; and

- Douglas Partners (2018) *Report on Preliminary Site Investigation, Proposed University Facility Redevelopment, Building J03, Electrical Engineering, Darlington* prepared for Laing O'Rourke Australia Construction Pty Ltd, Report 85658.01.R.001.Rev0 dated 7 February 2018.

2. Scope of Works

The scope of this DSI comprised:

- A review of previous investigations (DP, 2016a&b and DP 2017);
- A services search to position bores prior to drilling;
- A site walkover to observe signs that may indicate the potential for contamination;
- Drilling of 9 bores/pits using hand tools in soft landscape areas (where accessible) by environmental scientist/engineer;
- Collection of soil samples from each bore;
- Despatch of selected soil samples (plus QA/QC samples) for quantitative analysis by a NATA accredited laboratory for a selection of the following contaminants of concern and parameters:
  - Metals (As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Zn);
  - Total recoverable hydrocarbons (TRH) (a screening test for total petroleum hydrocarbons - TPH);
  - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylene – BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Organochlorine pesticides (OCP);
  - Organophosphorus pesticides (OPP);
  - Polychlorinated biphenyls (PCB);
  - Phenols;
  - Asbestos;
  - Collection/ preparation and analysis of 5% intra-laboratory duplicate soil and 5% inter-laboratory duplicate soil samples for QA/QC purposes (metals and PAH).
- Preparation of this DSI detailing the methodology and results, providing comment on the suitability of the site for the proposed university facility redevelopment, and recommendations for further investigations, remediation and management (as required).

3. Site Identification

The site comprises an irregular shaped area, the general layout of which is provided on Drawing 1, Appendix B. Currently the site is occupied by a large building containing university facilities. Around the building there is a garden/grassed area to the north and a car park to the south. The eastern end of the site comprises paved external areas and a second university building. Access to the site is off Maze Crescent to the west. The site slopes gently downwards to the east and ground surface levels vary between about RL 24 m and RL 16 m AHD. The regional topography slopes downwards to the north east.

The site is bounded by Maze Crescent to the west and north, university facilities to the south, and university facilities and Shepard St to the east. The surrounding land uses are university facilities in all directions.

Table 1: Site Identification Details

Item	Details
Site Owner	The University of Sydney
Site Address	96-148 City Road, Darlington
Current land use	University Facilities
Lot and Deposited Plan	Part Lot 1 D.P 790620
LEP Planning Zone	SP2: Infrastructure
Approximate Site Area	7,500 m^2
Proposed future land-use	University facilities

4. Proposed Development

The project involves the demolition of part of the existing Electrical Engineering building and the construction of a ten level teaching facility building with single basement levels under part of the building envelope. The lowest ground level is given as RL 16.240 m which is approximately 3 m below existing ground level.

5. Geology, Topography and Hydrogeology

Reference to the *Sydney* 1:100 000 Geology of Sydney Geological Series Sheet indicates that the site is located on Ashfield Shale of Triassic age. The Ashfield Shale typically comprises black to dark-grey shale and laminite. The *Sydney* 1:100,000 Soils Landscape Sheet indicates that the site is underlain by the Blacktown soil landscape group. The soil landscape group typically occurs on gently undulating rises. Local relief to 30 m and slopes are usually <5%.

The NSW National Resource Atlas *Acid Sulfate Soil Risk* Map indicates that the site is located in an area of no known occurrence of acid sulfate soil.

The site of the Electrical Engineering building is relatively level having been excavated into a gently rising slope to the west and possibly some filling on the eastern side.

The nearest surface water receptor is a pond approximately 400 m to the north of the site in Victoria Park. However it is likely that the regional groundwater flow would be to the north east towards Sydney Harbour (approximately 1.8 km to the north east of the site).

6. Site History

A site history search was undertaken in the PSI (DP 2018). Extracts from the PSI are provided in Appendix C. In summary, the PSI outlines the following considerations for potential contamination:

'The site history review indicated that prior to university land uses the site was mostly residential with some commercial operations possibly including manufacturers (bedstead, chemical, display fittings, woodware, sports goods, clock case, tennis and/or squash racquet press, sanitary fitting and hardware), sprayers, printers, and tobacco processors.

Given the length of time since the commercial operations on the site and the extensive redevelopment since then, residual contamination from former land uses is considered unlikely to be present.

Between 1965 and 1970 the site was redeveloped as part of the University of Sydney with the construction of a large building. Additional university development has continued over the years. The site walkover indicated that the site was mostly occupied by a large building containing university facilities. The University of Sydney holds a licence for hazardous, industrial or Group A waste generation or storage. This indicates that hazardous storage may be located within or near to the site.

Correspondence from the University confirmed that:

- *the Electrical Engineering Building (J03) included a large high voltage research facility with a large number of PCB containing electrical equipment; and*
- *the nearby Civil Engineering (J05) building contained large underground water tanks and systems which were used for fluid dynamics research and were previously contaminated with mercury.*

The presence of PCB containing equipment would in itself pose no significant risk to the environment unless leakage or spillage occurred into the substrate during operations or decommissioning. No records of such incidents have been reported by the University.'

7. Site Walkover

An environmental scientist from DP undertook a site walkover on 13 March 2018. Site photographs referred to herein are provided in Appendix B.

The site walkover confirmed the findings of the DP PSI that the site is currently occupied mainly by a building containing university facilities, including office and teaching spaces. The eastern end of the site comprises paved external areas and a second university building. A car park was noted in the southern end of the site and a garden/grassed area within the northern end of the site. Mature trees were noted along the western and northern boundaries.

8. Conceptual Site Model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM was prepared as part of the PSI and is provided in Appendix C.

In summary, the identified potential contamination sources and contaminants of concern include:

- Source 1 (S1) – Possible filling associated with the former and current buildings. Possible contaminants include: metals; total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene and xylene (BTEX); polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochloride pesticides (OCP), phenols and asbestos;
- Source 2 (S2) – Storage of hazardous substances (within or near to the site); and
- Source 3 (S3) – Hazardous building materials (PCB and asbestos).

9. Fieldwork

The minimum number of sampling points for a site of this size (7,500 m^2) in accordance with the NSW EPA *Sampling Design Guidelines* (1995) for contaminated site investigations would be 18 sampling points. NEPC (2013) recommends the use of professional judgement in determining appropriate sample numbers. However, given existing use of the building by the University, a reduced number of sampling points was used based on a targeted regime to accommodate existing site restraints.

The DSI with sampling has been devised broadly in accordance with the seven step data quality objective (DQO) process as specified in Schedule B2 of the *National Environment Protection (Assessment of Site Contamination)* Measure 1999 as amended 2013 (NEPC 2013). The DQO process is included in Appendix D. Field and laboratory procedures were assessed against data quality indicators (DQIs) which are also included in Appendix D. This DSI has been prepared to address the requirements of *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land*.

9.1 Test Locations and Rationale

The boreholes were located in soft landscape areas following service location undertaken by an environmental scientist on 14 March 2018. The locations were chosen to gain coverage of the accessible parts of the site. Environmental fieldwork, including drilling, and soil sampling was conducted on 17 March 2018. Source 2 (S2) – Storage of hazardous substances (within or near to the site) could not be adequately assessed due to access constraints and remains a data gap.

Soil samples were collected from nine boreholes (BH01 to BH09) at regular depth intervals and/or at signs of contamination.

Selected soil samples were analysed for a range of COPCs, as identified in the CSM provided in Appendix C. These samples were selected based on site observations (odour, staining etc.) and their

location within the subsoil strata (*i.e.* fill or natural). Borehole test locations are shown on Drawing 1, Appendix A.

9.2 Drilling Methods

The field work for the geotechnical investigation (DP 2016) included the drilling of two cored bores (Bores 1 to 2) at the locations shown on Drawing 1, in Appendix B. The bores were located on the outside of the building envelope as there were access difficulties in drilling in the courtyard of the building (DP 2016b). The bores were drilled to approximately 10 m depth using a Bobcat mounted drilling rig. The bores were initially augered to the top of rock at depths of 2.5 m and 1.0 m for Bores 1 and 2 respectively and then advanced using NMLC-sized diamond core drilling equipment to obtain 50 mm diameter continuous samples of the rock for identification and strength testing purposes. In addition, a dynamic cone penetrometer (DCP) test was carried out in the sunken garden to the south of the site.

The ground surface levels at the borehole locations were determined by hand held GPS methods.

All boreholes drilled as part of the current assessment were augered using hand tools by a suitably qualified environmental scientist on 17 March 2018. The bores were shallow and the depth range achieved was 0.25 – 1.0m depth.

9.3 Soil Sampling Procedures

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

- Use of disposable sampling equipment including disposal nitrile gloves;
- Transfer of samples into laboratory-prepared glass jars and capping immediately with Teflon lined lids;
- All re-used equipment where applicable was decontaminated between samples using a 3% solution of Decon 90 and rinsing with deionised water;
- Labelling of sampling containers with individual and unique identification, including project number sample location and sample depth;
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory.

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

9.4 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of concern based on information obtained for past and present activities and features within the site. The primary contaminants of concern as identified in Section 8 were metals, TPH, BTEX, PAH, OCP, OPP, PCB, phenols and asbestos.

10. Site Assessment Criteria

Analytical results from laboratory testing of soils are assessed against Site Assessment Criteria (SAC) primarily comprising (Tier 1) investigation levels, screening levels and management limits sourced from Schedule B1 of NEPC, 2013. This guideline has been endorsed by the NSW EPA under the Contaminated Land Management (CLM) Act 1997. Schedule B of NEPC (2013) provides investigation and screening levels for commonly encountered contaminants which are applicable to generic land uses and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. They establish concentrations above which further appropriate investigation (e.g. Tier 2 or Tier 3) should be undertaken.

In addition to SAC sourced from NEPC (2013), screening levels (for direct contact) have been adopted from the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) *Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011). The following sub-sections outline the adopted SAC for soil as documented in NEPC (2013) and CRC CARE, 2011.

10.1 Health Investigation Levels

Table 2 shows the health investigation levels (HIL) that have been adopted as SAC for assessing the human health risk from a contaminant via all relevant pathways of exposure. As the site is proposed to be developed into a University building for teaching, HIL have been adopted from Column D (for commercial/industrial sites). The table does not contain the complete list of HIL provided in NEPC (2013).

Table 2: Health Investigation Levels

Contaminant	HIL – D (mg/kg)
Metals	
Arsenic	3000
Cadmium	900
Chromium (VI)	3600
Copper	240 000
Lead	1500
Mercury (inorganic)	730
Nickel	6000
Zinc	400 000
PAH	
Carcinogenic PAH (as Benzo(a)pyrene TEQ)	40
Total PAH	4000
OCP	
DDT+DDE+DDD	3600
Aldrin + Dieldrin	45
Chlordane	530
Endosulfan	2000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2500
OPP	
Chlorpyrifos	2000
PCB	7
Phenols	
Phenol	240 000
Pentachlorophenol	660
Cresols	25 000

10.2 Health Screening Levels for Vapour Intrusion

Table 3 shows the health screening levels (HSL) for petroleum hydrocarbon compounds adopted for the assessment and are based on the exposure to petroleum hydrocarbons through the dominant vapour inhalation exposure pathway only (i.e. not direct contact to soils). The HSL have been adopted from Column HSL D (for commercial/industrial sites). The HSL derivation has assumed a slab-on-ground construction for building structures, and, therefore is only considered relevant to parts of the site with building structures (yet to be constructed). As clay, sand and silt have been identified at the site, the most conservative HSL for the three soil types have been listed in Table 2.

Table 3: Soil Health Screening Levels for Vapour Intrusion

Contaminant	HSL – D (mg/kg)
	Depth 0 m to <1 m
Naphthalene	NL
TPH C_6-C_{10} less BTEX	250
TPH >C_{10}-C_{16} less Naphthalene	NL
Benzene	3
Toluene	NL
Ethylbenzene	NL
Xylenes	230

NL Notes: NL is 'not limiting' (where the derived soil HSL exceeds the soil saturation concentration)

10.3 Health Screening Level for Direct Contact

Table 4 shows the HSL for direct contact for commercial and industrial sites, sourced from CRC CARE (2011), which are mentioned but not presented in NEPC (2013).

Table 4: Soil Health Screening Levels for Vapour Intrusion

Contaminant	HSL – D (mg/kg)
Naphthalene	11 000
TPH C_6-C_{10}	26 000
TPH >C_{10}-C_{16}	20 000
TPH >C_{16}-C_{34}	27 000
TPH >C_{34}-C_{40}	38 000
Benzene	430
Toluene	99 000
Ethylbenzene	27 000
Xylenes	81 000

10.4 Ecological Investigation Levels and Ecological Screening Levels

Given that the proposed development will essentially result in the site being covered by buildings and surrounding pavements with very minor peripheral landscaping in planter boxes it is considered that the site will have very limited ecological value and, thus, ecological investigation levels (EIL) and ecological screening levels (ESL) for terrestrial ecology have not been adopted as SAC.

10.5 Management Limits

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

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

Management limits to avoid or minimise these potential effects have been adopted in NEPC (2013) as interim Tier 1 guidance. The adopted management limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown in Table 5. The more conservative management limits are shown for both 'fine' and 'coarse' soil textures given that various soil types were encountered.

Table 5: Management Limits

Contaminant	Management Limit – Commercial and industrial (mg/kg)
TPH C_6 – C_{10}	700
TPH >C_{10}-C_{16}	1000
TPH >C_{16}-C_{34}	3500
TPH >C_{34}-C_{40}	10 000

10.6 Asbestos is Soil

Asbestos was screened from jar samples taken for general analysis of contaminants. Therefore the presence or absence of asbestos at a limit of reporting of 0.1 g/kg has been adopted for this assessment as an initial screen.

10.7 Potential Impacts on Groundwater

Groundwater testing was beyond the scope of the DSI. Soils have nevertheless been assessed with respect to their potential contamination risks to groundwater. The assessment includes a review of potential impacts based on the total contaminant concentrations present, the likelihood of migration of groundwater through the soils and/or leachability testing.

11. Field Work Observations

Details of the subsurface conditions encountered in each borehole are provided in the detailed bore logs in Appendix E, together with notes defining classification methods and descriptive terms.

The subsurface conditions encountered in the bores (DP 2016) and current hand auger investigation can be summarised as:

- Topsoil or Pavement – 100 mm to 300 mm of silty clay topsoils;
- Filling – clay, sandy clay and sand filling with some gravel, rootlets, asphalt, brick, woodchips, charcoal and plastic fragments to depths between 0.5 m and 0.6 m;
- Clay – very stiff hard clay to a depth of 2.2 m in Bore 1;
- Shaly Clay – hard shaly clay to depths of 2.5 m and 1.3 m; and
- Rock – extremely low strength and very low strength laminite and shale grading into medium strength shale at depths of 7.3 m and 3.5 m. Medium and high strength sandstone and/or siltstone were below the shale. Some joints, dipping in the range of 30^{o} to 85^{o}, were observed in the core samples.

Free groundwater was not observed during hand augering and the use of drilling fluid prevented groundwater observations during rotary wash-boring and coring (DP 2016b).

12. Results Summary

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

Table F1: Results Summary – Soil.

The NATA laboratory certificates of analysis together with the chain of custody and sample receipt information are included in Appendix F.

One sample in the previous waste classification report (2016a) included TCLP analysis, with the following leachate results: BH2 (0.4-0.5) TCLP (Pb) = 0.71mg/L and TCLP (B(a)P) <0.001mg/L.

13. Analysis and Discussion of Results

All results for soil samples analysed for BTEX, phenols, OCP, OPP, PCB and asbestos were below laboratory limits of reporting (Table F1). The remaining analyte concentrations (metals, TRH and PAH) were either less than the laboratory limits of reporting and/or less than the adopted SAC. Reported concentrations are unlikely to have any significant impact on groundwater quality and the reported leachate results for lead and PAH were low or below practical laboratory detection (DP 2016a).

It is noted that although no asbestos was observed in the bore returns or detected by the laboratory, the presence of brick and plastic within filling indicates the possible presence of hazardous materials within filling in untested locations and in existing structures at the site.

While total concentrations of contaminants were below SAC, DP notes that the levels of metals and PAH will exceed General Solid Waste criteria and leachate analysis will be required in subsequent waste classification testing regimes with regard to excavation areas for the proposed basements.

14. Conclusion and Recommendations

This DSI has been prepared in general compliance with the requirements of *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land* and to assist in development consent approval.

Although no exceedances of SAC have been registered during soil sampling at the site, DP notes that data gaps exist beneath building footprints and hardstand at the site and in the vicinity of hazardous goods storage. Groundwater testing was beyond the scope of the DSI. Soils have nevertheless been assessed with respect to their potential contamination risks to groundwater.

A Remediation Action Plan (with an Unexpected Finds Protocol) has been prepared such that any contamination subsequently discovered beneath structures, following demolition, can be assessed by further investigation and dealt with during site formation via any necessary remediation and validation which can be undertaken in tandem with the construction of the proposed single level basement which will be formed under part of the building envelope. DP therefore recommends the following be incorporated into the RAP for the site:

- Pre-demolition hazardous building materials survey prior to demolition of the existing structures and hardstands;
- Post demolition inspection and sampling from previously inspected areas, it is possible that asbestos may also be present and may be uncovered during earthworks;
- Additional sampling under building footprint and hardstand areas to fill data gaps, further characterise the site, and assess the risk and nature of potential contamination in previously untested areas and areas of concern;
- Waste classification of material to be excavated for the proposed basement on part of the building envelope;
- Validation of any filling which is to remain on site (if any) to confirm suitability for the intended land use;
- Asbestos Management Plan for asbestos removal works, if required; and
- Incorporation of an unexpected finds protocol in the site construction environmental management plan.

Based on the results of the DSI with limited sampling and the anticipated development, including bulk excavation for the basement, DP considers the site can be made suitable for a high rise University facility redevelopment subject to implementation of the aforementioned recommendations.

15. Limitations

Douglas Partners (DP) has prepared this report for Building J03, Electrical Engineering, Darlington in accordance with DP's proposal dated 13 March 2018, and email acceptance from the Laing O'Rourke Australia Construction Pty Ltd (dated 16 March 2018). The work was carried out under S2 Consultancy Agreement between Laing O'Rourke Australia Construction Pty Ltd and Douglas Partners Pty Ltd. This report is provided for the exclusive use of the Laing O'Rourke Australia Construction Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials, such as concrete, brick, tile [list as appropriate to the field work findings], were, however, located in previous below-ground filling and/or above-ground stockpiles [as appropriate], and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

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

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

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawings

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Locality Plan

NOTE:
1: Base image from Nearmap.com
2: Test locations are approximate only and were located using hand held GPS.

0 5 10 15 20 30 40 50m
1:500 @ A3

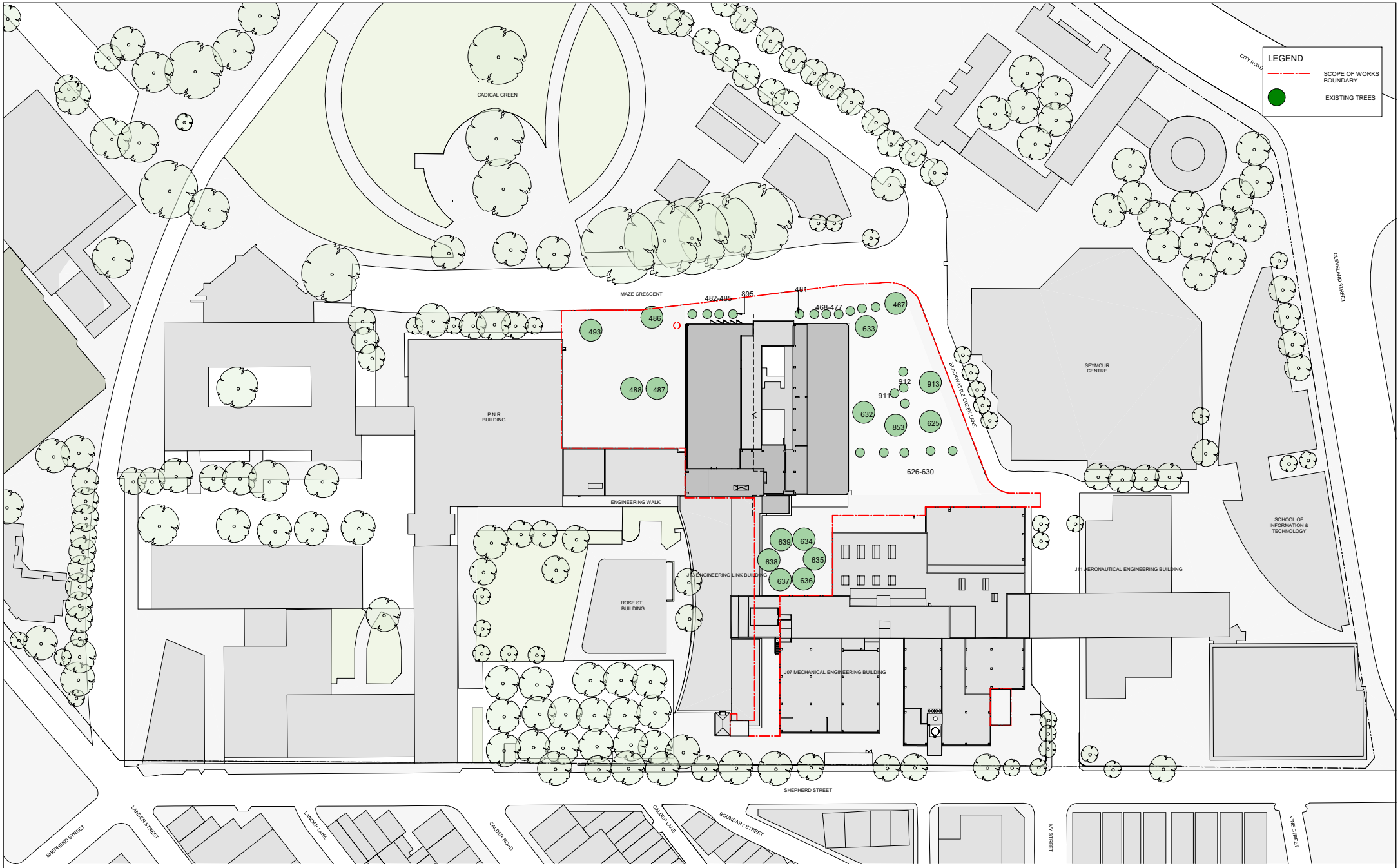
LEGEND
- Test bore location (DP 2016)
- Dynamic cone penetrometer test location (DP 2016)
- Current borehole location

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Laing O'Rourke Australia		TITLE: **Location of Tests** **Building J03** **THE UNIVERSITY OF SYDNEY**
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: 1:500 @ A3	DATE: 23.3.2018	

N

PROJECT No:	85658.02
DRAWING No:	1
REVISION:	0



Rev	Description	By	Date
A	PRELIMINARY ISSUE	SPG	08.11.2017
B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

Principal: THE UNIVERSITY OF SYDNEY

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Nominated Architects
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Russell Lee no. 6367

Project
THE UNIVERSITY OF SYDNEY ETP STAGE 1

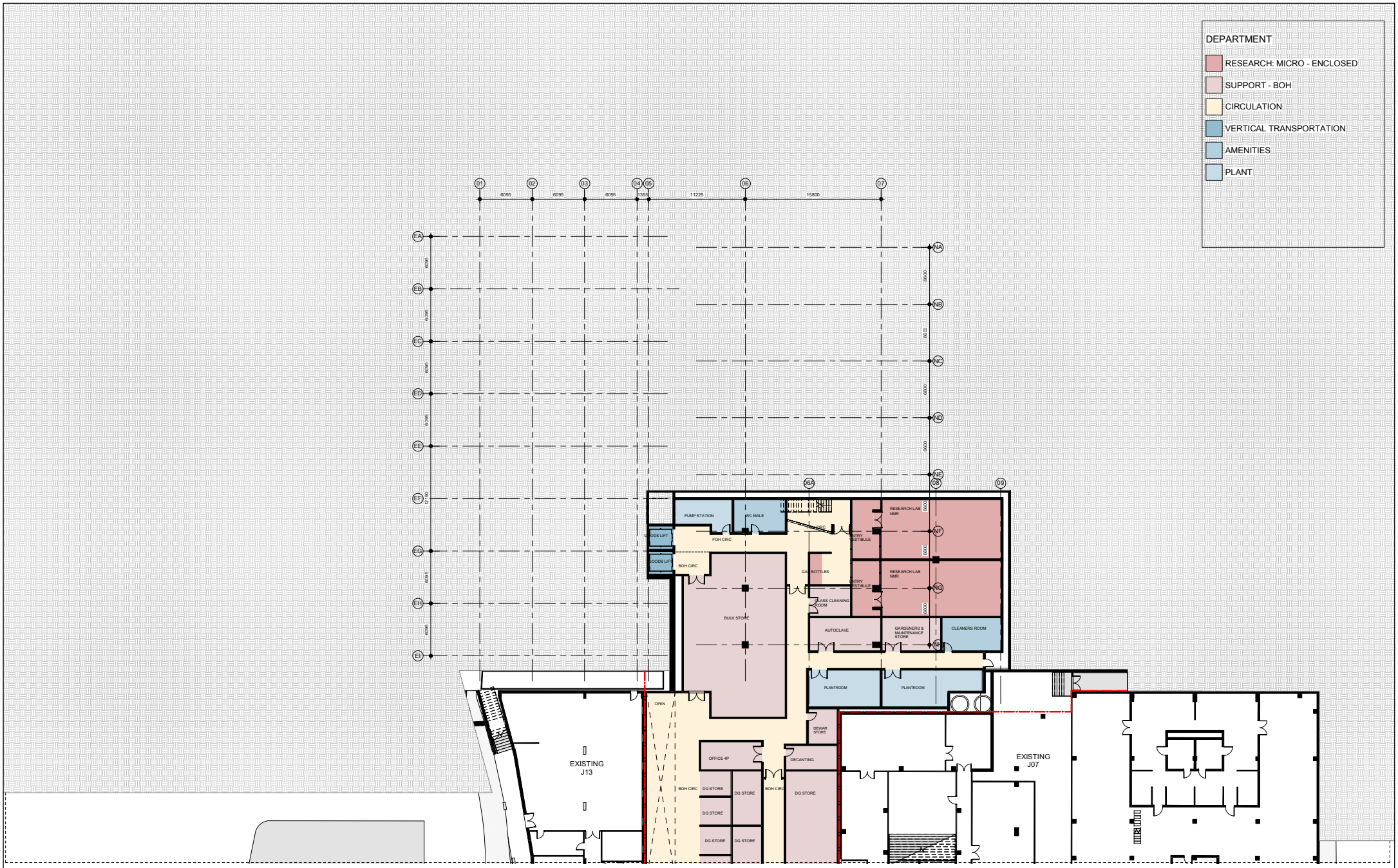
Electrical Engineering Building
University in Darlington, NSW 2008

Drawing Title
SITE PLAN - EXISTING

A1 DRAWING SHEET	
Co-ordinated: Michael Grave	Drawn: SPG
Project Architect: Michael Bradburn	Scale: As indicated @ A1
Project Director: David Holm	Date: 31/01/18
Drawing Number: A-DA-1121	Revision: C
	North:

Cox Architecture Pty Ltd ACN 002 535 891

PLOT STAMP DATE: 29/03/2018 10:19:22 AM



Rev	Description	By	Date
A	PRELIMINARY ISSUE	SPG	08.11.2017
B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

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Project
THE UNIVERSITY OF SYDNEY ETP STAGE 1

Electrical Engineering Building
University in Darlington, NSW 2008

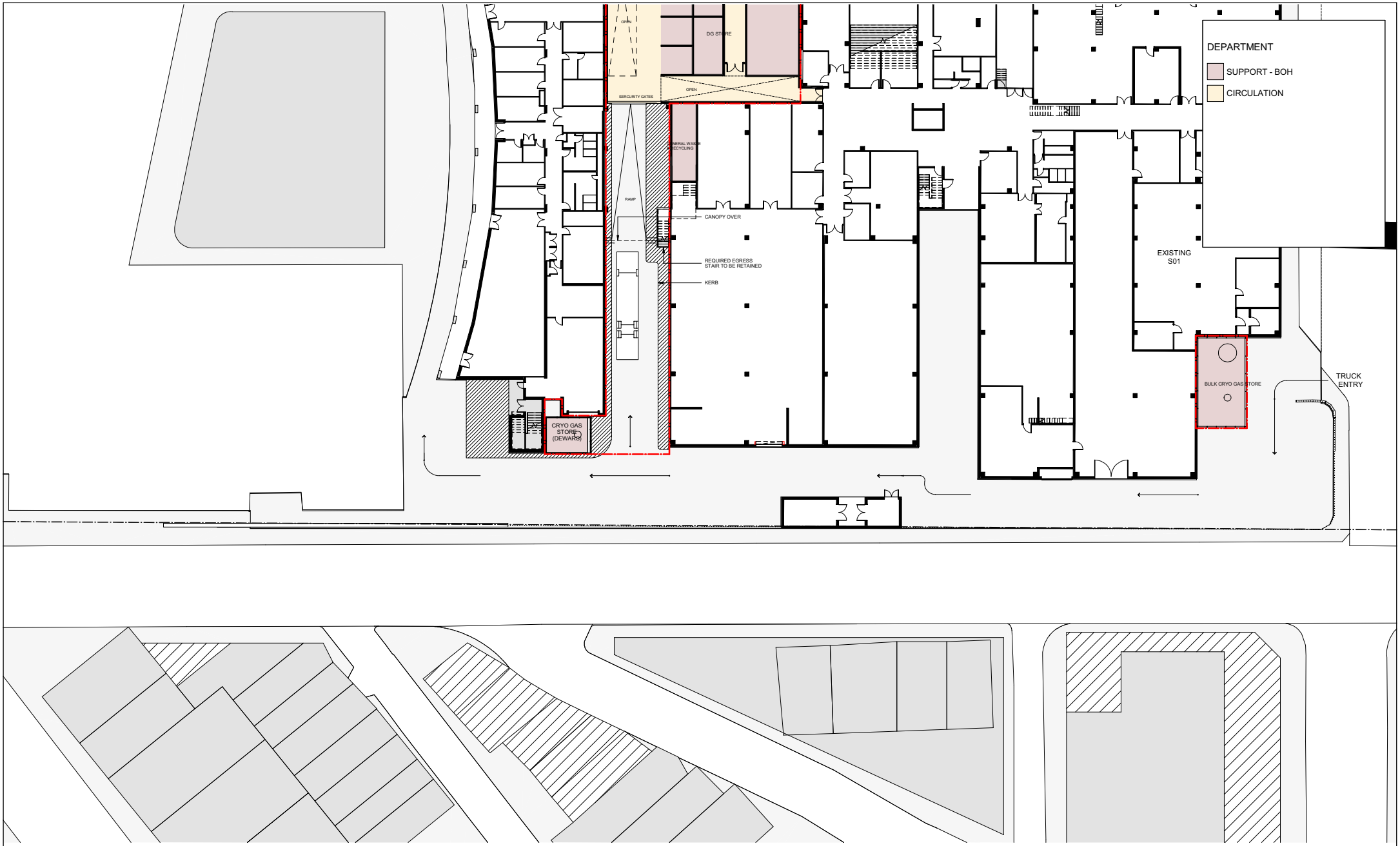
Drawing Title
FLOOR PLAN - LEVEL 01 (SHEET 01 OF 02)

A1 DRAWING SHEET

Co-ordinated: Michael Grave	Drawn: SPG
Project Architect: Michael Bradburn	Scale: 1 : 200 @ A1
Project Director: David Holm	Date: 31/01/18
Drawing Number: A-DA-2101A	Revision: C
	North:

Cox Architecture Pty Ltd ACN 002 535 891

PLOT STAMP DATE: 27/03/2018 5:51:10 PM



Rev	Description	By	Date
A	PRELIMINARY ISSUE	SPG	08.11.2017
B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

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Project
THE UNIVERSITY OF SYDNEY ETP STAGE 1

Electrical Engineering Building
University in Darlington, NSW 2008

Drawing Title
FLOOR PLAN - LEVEL 01 (SHEET 02 OF 02)

A1 DRAWING SHEET

Co-ordinated: Michael Grave	Drawn: SPG
Project Architect: Michael Bradburn	Scale: 1 : 200 @ A1
Project Director: David Holm	Date: 31/01/18
Drawing Number: A-DA-2101B	Revision: C
	North:

Cox Architecture Pty Ltd ACN 002 535 891

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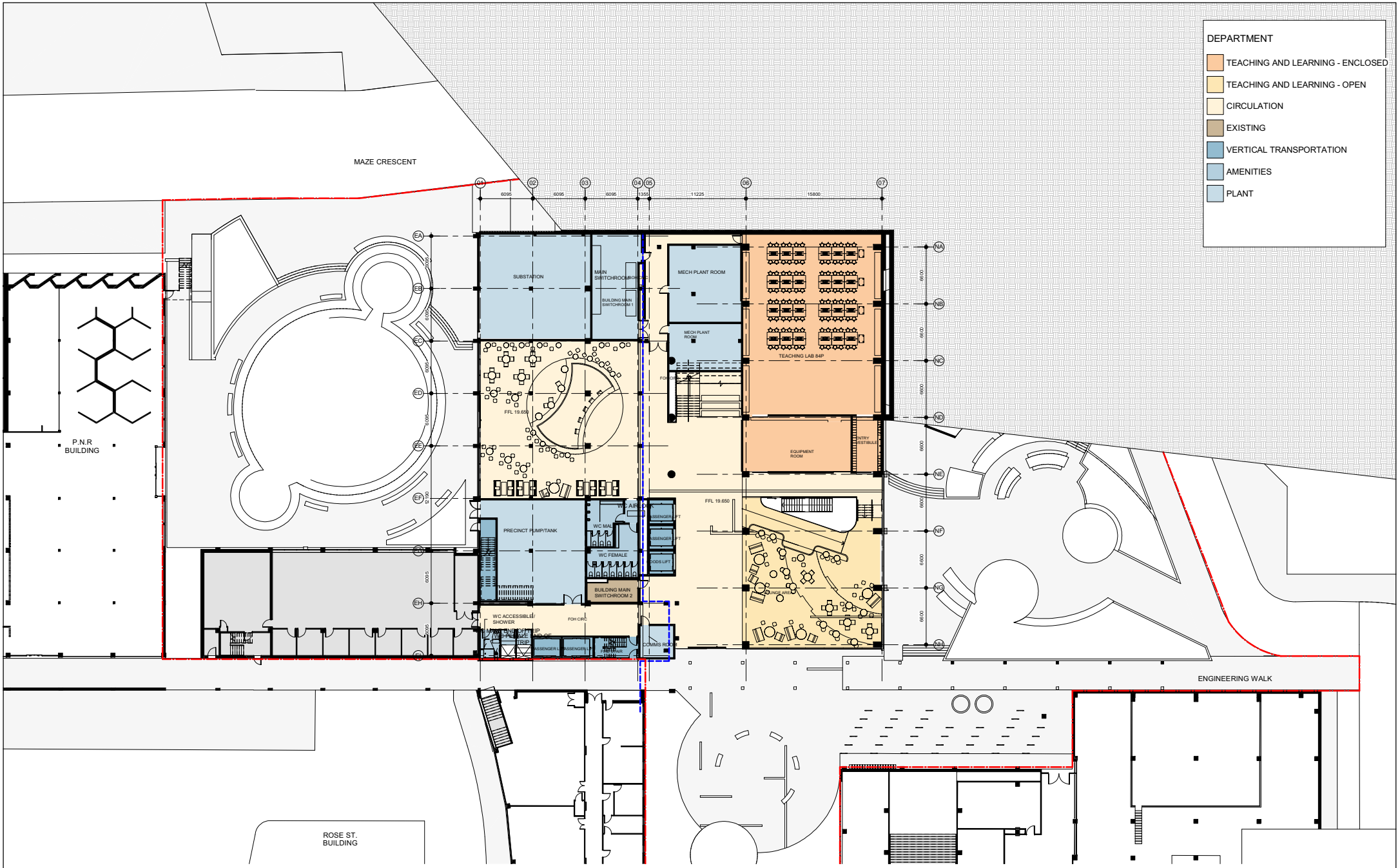

Rev	Description	By	Date
A	PRELIMINARY ISSUE	SPG	08.11.2017
B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

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Project
THE UNIVERSITY OF SYDNEY ETP STAGE 1

Electrical Engineering Building
University in Darlington, NSW 2008

Drawing Title
FLOOR PLAN - LEVEL 02

A1 DRAWING SHEET	
Co-ordinated: Michael Grave	Drawn: SPG
Project Architect: Michael Bradburn	Scale: 1 : 200 @ A1
Project Director: David Holm	Date: 31/01/18
Drawing Number: A-DA-2102	Revision: C
	North:

Cox Architecture Pty Ltd ACN 002 535 891

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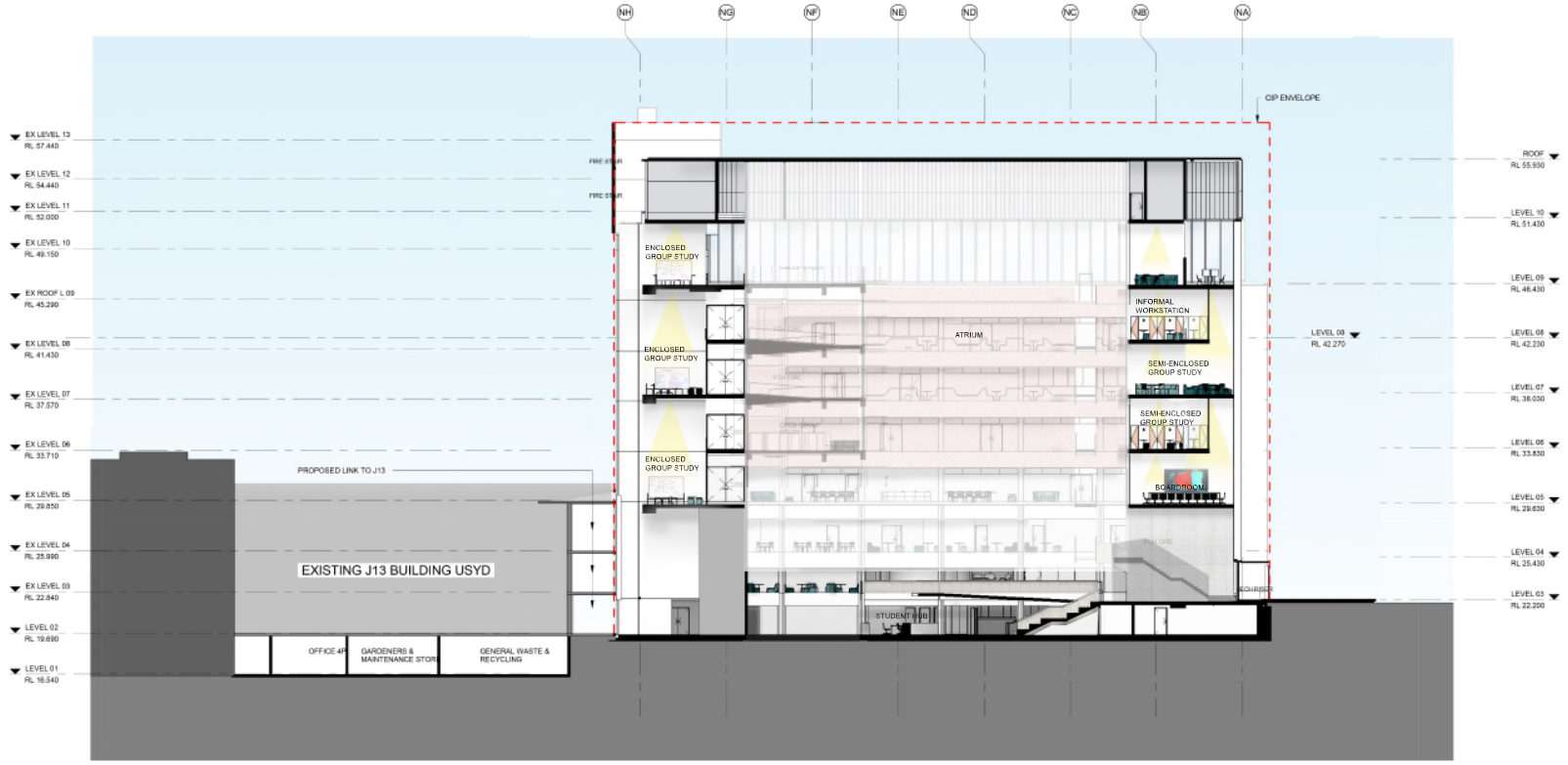

2 21-02 SECTION FACING SOUTH
SCALE 1 : 200

Rev	Description	By	Date
A	PRELIMINARY ISSUE	SPG	08.11.2017
B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

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Project
THE UNIVERSITY OF SYDNEY ETP STAGE 1

Electrical Engineering Building
University in Darlington, NSW 2008

Drawing Title
SECTIONS - EAST TO WEST

A1 DRAWING SHEET	
Drawn:	SPG
Co-ordinated: Michael Grave	Scale: 1 : 200 @ A1
Project Architect: Michael Bradburn	Date: 31/01/18
Project Director: David Holm	Revision: C
Drawing Number: A-DA-4001	North:

PLOT STAMP DATE: 31/01/2018 2:41:51 PM

Appendix B

Site Photographs

Photo 1 - Engineering Building

Photo 2 -Engineering Building and carpark

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **DSI with limited sampling** **Building J03, Electrical Engineering, Darlington**	PROJECT:	85658.02
		PLATE No:	1
		REV:	A
	CLIENT: Laing O'Rourke Australia Construction P	DATE:	20-Mar-18

Photo 3 - Courtyard

Photo 4 - Rear Access to building

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **DSI with limited sampling** **Building J03, Electrical Engineering, Darlington**	PROJECT:	85658.02
		PLATE No:	2
		REV:	A
	CLIENT: Laing O'Rourke Australia Construction P	DATE:	20-Mar-18

Appendix C

Extracts from PSI (CSM & Site History)

Report on Preliminary Site Investigation
Proposed University Facility Redevelopment
Building J03, Electrical Engineering, Darlington

1. Introduction

This report presents the results of a preliminary site investigation (PSI) undertaken for a proposed university facility redevelopment at Building J03, Electrical Engineering, Darlington (Part Lot 1 D.P 790620). The investigation was commissioned in an email dated 24 November 2017 by Hanan Mansor of Laing O'Rourke Australia Construction Pty Ltd and was undertaken in accordance with Douglas Partners' proposal SYD171543 dated 30 October 2017.

This PSI will support the development application for a ten level building with two basement levels under part of the building envelope. It is understood that the existing infrastructure on the site will be demolished.

The objectives of the PSI were to:

- Assess the potential for contamination at the site based on past and present site uses;
- Identify potential areas of environmental concern (PAEC);
- Identify potential contaminants of concern; and
- Comment on the need for further investigation and/or management (if required) in order to determine the compatibility of the site for the university facilities.

This report must be read in conjunction with the notes *About this Report* which are included in Appendix A.

2. Scope of Work

The following scope of work was conducted for the investigation:

- Review of previous assessments at the site;
- Site walkover by an environmental scientist;
- Review of historical and current aerial photographs and maps (from Lotsearch Pty Ltd);
- Review of historical title deeds;
- Review of SafeWork NSW records pertaining to dangerous goods;
- Review of soils and geological maps including potential acid sulfate soils risk maps;
- Review of the Section 149 Planning certificate (from Lotsearch Pty Ltd);
- Review of Council records;

- Review Environment Protection Authority (EPA) Notices and registered groundwater bore records (from Lotsearch Pty Ltd); and
- Preparation of this PSI report detailing the findings of the review of site history information and walkover, and comment on the potential risk of contamination, and provide recommendations for further investigations, if considered necessary.

3. Site Identification and Description

3.1 Site Identification

The site identification information is summarised as follows:

Table 1: Site Identification Details

Item	Details
Site Owner	The University of Sydney
Site Address	96-148 City Road, Darlington
Current land use	University Facilities
Lot and Deposited Plan	Part Lot 1 D.P 790620
LEP Planning Zone	SP2: Infrastructure
Council	City of Sydney
Approximate Site Area	7,500 m^2
Proposed future land-use	University facilities

3.2 Site Layout and Description

The site comprises an irregular shaped area, the general layout of which is provided on Drawing 1, Appendix B. Currently the site is occupied by a large building containing university facilities. Around the building there is a garden/grassed area to the north and a car park to the south. The eastern end of the site comprises paved external areas and a second university building. Access to the site is off Maze Crescent to the west. The site slopes gently downwards to the east and ground surface levels vary between about RL 24 m and RL 16 m AHD. The regional topography slopes downwards to the north east.

The site is bounded by Maze Crescent to the west and north, university facilities to the south, and university facilities and Shepard St to the east. The surrounding land uses are university facilities in all directions.

4. Regional Geology and Hydrogeology

4.1 Regional Geology

Reference to the *Sydney* 1:100 000 Geology of Sydney Geological Series Sheet indicates that the site is located on Ashfield Shale of Triassic age. The Ashfield Shale typically comprises black to dark-grey shale and laminite.

4.2 Soil Landscape

The *Sydney* 1:100,000 Soils Landscape Sheet indicates that the site is underlain by the Blacktown soil landscape group. The soil landscape group typically occurs on gently undulating rises. Local relief to 30 m and slopes are usually <5%.

4.3 Acid Sulfate Soils

The NSW National Resource Atlas *Acid Sulfate Soil Risk* Map indicates that the site is located in an area of no known occurrence of acid sulfate soil.

4.4 Hydrogeology

The nearest surface water receptor is a pond approximately 400 m to the north of the site in Victoria Park. However it is likely that the regional groundwater flow would be to the north east towards Sydney Harbour (approximately 1.8 km to the north east of the site).

4.5 Groundwater Bore Search

Based a search of the groundwater bore database by Lotsearch Pty Ltd (refer to Appendix C) there are no groundwater abstraction bores registered within a 500 m radial search area of the site. However, Lotsearch Pty Ltd included groundwater abstraction bores within a 2 km radius of the site. Details have been provided for the approximately 49 groundwater abstraction bores registered within a 1 km radial search area of the site. Further information was available for all 49 bores as shown in Table 2.

Table 2: Groundwater Bores

Groundwater Bore Number	Distance to site (m)	Groundwater Usage	Depth (m)	Depth to standing water level (m)
GW110247	575 SW	Domestic	210	31
GW109503	587 NE	Monitoring	5.2	2.24
GW109502	601 NE	Monitoring	6.4	2.18

Groundwater Bore Number	Distance to site (m)	Groundwater Usage	Depth (m)	Depth to standing water level (m)
GW113880	630 NE	Monitoring	5	unknown
GW113862	631 NE	Monitoring	3.8	unknown
GW113863	632 NE	Monitoring	4.6	unknown
GW113864	634 NE	Monitoring	4.5	unknown
GW113865	636 NE	Monitoring	6.5	unknown
GW113866	637 NE	Monitoring	3	unknown
GW113867	639 NE	Monitoring	3.5	unknown
GW113868	641 NE	Monitoring	3.7	unknown
GW113861	643 NE	Monitoring	6.5	unknown
GW113869	643 NE	Monitoring	6	unknown
GW109501	645 NE	Monitoring	6	2.3
GW113870	645 NE	Monitoring	4.8	unknown
GW113871	647 NE	Monitoring	6	unknown
GW113872	656 NE	Monitoring	8	unknown
GW113876	661 NE	Monitoring	7.8	unknown
GW113877	668 NE	Monitoring	5.5	unknown
GW113878	674 NE	Monitoring	7	unknown
GW109646	677 NE	Monitoring	8.2	5.93
GW113887	716 NE	Monitoring	5.7	unknown
GW113859	720 NE	Monitoring	6.1	unknown
GW113888	721 NE	Monitoring	5.5	unknown
GW113886	721 NE	Monitoring	5.8	unknown
GW109648	726 NE	Monitoring	6.2	5.23
GW113881	728 NE	Monitoring	6.1	unknown
GW113858	730 NE	Monitoring	6.3	unknown
GW113889	730 NE	Monitoring	6.7	unknown
GW113857	732 NE	Monitoring	6	unknown
GW113882	732 NE	Monitoring	6.1	unknown
GW109649	733 NE	Monitoring	7.2	2.95

Groundwater Bore Number	Distance to site (m)	Groundwater Usage	Depth (m)	Depth to standing water level (m)
GW113890	735 NE	Monitoring	6	unknown
GW113875	739 NE	Monitoring	7.5	unknown
GW113884	739 NE	Monitoring	6.8	unknown
GW109500	739 NE	Monitoring	7.8	2.3
GW113891	739 NE	Monitoring	6.8	unknown
GW113874	742 NE	Monitoring	7	unknown
GW113873	742 NE	Monitoring	6	unknown
GW113892	742 NE	Monitoring	7	unknown
GW113885	742 NE	Monitoring	7	unknown
GW113893	745 NE	Monitoring	8.5	unknown
GW113883	745 NE	Monitoring	6.1	unknown
GW113856	746 NE	Monitoring	6.2	unknown
GW113855	748 NE	Monitoring	5	unknown
GW113860	753 NE	Monitoring	6.5	unknown
GW113879	763 NE	Monitoring	5.3	unknown
GW105938	954 S	unknown	unknown	unknown
GW111408	961 NW	Monitoring	4.4	2.07

It noted that based on the inferred groundwater flow direction to the north east following the topography, there are 46 registered bores located with 1 km down-gradient of the site.

5. Background Information

5.1 Preliminary *In Situ* Waste Classification

A Preliminary *In Situ* Waste Classification was completed by DP in November 2016 and presented in the letter report entitled: *Preliminary In Situ Waste Classification, Building J03 Electrical Engineering, Engineering Faculty Darlington Campus*, dated 4 November 2016 (DP, 2016a). The report comprised a limited intrusive investigation. It was understood that an area of approximately 2500 m^2 was proposed to be excavated as part of the proposed development with the maximum depth of basement excavation approximately 7 m below ground level (bgl).

Six soil samples were collected and analysed from two boreholes. The laboratory results were below the laboratory detection limits (PQL) for total recoverable hydrocarbons (TRH); benzene, toluene,

ethylbenzene and xylene (BTEX); polychlorinated biphenyls (PCB), organochloride pesticides (OCP) and phenols. No asbestos was detected in the samples.

Metals and polycyclic aromatic hydrocarbons (PAH) were noted to be above PQL, however when compared to the investigation and screening levels of Schedule B1, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC, 2013), the levels were all below a conservative criteria for a commercial/industrial land use with the exception of benzo(a)pyrene which was above the ecological screening levels (ESLs) within one sample.

The filling was considered to be classified as general solid waste (non-putrescible) and the natural soils as virgin excavated natural material (VENM).

5.2 Geotechnical Investigation

A geotechnical investigation was completed by DP in November 2016 and presented in the letter report entitled: *Report on Geotechnical Investigation, Building J03, Engineering Faculty, The University of Sydney*, dated November 2016 (DP, 2016b). The investigation comprised the drilling of two boreholes (Bores 1 and 2).

The subsurface conditions encountered in the bores were summarised as follows:

- Topsoil or Pavement – 100 mm to 300 mm of silty clay topsoils;
- Filling – clay, sandy clay with some gravel to depths between 0.5 m and 0.6 m;
- Clay – very stiff hard clay to a depth of 2.2 m in Bore 1;
- Shaly Clay – hard shaly clay to depths of 2.5 m and 1.3 m; and
- Rock – extremely low strength and very low strength laminite and shale grading into medium strength shale at depths of 7.3 m and 3.5 m. Medium and high strength sandstone and/or siltstone were below the shale.

Free groundwater was not observed during augering and the use of drilling fluid prevented groundwater observations during rotary wash-boring and coring.

6. Site History

The following sections describe the methodology and outcomes of the site history review.

6.1 Regulatory Notice Search Under the CLM and POEO Acts

The register of Statutory Notices issued under the *Contaminated Land Management Act 1997* (CLM Act) and *Protection of the Environment Operation Act 1997* (POEO Act), available on the NSW Environment Protection Authority (EPA) website and summarised by Lotsearch Pty Ltd, indicated that there have been no notices issued on the site. However, within 1 km of the site the following have been listed:

- Australian Technology Park, 455 m to the south;
- BP Service Station, a service station 617 m to the south east;
- Frasers Development, 629 m to the north east;
- Formerly Gas N Go Alexandria, a service station 708 m to the south east;
- Shell Coles Express Service Station, a service station 842 m to the north;
- Aluminium Enterprises, a metal industry 897 m to the south west; and
- Macdonaldtown Triangle, gasworks 935 m to the south west.

Two of the above are considered to be up-gradient to the south west of the site. However, due to their distance from the site (i.e. greater than 500 m) these would not be considered likely to have impacted the site.

Lotsearch also notes that the site, as part of the larger University of Sydney, holds a licence for hazardous, industrial or Group A waste generation or storage. This indicates that hazardous storage may be located within or near to the site.

6.2 NSW SafeWork Records Searches

A search of the NSW SafeWork's records of the Stored Chemical Information Database (SCID) could not be made available, however, sources at the University provided the following information by email:

- the Electrical Engineering Building (J03) included a large high voltage research facility with a large number of PCB containing electrical equipment; and
- the nearby Civil Engineering (J05) building contained large underground water tanks and systems which were used for fluid dynamics research and were previously contaminated with mercury.

The University indicated that the previous Dangerous Goods licence number was 35/000157, and the current notification reference was NDG000157. Plans of DG locations in the vicinity of Building J03 were also provided, but indicated no major DG facilities in the building itself (see Appendix C).

6.3 Council Records

Council's records including development applications and approvals, and information regarding any site audits within the lot were not available at the time of this draft report.

6.4 Section 149 (2 and 5) Planning Certificate

The Section 149 Certificate was obtained for Lot 1 DP 790620. The site is located within the local government area of the City of Sydney. The site is zoned as SP2: Infrastructure.

As prescribed by section 59 (2) of the Contaminated Land Management Act 1997 additional matters to be specified in a planning certificate are as follows:

(a) The land to which this certificate relates is not significantly contaminated land.

(b) The land to which this certificate relates is not subject to a management order.

(c) The land to which this certificate relates is not the subject of an approved voluntary management proposal.

(d) The land to which this certificate relates is not subject to an ongoing maintenance order.

(e) The land to which this certificate relates is subject to a site audit statement.

It is noted in the Planning Certificate that a copy of the site audit statement has been provided to Council. The site audit statement was not, however, made available at the time of finalising this report.

The Section 149 (2 and 5) Planning Certificate is included in Appendix C.

6.5 Historical Title Search

A historical title deed search was undertaken to cover approximately the past 100 years and is summarised below. Determination of the ownership or occupancy of the property, including company names, can assist in the identification of previous land uses and therefore assists in establishing potentially contaminating activities. The land title certificates are included in Appendix C.

The site is currently owned by the University of Sydney, who were registered as proprietors since 1994. Ownership of the property prior to this time is summarised in Table 3, below, together with the occupation of the owner given in the title and the possible use of the site or nature of the business of the site/owner

Table 3: Land Deed Titles

Date of Acquisition and term held	Registered Proprietor(s) & Occupations	Landuse	Section of the site (on the attached cadastre – Appendix C)
1866 to 1920	Henry Todd (Dairyman)	Unknown	Part tinted blue
1886 to 1927	Thomas Warren (Seedsman)	Unknown	Part tinted green and numbered (6)
1902 to 1919	James Wilson (Contractor)	Unknown	Part tinted yellow and numbered (3)
1909 to 1918	Angela Moir (Spinster) Now Angela Tunbridge (Married Woman)	Unknown	Part tinted yellow and numbered (1) and (2)

Date of Acquisition and term held	Registered Proprietor(s) & Occupations	Landuse	Section of the site (on the attached cadastre – Appendix C)
1909 to 1911	William Campbell (Contractor)	Unknown	Part tinted green and numbered (5)
1911 to 1925	Frederick Petley (Tobacconist)	Unknown	Part of the parts tinted yellow and numbered (5) and (6)
1911 to 1923	James Wilson (Contractor)	Unknown	Part tinted green and numbered (5)
1913 to 1925/1945	Alice Elizabeth Harrison (Spinster)	Unknown	Part tinted yellow and numbered (4), part (5) and (6)
1918 to 1919	Annie Ross (Widow)	Unknown	Parts tinted yellow and numbered (1) and (2)
1919 to 1955/1956	Glaud Reay Walker (Medical Student) (& His Deceased Estate)	Unknown	Part tinted yellow and numbered (1), (2) and (3)
1920 to 1941	William Smith Deane (Solicitor), Henry Hamilton Maze (Grazier)	Unknown	Part tinted blue
1921 to 1960	Imelda Marion O'Brien (Spinster) Now Imelda Marion McMahon (Married Woman)	Unknown	Part tinted yellow and numbered (7)
1921 to 1957	Michael O'Brien (Licensed Victualler)	Unknown	Part tinted green and numbered (1) and (2)
1923 to 1923	Glaud Reay Walker (Medical Student) (& His Deceased Estate)	Unknown	Part tinted green and numbered (5)
1923 to 1955	Margery Victoria Walker (Spinster) Now Margery Victoria Turtle (Married Woman)	Unknown	Part tinted green and numbered (5)
1925 to 1927	Mabel Austin Nott (Married Woman)	Unknown	Part of the parts tinted yellow and numbered (5) and (6)
1925 to 1938	Richard Walter Harrison (Labourer)	Unknown	Part tinted green and numbered (4)

Date of Acquisition and term held	Registered Proprietor(s) & Occupations	Landuse	Section of the site (on the attached cadastre – Appendix C)
1927 to 1934	Nesbit Spence Freeborn (Gentleman)	Unknown	Parts tinted yellow and numbered (5) and (6)
1927 to 1963	Rosina Trindall (Married Woman)	Unknown	part tinted green and numbered (6)
1927 to 1947	Ethel Grace Watson (Married Woman)	Unknown	Part tinted green and numbered (7)
1928 to 1943	Henrietta Fitz (Married Woman) – for life After, for Henry Robert William Fitz (Tobacco Worker)	Unknown	Part tinted green and numbered (3)
1934 to 1934	Percy John Jeater (Clerk), George Wesley Stewart (Estate Agent), Nelson Freeborn (Retired Farmer)	Unknown	Parts tinted yellow and numbered (5) and (6)
1934 to 1940	Nelson Freeborn (Retired Farmer)	Unknown	Parts tinted yellow and numbered (5) and (6)
1938 to 1938	Suburban Mortgagee Company Proprietary Limited	Unknown	Part tinted green and numbered (4)
1938 to 1954	Jacketta May Tierney (Married Woman, now Widow)	Unknown	Part tinted green and numbered (4)
1940 to 1948	Eliza Maud Freeborn (Spinster), Percy John Jeater (Gentleman)	Unknown	Parts tinted yellow and numbered (5) and (6)
1941 to 1941	William Smith Deane (Solicitor)	Unknown	Part tinted blue
1941 to 1958	Henry Todd (Retired Master Carrier)		Part tinted blue
1943 to 1944	Henry Robert William Fitz (Tobacco Worker)	Unknown	Part tinted green and numbered (3)
1944 to 1946	Sarah Underwood (Widow)	Unknown	Part tinted green and numbered (3)
1945 to 1947	William Robert Fawcett King (Painter)	Unknown	Part tinted yellow and numbered (4)
1946 to 1947	Eva May Playford (Feme Sole)	Unknown	Part tinted green and numbered (3)
1947 to 1961	John Foster (Master Plumber), Ellen Foster (Married Woman) Now Ellen Ricketts (Married woman)	Unknown	Part tinted yellow and numbered (4)

Date of Acquisition and term held	Registered Proprietor(s) & Occupations	Landuse	Section of the site (on the attached cadastre – Appendix C)
1947 to 1960	Gwen Lorraine Fitzell (Married Woman, now Widow)	Unknown	Part tinted green and numbered (3)
1947 to 1963	Mary May Colville Arthur (Widow)	Unknown	Part tinted green and numbered (7)
1948 to 1953	Alice Thelma Young (Married Woman)	Unknown	Parts tinted yellow and numbered (5) and (6)
1953 to 1955	Michael Joseph Killeen (University Attendant)	Unknown	Parts tinted yellow and numbered (5) and (6)
1954 to 1954	Wallace James Smith (Labourer)	Unknown	Part tinted green and numbered (4
1954 to 1960	Eva Simeone (Domestic)	Unknown	Part tinted green and numbered (4)
1955 to 1955	Marciano Investments Pty Limited	Unknown	Parts tinted yellow and numbered (5) and (6)
1955 to 1955	Wallace Allan Bubb (Farmer)	Unknown	Parts tinted yellow and numbered (5) and (6)
1955 to 1960	Carmelo Brancato (Fruiterer), Francesco (Malfitano (Fruiterer)	Unknown	Part tinted yellow and numbered (5)
1955 to 1963	John Panayotopoulos (Fitter)	Unknown	Part tinted yellow and numbered (6)
1955 to 1955	Ernest Gillan (Painting Contractor)	Unknown	Part tinted green and numbered (5)
1955 to 1961	Joseph Vella (Engineer)	Unknown	Part tinted green and numbered (5)
1955/1956 to 1956	Hilda Evelyn Morton (Married Woman), Margory Victoria Turtle (Married Woman), William George Ross Walker (Builder & Contractor) (Trustees)	Unknown	Parts tinted yellow and numbered (1), (2) and (3)
1956 to 1957	George Frederick Cratchley (Company Director)	Unknown	Part tinted yellow and numbered (1), (2) and (3)

Date of Acquisition and term held	Registered Proprietor(s) & Occupations	Landuse	Section of the site (on the attached cadastre – Appendix C)
1957 to 1964	Harry Attard (Oxy-Welder), Mary Attard (Married Woman)	Unknown	Part tinted green and numbered (1) and (2)
1957 to 1960	Ernest Hugh Gillan (Contractor)	Unknown	Part tinted yellow and numbered (1), (2) and (3)
1958 to 1961	Rupert James Todd (Telegraph Technician), Albert George Todd (Bank Manager)	Unknown	Part tinted blue
1958 to 1964	Nicolas Cardiacos (Truck Driver), Doxa Cardiacos (Married Woman)	Unknown	Part tinted green and numbered (2)
1960 to 1963	Panagiotis Gardikiotis (Labourer)	Unknown	Part tinted yellow and numbered (2)
1960 to 1964	Andrew Karavias (Labourer), Amalia Karavias (Married Woman)	Unknown	Part tinted yellow and numbered (1)
1960 to 1964	Nicolaos Caperonis (Labourer)	Unknown	Part tinted yellow and numbered (3)
1960 to 1962	Andrew Joseph Marks (Fitter & Turner)	Unknown	Part tinted green and numbered (3)
1963 to 1964	Alexander Buckingham Walker – Smith (Married Woman) (Trustee)	Unknown	Part tinted green and numbered (6)
1964 to 1064	Alexander Buckingham Walker – Smith (Married Woman), Noel William Warner (Solicitor) (Trustees)	Unknown	Part tinted green and numbered (6)
1964 to 1969	The University of Sydney	University Facilities	Whole site – except parts tinted pink
1969 to 1994	Her Most Gracious Majesty Queen Elizabeth the Second (Resumed for the purposes of the University of Sydney, declared to be an institution for the purpose of the Land Acquisition (Charitable Institutions) Act, 1946	University Facilities	Whole site
1994 to date	The University of Sydney	University Facilities	Whole site

6.6 Historical Aerial Photography and Historical Maps

Historical aerial photographs from 12 periods of photography and six maps, provided by Lotsearch Pty Ltd were reviewed (refer to Appendix C). The photographs and maps indicated that the site has undergone changes in layout since the earliest available map dated 1917.

The historical aerial photographs were examined for signs of potential areas of environmental concern such as previous structures which may have subsequently been removed, existing structures, stripped soil or areas of filling or disturbance or other signs of a potentially contaminating nature. The historical maps were examined for land uses that could be potential sources of contamination. The findings of the review are summarised below in Table 4.

Table 4: Historical Aerial Photograph/Map Observations

Aerial Photograph/Map (Year)	Observations
1917 (Map)	• The site and surrounding area was likely to have been residential with the University of Sydney noted to the west of the site.
1930 (Photo)	• The site appeared to have been mostly residential properties; • It is possible there was some commercial use particularly at the southern portion of the site; • A road crossed through the centre of the site and a second road was noted perpendicular through the southern end of the site; • Maze Crescent to the west and Sheppard Street to the east were visible; and • The surrounding area appeared to be residential with possible scattered commercial properties in all directions.
1943 (Photo)	• The site remained generally the same as the *1930 Photograph* with some possible additional commercial development at the southern boundary; and • Additional development (likely commercial) had occurred to the north, east and south of the site.
1938-1951 (Map)	• The site was likely to have been residential, possibly with some commercial properties; and • A road (Rose Street) crossed through the centre of the site and a second road (Calder Street) was noted perpendicular through the southern end of the site.
1949 (Map)	• The site and surrounding area appeared to be similar to the *1917 Map* with the development of the Hospital Tower to the south west of the site.
1951 (Photo)	• The site and surrounding area remained generally the same as the *1943 Photograph*.
1955 (Photo)	• The site and surrounding area remained generally the same as the *1951 Photograph* with a building demolished to the east of the site.

Aerial Photograph/Map (Year)	Observations
1956 (Map)	• The site and surrounding area remained generally the same as the *1938-1950 Map,* two commercial properties were named within the site (Bazton & Carr and Kingslea Pty Ltd)
1961 (Photo)	• The site and surrounding area remained generally the same as the *1943 Photograph*; and • Some additional redevelopment (possibly commercial) had occurred to the west, south and east of the site.
1965 (Photo)	• Most of the sites structures had been demolished with the former building footprints visible; • Parts of the surrounding area in all directions had also been demolished; and • Development had occurred to the south of the site (likely university buildings).
1970 (Photo)	• A large building (university building) had been constructed on the site; • The remaining buildings within the site noted in the *1965 Photograph* had been demolished; • Additional development had occurred to the south of the site; • More buildings to the north of the site had been demolished; • Redevelopment had also occurred to the west of the site likely as part of the University of Sydney expansion.
1956 (Map)	• The site and surrounding area appeared to be part of the University of Sydney.
1982 (Photo)	• Buildings had been constructed at the eastern end of the site; and • Development had occurred to the north and west of the site likely as part of the University of Sydney expansion; and • A park had been established to the west of the site; and • Redevelopment had also occurred in parts to the east of the site
1991 (Photo)	• The site and surrounding area remained generally the same as the *1982 Photograph* with additional redevelopment to the east of the site.
2000 (Photo)	• A building was constructed at the eastern end of the site; • Some redevelopment had occurred to the north, west, east and south.
2009 (Photo)	• The site and surrounding area remained generally the same as the 2002 *Photograph* with some continued redevelopment to the north, west and south of the site.
2015 (Map)	• The site was part of the University of Sydney occupied by a few buildings; and • The surrounding area to the north, south and west was also part of the University of Sydney, and the east was likely residential and commercial.

Aerial Photograph/Map (Year)	Observations
2016 (Photo)	) The surrounding area remained generally the same as the *2009 Aerial Photograph.*

It is noted that data obtained from aerial photographs was limited due to the relatively small scale and poor resolutions when enlarged.

6.7 Historical Business Directory

A review of historical business directories was provided by Lotsearch Pty Ltd (refer to Appendix C). The directory was available for 1950, 1961, 1965, 1970, 1975, 1978, 1982, 1986 and 1991. The potential contaminating activities within a 150 m radius are shown in Table 5 below. Motor garages, engineers and services stations, and dry cleaners, pressers and dryers within a 500 m radius are shown in Table 6 below. Lotsearch Pty Ltd provided a list of motor garages, engineers and services stations, and dry cleaners, pressers and dryers within a 1 km radius however it is considered that those beyond a 500 m radius would be most unlikely to have potentially impacted the site.

Table 5: Potentially contaminating activities within a 150 m radius

Industry	Distance to site (m)	Year
Manufacturers (bedstead, chemical, display fittings, woodware, sports goods, clock case, tennis and/or squash racquet press, sanitary fitting and hardware), sprayers, printers, and tobacco processors at various times	0 m Road Match	1950, 1961, 1965 and 1970
Mattress and bedding manufacturers	3 E	1950
Collar and harness manufacturers	7 E	1950
Printers	16 Road match	1950, 1961, 1965 and 1970
Boiler and furnace cleaners, boilermakers, and engineers-general and/or manufacturers	17 SW	1950
Engineers – repetition	20 S	1961
Founders, and manufacturers (metal work, bearings and bushes)	20 S	1965 and 1970
Coal and coke merchants	20 SE	1965
Box and case merchants and manufacturers	22 S	1950
V-belt drive specialists	22 E	1965
Cardboard box and carton manufacturers, printers and abrasive manufacturers	23 SE	1950
Brands and branding cradle manufacturers	23 SE	1961, 1965 and 1970

Industry	Distance to site (m)	Year
Engineers (including structural, supplies and transmission) and manufacturers (including transmission belting, wax and belting-leather, rubber and plastic, abrasive distributors, essence fire protection appliance, toilet preparations) at various times	26 E	1950, 1961, 1965, 1970, 1975 and 1978 directories
Painters, sheet metal workers and dust collection equipment manufacturers at various times	38 NE	1950, 1961, 1965 and 1970
Air compressor manufacturers	38 NE	1961
Cotton waste merchants, cleaning cloth manufacturers, and waste product merchants	46 E	1950
Sheet metal workers, steel fabricators, engineers-hot water ventilating/filtration at various times	66 N	1950, 1961, 1965 and 1970
Chemists and powder puff manufacturers	72 m NW	1950
Furniture manufacturers, scrap metal and metal merchants	76 S	1950
Engineers – foundry	81 NW	1950
Paper clip manufacturers	81 W	1950
Manufacturers (handle, garden tool. mop, furnishing, blind, and cabinetmakers)	85 m/86 NW	1950
Motor panel beaters, painters, repairs and dealers, and welders	86 NW	1961
Handbag and leather goods manufacturers	86 Road match	1970
Motor painters, panel beaters, trimmers, and body builders, metal spinners, brass finishers, kitchenware manufactures, electrical supplies/appliance manufacturers, and sheet metal works at various times	87 N	1950 and 1961
Bath and sink heater repairs	87 N	1950, 1961, 1965 and 1970
Paint, varnish, oil and colour merchants	97 E	1950
Brewers and maltsters, engineers-general and/or manufacturing, manufacturers (bottle filling machinery, bottle washing machinery and machinery) at various times	98 NE	1950, 1965 and 1970
Furniture manufacturers	100 S	1961
Manufacturers (display model, and display fittings)	101 NE	1965
Toy manufacturers and metal pressers and stampers	104 W	1950
Manufacturers (floor polishing machine, detergents, disinfectants and cleaning aids, floor polishing machine, cleansers and/or cleaning preparations, adhesives, wax, polish, soap, chemists, insecticide, antiseptic, deodorant, bituminous tar oils and/or paint, and printers) and oil wood preserving merchants at various times	102/105 E	1965, 1970, 1975, 1978, 1982 and 1986
Motor accessories/dealer	104 W	1970

Industry	Distance to site (m)	Year
Printers	110 and 114 E	1982
Motor painters and panel beaters, welders, manufacturers (refrigeration equipment, ammonia compressor) and engineers (refrigeration)	112 SE	1950
Manufacturers (clothing, bathroom equipment, safes/strongroom door, recording equipment, public address loud speaker, radio loud speaker, electrical instruments, electronic equipment, stereophonic equipment, and printers), and engineers (electronic) at various times	110 and 114 E	1950, 1961, 1970 and 1975
Manufacturers (plastic good, bandsaw blades and machine tools) at various times	116 Road match	1950 and 1970
Founders,	116 S	1950
Manufacturers (trucks and trolleys, scaffolding, ladder and rung and furniture),	117 NW	1950
Engineering-general and/or manufacturing	121 SW	1950
Coppers – electric manufacturers and/or distributors, electrical conduit/wiring accessories manufacturers, and railway equipment manufacturers at various times	121 SW	1961 and 1965
Motor printers, panel beaters, motor garages and engineers, and motor car/truck dealers	121 SW	1970
Manufacturers (belt, bedding, bedstead and wire mattress) and founders	122 S	1961
Manufacturers (electric terminal, electric toaster, electric heater, automotive electrical, battery parts, electrical supplies and appliances), and electrical engineers	122 W	1950
Metal stampers and rustic manufacturers	123 W	1950
Bedding and bedstead manufacturers	126 N	1965
Picture frame manufacturers, engineers (woodworking, general and/or manufacturing, precision, production and repetition), enamellers, sprayers and motor cycle sales/service at various times	123 Road match	1950, 1961, 1965, 1970, 1982 and 1986
Manufacturers (clothing, textile, knitted goods and woollen)	125/126 N	1961, 1950, 1965, 1970, 1975, 1978, 1982 and 1986
Sports goods and leather goods manufacturers	126 N	1950
Manufacturers (railway equipment and electric toaster) at various times	129 NE	1950 and 1961
Manufacturers (carpet sweeper, disinfectant, wax and chemists),	129 E	1975 and1986
Furniture Manufacturers	133 E	1986

Industry	Distance to site (m)	Year
Manufacturers (caravan fitting and/or spare parts, and motor car springs)	133 E	1950, 1961, 1965, 1970, 1975 and 1978
Electrical switch and control gear manufacturers, and electrical engineers	134 W	1950
Sheet metal workers	140 S	1950
Printers	142 W	1961 and 1965
Furniture manufacturers	149 SW	1950
Battery Service Stations	223 E	1950 and 1961

Based on the inferred groundwater flow to the north east, there are a number of activities of concern up-gradient of the site between 17 m and 121 m in the 1950, 1961, 1965 and 1970 directories. Given the length of time since these were in operation it is considered unlikely that there would be any residual impacts on the site.

Manufacturers (bedstead, chemical, display fittings, woodware, sports goods, clock case, tennis and/or squash racquet press, and sanitary fitting and hardware), sprayers, printers, and tobacco processors were at various times noted on the site in the 1950, 1961, 1965 and 1970 directories. Again given the length of time since these operations and the significant changes to the site since 1970, there are unlikely to be residual impacts remaining on the site. It is noted that only the tobacco processors were present in 1970. Given the manufacturing of hardware and furniture occurred prior to 1970 it is unlikely to have involved the use of per- and poly- fluoroalkyl substances (PFAS).

Table 6: Motor garages, engineers and services stations, and dry cleaners, pressers and dryers with a 500 m radius

Motor garages, engineers and service stations	
Direction	**Distance to site (m) and Year**
North	300 m in 1950 and 1961, 319 m in 1961, 1965, 1970, 1978 and 1982
North east	237 in 1961, 1965, 1970, 1978 and 1980, 240 m in 1975, 280 m in 1982 and 1991, 351 m in 1951, 484 m in 1950 and 1961
South west	121 m in 1970
East	201 m in 1961, 252 m in 1950, 1965 and 1970, 254 m in 1961, 266 m in 1965 and 1970, 322 m in 1982 and 1986, 338 m in 1965, 349 m in 1970, 1978, 1982 and 1986, 351 m in 1975, 357 m in 1970, 370 m in 1961, 371 m in 1950, 1965 and 1970, 389 m in 1961, 436 m in 1950
Dry cleaners, pressers and dryers	
Direction	**Distance to site (m) and Year**
North east	26 m in 1950 and 1961, 174 m in 1950, 426 m in 1950, 489 m in 1950 and 1975,
South east	210 m in 1975, 215 m in 1950, 393 m in 1986, 610 m in 1950, 1961, 1965, 1970 and 1975

Motor garages, engineers and service stations	
Direction	**Distance to site (m) and Year**
East	440 m in 1961, 1965 and 1970

Three motor garages, engineers and service stations were also noted as a road match between 417 m and 463 m from the site and 1 dry cleaner, presser and dryers was noted as a road match at 487 m from the site.

One motor garage, engineers and service station was noted within 500 m up-gradient of the site, at 121 m in the 1970 directory. Given the length of time since its operation, there is unlikely to be residual impacts on the site. No dry cleaners, pressers and dryers were noted within 500 m up-gradient of the site.

7. Site Walkover

A site walkover was undertaken on 8 December 2017. The objective was to check and identify (where possible) the likely presence, or otherwise, of potential sources of contamination with reference to the site history review, and to identify and comment on additional potential sources of contamination which were encountered/observed. Drawing 1 (Appendix B) and Photographs 1 and 2 below show the layout of the site.

Photograph 1: Car park at southern end

Photograph 2: University facilities in building

The site walkover confirmed that the site is currently occupied mainly by a building containing university facilities, including office and teaching spaces. The eastern end of the site comprises paved external areas and a second university building. A car park was noted in the southern end of the site and a garden/grassed area within the northern end of the site. Mature trees were noted along the western and northern boundaries.

8. Potential for Contamination

The site history review indicated that prior to university land uses the site was mostly residential with some commercial operations possibly including manufacturers (bedstead, chemical, display fittings,

woodware, sports goods, clock case, tennis and/or squash racquet press, sanitary fitting and hardware), sprayers, printers, and tobacco processors.

Given the length of time since the commercial operations on the site and the extensive redevelopment since then, residual contamination from former land uses is considered unlikely to be present.

Between 1965 and 1970 the site was redeveloped as part of the University of Sydney with the construction of a large building. Additional university development has continued over the years. The site walkover indicated that the site was mostly occupied by a large building containing university facilities. The University of Sydney holds a licence for hazardous, industrial or Group A waste generation or storage. This indicates that hazardous storage may be located within or near to the site.

Correspondence from the University confirmed that:

- the Electrical Engineering Building (J03) included a large high voltage research facility with a large number of PCB containing electrical equipment; and
- the nearby Civil Engineering (J05) building contained large underground water tanks and systems which were used for fluid dynamics research and were previously contaminated with mercury.

The presence of PCB containing equipment would in itself pose no significant risk to the environment unless leakage or spillage occurred into the substrate during operations or decommissioning. No records of such incidents have been reported by the University.

9. Preliminary Conceptual Site Model

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

9.1 Potential Contamination Sources

Based on Section 7 the potential contamination sources are as follows:

Source 1 (S1) – Possible filling associated with the former and current buildings. Possible contaminants include: metals; total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene and xylene (BTEX); polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochloride pesticides (OCP), phenols and asbestos;

Source 2 (S2) – Storage of hazardous substances (within or near to the site); and

Source 3 (S3) – Hazardous building materials (PCB and asbestos).

9.2 Potential Receptors

9.2.1 Human Health Receptors

Potential human health receptors include the following:

R1 – Current users (university facilities);

R2 – Construction and maintenance workers;

R3 – End users (university facilities); and

R4 – Land users in adjacent areas (university facilities).

9.2.2 Environmental Receptors

Potential environmental receptors include the following:

R5 – Groundwater;

R6 – Terrestrial ecology; and

R7 – Surface water.

9.3 Potential Pathways

Potential pathways for contamination present include the following:

P1 – Ingestion and dermal contact;

P2 – Inhalation of dust and/or vapours;

P3 – Surface water run-off;

P4 – Leaching of contaminants and vertical mitigation into groundwater;

P5 – Lateral migration of groundwater providing baseflow to watercourses; and

P6 – Direct contact with terrestrial ecology.

9.4 Summary of Potential Complete Pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via transport pathways (potential complete pathways). The possible pathways between the above sources (S1, S2 and S3) and receptors (R1 to R7) are provided below in Table 7.

Table 7: Summary of Potential Complete Pathways

Source	Transport Pathway	Receptor	Comments
S1 – Possible filling: metals, TRH, BTEX, PAH, PCB, OCP, , phenols and asbestos. S2 – Storage of hazardous substances in or around the site	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (university facilities). R2 – Construction and maintenance workers. R3 –End users (university facilities).	An intrusive investigation would be required to assess possible contamination including chemical testing of the soils and groundwater if there are to be intrusive works associated with the site development. Hazardous substances such as PCBs and mercury have been stored at the site and environs, but no records of spillages or leakages in to the substrate have been reported by the University. See Notes 1 and 2.
	P2 – Inhalation of dust and/or vapours.	R4 – Land users in adjacent areas (university facilities).	
	P4 – Leaching of contaminants and vertical migration into groundwater.	R5 – Groundwater.	
	P3 – Surface water run-off. P5 – Lateral migration of groundwater providing base flow to watercourses.	R7 – Surface water.	
	P6 – Direct contact with terrestrial ecology.	R6 – Terrestrial ecology.	
S3– Hazardous building materials: PCB and asbestos	P1 – Ingestion and dermal contact. P2 – Inhalation of dust and/or vapours.	R1 – Current users (students and workers). R2 – Construction and maintenance workers. R3 – Final end users (students and workers).	A hazardous building materials survey of the building is required prior to demolition.

1. If an intrusive investigation is required in the future, Leachability testing will be undertaken only if a viable complete pathway between on-site soil contamination and groundwater is identified. Should testing indicate a viable complete pathway between on-site soil contamination and groundwater via a leachable migration pathway then leachability testing (ASLP) may be required.
2. The nearest surface water receptors is pond approximately 400 m to the north of the site in Victoria Park. Should testing if required in the future indicate a viable complete pathway between on-site soil contamination and surface water, testing of surface water may be required.

Appendix D

Data Quality Assessment

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

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

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

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

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S18 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S2 Scope of Works S3 Site Identification S4 Proposed Development S5 Site Geology, Topography and Hydrogeology S6 Site History S7 Site Walkover S8 Conceptual Site Model S11 Fieldwork Observations S12 Results summary
Define the Boundary of the Assessment	S3 Site Identification Drawing 1 (Appendix A)
Develop a Decision Rule	S10 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S10 Site Assessment Criteria Data Quality Assessment – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S9 Fieldwork Data Quality Assessment – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the data quality indicators in Table Q5 and the laboratory results certificates in Appendix F for further details.

Table Q2: Field QC

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

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

Table Q3: Laboratory QC

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

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

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

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

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

Q2.1 Intra-Laboratory Replicates

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

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

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

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

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

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

Lab	Sample ID	Date Sampled	Media	Units	Metals								PAH			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	B(a)P	B(a)P total potential equivalent	Naphthalene	Total +ve PAHs
ELS	BD1/170318	0.1-0.2	Filling	mg/kg	<4	<0.4	30	130	33	0.1	26	160	<0.05	<0.5	<0.1	<0.05
ELS	BH01	0.1-0.2	Filling	mg/kg	<4	<0.4	21	87	25	<0.1	24	110	<0.05	<0.5	<0.1	<0.05
Difference				mg/kg	0	0	9	43	8	0	2	50	0	0	0	0
RPD				%	0	0	**35**	**40**	28	0	8	**37**	0	0	0	0

Q2.2 Inter-Laboratory Analysis

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

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

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

The calculated RPD values exceeded the acceptable range of {M0 but it is considered that this is likely to be a result of the heterogeneous soil matrix which comprised a clay, sandy clay and sand filling with some gravel, rootlets, asphalt, brick, woodchips, charcoal and plastic fragments to depths between 0.5 m and 0.6m.. The difference in lab PQLs may also be a contributing factor in this regard.

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

Lab	Sample ID	Date Sampled	Media	Units	Metals								PAH			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	B(a)P	B(a)P total potential equivalent	Naphthalene	Total +ve PAHs
ELS	BH08	0.1-0.2	Filling	mg/kg	6	0.5	16	57	320	0.4	8	270	0.83	1.2	<0.1	8.4
ALS	BD3/170318	0.1-0.2	Filling	mg/kg	<5	<1	14	53	280	0.4	8	328	1.5	1.9	<0.5	12.4
Difference				mg/kg	1	0.5	2	4	40	0	0	58	0.67	0.7	0.4	4
RPD				%	18	**67**	13	7	13	0	0	19	**58**	**45**	**133**	**38**

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

Q2.3 Field Instrument Calibration

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

Q3. Data Quality Indicators

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

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

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

Table Q6: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project;

Data Quality Indicator	Method(s) of Achievement
	Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Samples were extracted and analysed within holding times. Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates. The laboratory has noted precent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference. The RPD for duplicate results is accepted due to the non-homogenous nature of the sample/s. Overall, satisfactory results were achieved for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

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

Appendix E

Borehole Log Results

Sampling Methods

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Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Soil Descriptions

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Description and Classification Methods

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

Soil Types

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

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

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

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

The proportions of secondary constituents of soils are described as:

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

Definitions of grading terms used are:

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

Cohesive Soils

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

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

Cohesionless Soils

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

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

Soil Descriptions

Soil Origin

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

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

Transported soils may be further subdivided into:

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

Rock Strength

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Degree of Fracturing

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

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

Rock Descriptions

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Symbols & Abbreviations

Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

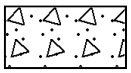
Symbols & Abbreviations

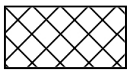
Graphic Symbols for Soil and Rock

General

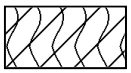

Asphalt

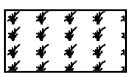

Road base

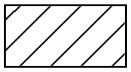

Concrete

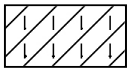

Filling

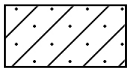
Soils


Topsoil

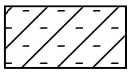

Peat

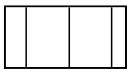

Clay

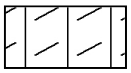

Silty clay

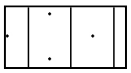

Sandy clay

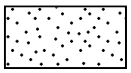

Gravelly clay

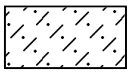

Shaly clay

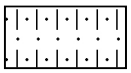

Silt


Clayey silt


Sandy silt

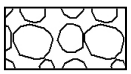

Sand

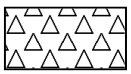

Clayey sand


Silty sand


Gravel

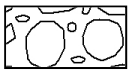

Sandy gravel


Cobbles, boulders

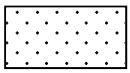

Talus

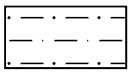
Sedimentary Rocks

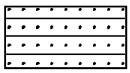

Boulder conglomerate

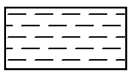

Conglomerate


Conglomeratic sandstone

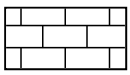

Sandstone


Siltstone

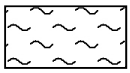

Laminite

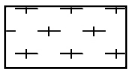

Mudstone, claystone, shale

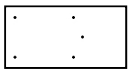

Coal


Limestone

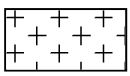
Metamorphic Rocks

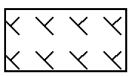

Slate, phyllite, schist

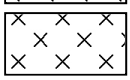

Gneiss

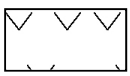

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: The University of Sydney
PROJECT: Building J03
LOCATION: Codrington Street, Darlington

SURFACE LEVEL: 19.6 AHD
EASTING: 332912
NORTHING: 6248610
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 85658.00
DATE: 5/10/2016
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
19	0.02	ASPHALT							A			
	0.05	ROADBASE							A			
	0.6	FILLING - brown, clay filling with a trace of sand, MC>PL							A			
18	1	CLAY - very stiff, orange clay, MC>PL, medium to high plasticity 1.0m: hard, orange mottled grey 1.5-1.8m: ironstone bands						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	S A A			6,10,13 N = 23
	2.2	SHALY CLAY - hard, red-brown shaly clay (residual)							A			
17	2.5	SHALE - extremely low strength, extremely weathered, fractured, light grey and red-brown shale with some iron-cemented bands						2.77-4.1m: B (x5) 0°- 5°, fe, cly	C	100	0	pp >600
16	3											
	4											
15	4.2	SHALE - extremely low to very low strength, extremely to highly weathered, fractured, light grey brown shale with some low to medium strength bands						4.1m: B0°, fe 4.25m: J30°, pl, ro, fe 4.32m: fg, 10mm 4.45m: J35°, un, ro, cly 4.6m: B0°, fe, fg, 20mm 4.76m: J30°, pl, ro, fe	C	100	0	PL(A) = 0.69 pp >600
	5											
14	6							5.5-5.60m: fg 6.23m: J70°, un, ro, fe, 20mm 6.6-6.7m: fg	C	100	0	PL(A) = 0.33
13	6.8	SHALE - medium strength, slightly weathered, highly fractured to fractured, grey-brown shale						6.85-6.95m: fg 7m: CORE LOSS: 350mm	C	78	40	PL(A) = 0.34
	7.35							7.4-7.6m: J45° & 75°, st, ro, cln 7.72-7.9m: fg, cly				PL(A) = 0.56
12	7											
	8							8.12-8.2m: fg 8.35m: J75°, pl, sm, cln				
11	8.5	SANDSTONE - medium and high strength, slightly weathered, slightly fractured, grey-brown medium grained sandstone						8.71m: B5°, fe 8.77m: J45°, un, ro, cln	C	97	83	PL(A) = 2.7
	9							9.25-9.4m: B (x3) 0°- 5°, fe				PL(A) = 0.53
10	9.95	9.95-10.0m: core left down hole						9.9m: B0°, cly, 10mm				PL(A) = 1.5
	10 10.0	Bore discontinued at 10.0m						9.95m: CORE LOSS: 50mm				

RIG: Bobcat **DRILLER:** GM **LOGGED:** ARM/SI **CASING:** HW to 2.5m

TYPE OF BORING: Solid flight auger (TC-bit) to 2.5m; NMLC-Coring to 10.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: The University of Sydney
PROJECT: Building J03
LOCATION: Codrington Street, Darlington

SURFACE LEVEL: 19.7 AHD
EASTING: 332930.5
NORTHING: 6248650.4
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 85658.00
DATE: 30/9/2016
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
19	0.2	TOPSOIL - dark brown, silty sand topsoil with a trace of fine gravel and near-surface rootlets, damp							A/E			
	0.5	FILLING - grey and brown, slightly sandy clay with some fine ironstone and basalt gravel, MC<PL							A/E			
1		SHALY CLAY - hard, grey mottled red-brown, shaly clay with some ironstone bands, MC<PL						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	A			
	1.3								A			24/100mm refusal (bouncing)
18		LAMINITE - extremely low and very low strength, highly weathered, highly fractured, light grey-brown laminite with some low to medium strength iron-cemented bands						1.3-1.4m: fg 1.4-1.76m: B's 0°, fe, cly, 10mm 1.76-1.73m: Cs 1.83-1.88m: Cs 2.08-2.25m: Ds 2.3-2.5m: B (x3) 0°, fe, cly, 10mm	S			
2	2.4	SHALE - low to medium strength, moderately to slightly weathered, highly fractured to fractured, grey-brown shale with some fine sandstone laminations							C	100	20	PL(A) = 0.35
17								2.92-3.2m: fg 3.25m: J30°, pl, ro, fe 3.6m: J30°, pl, ro, fe 3.72m: J30°, pl, ro, fe 4.07m: J45°, he, fe	C	100	10	PL(A) = 0.73
16	4											
15								4.67m: J85°, pl, ro, fe, fg 4.86m: J85° & 70°, st, ro, cln	C	100	50	PL(A) = 0.57
14	5.0	SHALE - high strength, slightly weathered then fresh, fractured and slightly fractured, dark grey shale						5.3m: J85°, un, ro, fe 5.5-5.83m: J (x3) 80°, pl, sm, cln	C	100	94	PL(A) = 1.3
13	6							6.05m: J70°- 80°, cu, sm, cln 6.2-6.3m: J (x3) 70°, pl, sm, cln				
12	7								C	100	90	PL(A) = 2 PL(A) = 1.1
11	8	8.0-8.25m: very low to low strength, fragmented shale						7.85m: J45°, pl, sm, cln 8.0-8.04m: Sz, fg				
	8.65	SILTSTONE - high strength, fresh, fractured, light grey siltstone						8.3-8.5m: J (x2) 35°- 40°, pl, sm, qn?? 8.7-8.9m: J (x4) 30°- 35°, un, ro, cln	C	100	80	PL(A) = 1
10	9	9.5m: becoming fine sandstone						9.1-9.3m: J (x4) 60°- 70°, un, ro, ti 9.5 & 9.6m: J45°- 50°, pl, ro, cln				PL(A) = 2.1
	9.85	SANDSTONE - see next page										

RIG: Bobcat **DRILLER:** GM **LOGGED:** ARM **CASING:** HW to 1.3m

TYPE OF BORING: Solid flight auger (TC-bit) to 1.0m; Rotary to 1.3m; NMLC-Coring to 11.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Co-ordinates obtained via DGPS

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: The University of Sydney
PROJECT: Building J03
LOCATION: Codrington Street, Darlington

SURFACE LEVEL: 19.7 AHD
EASTING: 332930.5
NORTHING: 6248650.4
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 85658.00
DATE: 30/9/2016
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SANDSTONE - medium strength, slightly weathered, slightly fractured, medium to coarse grained sandstone *(continued)*						9.96 & 10.1m: B (x2) 5°, fe	C	100	80	PL(A) = 0.92
	11 11.0	Bore discontinued at 11.0m										

RIG: Bobcat **DRILLER:** GM **LOGGED:** ARM **CASING:** HW to 1.3m

TYPE OF BORING: Solid flight auger (TC-bit) to 1.0m; Rotary to 1.3m; NMLC-Coring to 11.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Co-ordinates obtained via DGPS

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: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: 19 AHD
EASTING: 332903.2
NORTHING: 6248625.6
DIP/AZIMUTH: 90°/--

BORE No: BH01
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
19		FILLING - brown, slightly clayey, fine to medium sand filling with some roadbase gravel and rootlets		A*	0.0				
		- with some light brown clay from 0.1-0.2m			0.1				
		- becoming light brown at 0.2m							
	0.3	Bore discontinued at 0.3m on tree root							
18	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BDI/170318 taken from 0.0-0.1

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: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332902.5
NORTHING: 6248578
DIP/AZIMUTH: 90°/--

BORE No: BH02
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark brown, slightly sandy clay filling with some rootlets and blue metal gravel and traces of asphaltic concrete, brick and plastic fragments		A	0.0				
					0.1				
		-becoming mottled light brown at 0.6m		A	0.4				
					0.5				
	0.7	Bore discontinued at 0.7m on brick							
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.7m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Raised planter bed with filling

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: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332896.1
NORTHING: 6248603.7
DIP/AZIMUTH: 90°/--

BORE No: BH03
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark grey, slightly sandy clay with some rootlets, moist		A	0.0				
					0.1				
		- with some light grey mottled brown clay lumps and brick fragments from 0.4m		A	0.4				
	0.5	FILLING - dark grey and grey-brown clay filling with some rootlets and a trace of sand and charcoal			0.5				
				A	0.65				
					0.75				
	0.85	Bore discontinued at 0.85m on tree root							
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased
TYPE OF BORING: Hand Auger to 0.85m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332951.4
NORTHING: 6248657.7
DIP/AZIMUTH: 90°/--

BORE No: BH04
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING -brown, slightly clayey sand filling with some grass rootlets, moist		A	0.0				
	0.25	FILLING - grey-brown, sandy clay filling with some rootlets and traces of sandstone, shale gravel, charcoal and roadbase gravel			0.1				
	0.5	CLAY - apparently stiff, brown mottled grey and orange clay with some sand and traces of rootlets, moist		A	0.4				
	0.8	Bore discontinued at 0.8m		A	0.5				
	1				0.6				1
					0.7				

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332925.2
NORTHING: 6248675.8
DIP/AZIMUTH: 90°/--

BORE No: BH05
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, fine and medium clayey sand filling with some woodchips, sandstone and roadbase gravel		A	0.0				
					0.1				
	0.2	FILLING - light grey and brown, fine to medium sand and clay filling with some crushed sandstone, moist							
				A	0.3				
	0.4	Bore discontinued at 0.4m on sandstone block			0.4				
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.4m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332944.7
NORTHING: 6248671
DIP/AZIMUTH: 90°/--

BORE No: BH06
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, fine to medium, clayey sand filling with some rootlets and traces of crushed shale and sandstone gravel and brick fragments.		A	0.0 0.1				
	0.4	Bore discontinued at 0.4m on sandstone block							
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased
TYPE OF BORING: Hand Auger to 0.4m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 333016.4
NORTHING: 6248602.6
DIP/AZIMUTH: 90°/--

BORE No: BH07
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - grey, slightly clayey, medium sand filling with some mulch, roadbase gravel, traces of plastic and brick fragments		A*	0.0 - 0.1				
	0.15	FILLING - dark grey, slightly clayey, medium, sand with some roadbaset gravel							
	0.25	Bore discontinued at 0.25m due to risk to services							
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.25m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD2/170318 taken at 0.0 - 0.1

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: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 333013.5
NORTHING: 6248610.6
DIP/AZIMUTH: 90°/--

BORE No: BH08
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark grey, slightly sandy, clay filling with some ripped sandstone gravel, traces of shale gravel; brick and glass fragments, damp		A*	0.0				
					0.1				
					0.4				
		- becoming moist at 0.7m		A					
		- traces of asphaltic concrete and decomposing organic matter from 0.6m			0.5				
	0.8	FILLING - dark grey-brown clay filling with traces of rootlets, decomposing organic matter and crushed shale fragments, moist							
				A	0.9				
	1.0	Bore discontinued at 1.0m			1.0				1
		TBR							

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 1.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: *BD3/170318 taken at 0.0 - 0.1

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: Laing O'Rourke
PROJECT: Detailed Site Investigation
LOCATION: University of Sydney Electrical Engineering Building JO3 Darlington

SURFACE LEVEL: --
EASTING: 332972.6
NORTHING: 6248649.7
DIP/AZIMUTH: 90°/--

BORE No: BH09
PROJECT No: 85658.02
DATE: 17/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark grey, slightly clayey, medium sand filling with some rootlets		A	0.0				
					0.1				
		- becoming grey at 0.2m							
	0.3	FILLING - grey brown, slightly sandy clay filling with traces of roadbase gravel, moist		A	0.35				
	0.4	Bore discontinued at 0.4m on concrete			0.4				
	1								1

RIG: Hand tools **DRILLER:** MW **LOGGED:** MW **CASING:** Uncased

TYPE OF BORING: Hand Auger to 0.4m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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Appendix F

Results Tables F1

Laboratory Certificates and Chain of Custody

Table F1: Summary of Laboratory Results

	8 metals in soil									Cyanide TPhenol 2.5g	Inorg Soil - DRY		Moisture	OCs in Soil																	
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Asbestos	Phenolics Total	Chloride	Sulphate	Moisture	4,4-DDE	a-BHC	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil	3000	900	3600	240000	1500	730	6000	400000		240000						45			530				3600			2000		100			50
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand																															
CRC Care Direct Contact HSL-D																															
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil																															
EQL	4	0.4	1	1	1	0.1	1	1		5	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																											
BD1/170318	BD1/170318		17/03/2018	filling	<4	<0.4	30	130	33	0.1	26	160	ND	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01	0-0.1	17/03/2018	filling	<4	<0.4	21	87	25	<0.1	24	110	ND	<5	-	-	9.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH02	BH02	0-0.1	17/03/2018	filling	4	<0.4	12	27	59	0.1	20	59	ND	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	BH02	0.4-0.5	17/03/2018	filling	<4	<0.4	11	39	46	<0.1	26	58	ND	<5	-	-	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH03	BH03	0-0.1	17/03/2018	filling	52	0.4	13	32	120	<0.1	7	130	ND	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	BH03	0.65-0.75	17/03/2018	filling	10	<0.4	24	29	100	0.2	10	100	ND	<5	-	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04	BH04	0-0.1	17/03/2018	filling	<4	<0.4	5	12	32	<0.1	3	56	ND	<5	-	-	15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04	BH04	0.4-0.5	17/03/2018	filling	5	<0.4	10	14	81	<0.1	2	56	ND	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04	0.6-0.7	17/03/2018	natural	<4	<0.4	9	7	25	<0.1	<1	7	ND	<5	-	-	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH05	BH05	0.3-0.4	17/03/2018	filling	<4	<0.4	9	29	80	0.7	5	61	ND	<5	-	-	12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH06	BH06	0-0.1	17/03/2018	filling	<4	0.4	12	34	530	0.2	6	230	ND	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	BH07	0-0.1	17/03/2018	filling	<4	<0.4	19	55	93	0.2	26	220	ND	<5	-	-	17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH08	BH08	0-0.1	17/03/2018	filling	6	0.5	16	57	320	0.4	8	270	ND	<5	-	-	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH08	BH08	0.4-0.5	17/03/2018	filling	<4	<0.4	7	5	47	0.3	2	16	ND	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	BH08	0.9-1	17/03/2018	filling	5	<0.4	13	11	88	0.1	3	640	ND	<5	-	-	19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH09	BH09	0.35-0.4	17/03/2018	filling	5	<0.4	25	31	41	<0.1	18	91	ND	<5	-	-	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	0.4-0.5	5/10/2016	filling	7	<0.4	24	4	25	<0.1	4	47		<5	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.9-1	5/10/2016	natural	6	<0.4	15	1	23	<0.1	<1	1		<5	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	1.45-1.5	5/10/2016	natural	7	<0.4	12	6	18	<0.1	<1	<1		<5	85	62	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	2.4-2.5	5/10/2016	natural	10	<0.4	11	13	17	<0.1	<1	2		<5	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1 - [TRIPLICATE]	BH1 - [TRIPLICATE]	0.4-0.5	5/10/2016	filling	8	<0.4	24	12	39	<0.1	8	96		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.1-0.2	30/09/2016	topsoil	<4	<0.4	7	79	54	<0.1	4	120		<5	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.4-0.5	30/09/2016	filling	5	<0.4	7	60	300	<0.1	6	190		<5	<10	10	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Statistical Summary																															
Number of Results					23	23	23	23	23	23	23	23		16	2	2	22	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Number of Detects					13	3	23	23	23	9	19	22		0	1	2	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<4	<0.4	5	1	17	<0.1	<1	<1		<5	<10	10	9.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect					4	0.4	5	1	17	0.1	2	1		ND	85	10	9.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					52	0.5	30	130	530	0.7	26	640		<5	85	62	22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect					52	0.5	30	130	530	0.7	26	640		ND	85	62	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration					6.5	0.23	15	34	95	0.13	9.1	118		2.5			15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration					5	0.2	12	29	47	0.05	6	91		2.5	45	36	14.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation					10	0.082	7	32	124	0.16	9.2	137		0			3.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances					0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table F1: Summary of Laboratory Results

					OPs in Soil												Organochlorine Pesticides																			
					Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil						80	2500			2000														530													
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand																																				
CRC Care Direct Contact HSL-D																																				
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil																																				
EQL					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																	
BD1/170318	BD1/170318		17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	BH02	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	BH02	0.4-0.5	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	BH03	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03	BH03	0.65-0.75	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH04	BH04	0.6-0.7	17/03/2018	natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05	BH05	0.3-0.4	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH06	BH06	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07	BH07	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	BH08	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	BH08	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08	BH08	0.9-1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH09	BH09	0.35-0.4	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH1	BH1	0.4-0.5	5/10/2016	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	0.9-1	5/10/2016	natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	1.45-1.5	5/10/2016	natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	2.4-2.5	5/10/2016	natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1 - [TRIPLICATE]	BH1 - [TRIPLICATE]	0.4-0.5	5/10/2016	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.1-0.2	30/09/2016	topsoil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH2	BH2	0.4-0.5	30/09/2016	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Statistical Summary																																					
Number of Results					10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table F1: Summary of Laboratory Results

					Organophosphorus Pesticides													PAHs in Soil																					
					Methoxychlor	Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Benzo(a)pyrene TEQ (LOR)	Benzo(b+j+k)fluoranthene	Total Positive PAHs	Benzo(a)pyrene TEQ calc (Half)	Benzo(a)pyrene TEQ calc (Zero)	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Arochlor 1016	Arochlor 1221
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																		40		4000																			
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand																																		NL				
CRC Care Direct Contact HSL-D																																		11000				
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil																																						
EQL					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.2	0.05	0.5	0.5	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																																			
BD1/170318	BD1/170318		17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
BH01	BH01	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2
BH02	BH02	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.6	4	0.5	<0.5	<0.1	<0.1	0.2	0.3	0.4	0.3	0.3	<0.1	0.7	<0.1	0.3	<0.1	0.4	0.7	-	-
BH02	BH02	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5	3.4	<0.5	<0.5	<0.1	<0.1	0.2	0.2	0.3	0.2	0.3	<0.1	0.5	<0.1	0.3	<0.1	0.4	0.5	<0.1	<0.1
BH03	BH03	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.6	3.3	0.5	<0.5	<0.1	<0.1	<0.1	0.2	0.4	0.3	0.3	<0.1	0.5	<0.1	0.3	<0.1	0.2	0.5	-	-
BH03	BH03	0.65-0.75	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.7	3.8	0.6	0.5	<0.1	<0.1	<0.1	0.3	0.4	0.3	0.3	<0.1	0.6	<0.1	0.3	<0.1	0.2	0.6	<0.1	<0.1
BH04	BH04	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	0.3	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
BH04	BH04	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	0.4	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	-	-
BH04	BH04	0.6-0.7	17/03/2018	natural	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH05	BH05	0.3-0.4	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	7.8	0.9	0.8	<0.1	0.2	0.4	0.7	0.63	0.4	0.5	<0.1	1.4	<0.1	0.4	<0.1	0.8	1.4	<0.1	<0.1
BH06	BH06	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	3.1	3.2	22	3.1	3.1	<0.1	0.5	0.6	2	2.1	1.5	1.5	0.3	3.5	<0.1	1.2	0.1	1.5	3.7	-	-
BH07	BH07	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.6	3.8	0.6	0.5	<0.1	0.1	0.1	0.4	0.4	0.4	0.3	<0.1	0.5	<0.1	0.3	<0.1	0.2	0.6	<0.1	<0.1
BH08	BH08	0-0.1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	1	8.4	1.2	1.2	<0.1	0.2	0.2	0.8	0.83	0.7	0.6	0.1	1.3	<0.1	0.5	<0.1	0.5	1.3	<0.1	<0.1
BH08	BH08	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
BH08	BH08	0.9-1	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH09	BH09	0.35-0.4	17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.2	<0.05	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	0.4-0.5	5/10/2016	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	0.9-1	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	1.45-1.5	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1	BH1	2.4-2.5	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH1 - [TRIPLICATE]	BH1 - [TRIPLICATE]	0.4-0.5	5/10/2016	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.1-0.2	30/09/2016	topsoil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.5	4.3	<0.5	<0.5	<0.1	0.1	0.2	0.3	0.2	0.2	0.5	<0.1	0.7	<0.1	0.2	<0.1	0.5	0.9	<0.1	<0.1
BH2	BH2	0.4-0.5	30/09/2016	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.8	3	22	2.8	2.8	<0.1	0.4	0.6	1.9	2	1.2	1.7	0.2	4	<0.1	0.9	<0.1	1.7	4.3	<0.1	<0.1
Statistical Summary																																						
Number of Results					6	6	6	6	6	6	6	6	6	6	6	6	6	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	16	16
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	9	10	16	8	6	0	6	8	10	12	10	10	3	12	0	10	1	10	12	0	0
Minimum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.2	0	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0.5	0.3	0.5	0.5	ND	0.1	0.1	0.2	0.06	0.2	0.3	0.1	0.1	ND	0.2	0.1	0.2	0.1	ND	ND
Maximum Concentration					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3.1	3.2	22	3.1	3.1	<0.1	0.5	0.6	2	2.1	1.5	1.7	0.3	4	<0.1	1.2	0.1	1.7	4.3	<0.2	<0.2
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.1	3.2	22	3.1	3.1	ND	0.5	0.6	2	2.1	1.5	1.7	0.3	4	ND	1.2	0.1	1.7	4.3	ND	ND
Average Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.65	0.59	3.8	0.62	0.59	0.05	0.1	0.15	0.35	0.37	0.28	0.31	0.07	0.66	0.05	0.24	0.052	0.32	0.7	0.053	0.053
Median Concentration					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.25	0.1	0.35	0.25	0.25	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.15	0.05	0.05	0.05	0.05	0.15	0.05	0.05
Standard Deviation					0	0	0	0	0	0	0	0	0	0	0	0	0	0.79	0.87	6.4	0.79	0.8	0	0.12	0.17	0.56	0.59	0.39	0.45	0.061	1.1	0	0.3	0.011	0.46	1.2	0.013	0.013
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table F1: Summary of Laboratory Results

	PCBs in Soil						TRH Soil C10-C40 NEPM								vTRH & BTEXN in Soil NEPM									
	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	PCBs (Sum of total)	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C10 - C14	C15 - C28	C29-C36	C10 - C40 (Sum of total)	Benzene	Ethylbenzene	Naphthalene	Toluene	C6 - C9	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	C6-C10
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil						7																		
NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand										NL					3	NL		NL				230	250	
CRC Care Direct Contact HSL-D							20000	27000	38000						430	27000		99000				81000		26000
NEPM 2013 Table 1B(7) Management Limits Comm / Ind, Coarse Soil							1000	3500	10000															700
EQL	0.1	0.1	0.1	0.1	0.1	0.1	50	100	100	50	50	100	100	50	0.2	1	1	0.5	25	2	1	1	25	25
Field_ID	**LocCode**	**Sample_Depth_Range**	**Sampled_Date-Time**	**Matrix_Description**																						
BD1/170318	BD1/170318		17/03/2018	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	BH01	0-0.1	17/03/2018	filling	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH02	BH02	0-0.1	17/03/2018	filling	-	-	-	-	-	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH02	BH02	0.4-0.5	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH03	BH03	0-0.1	17/03/2018	filling	-	-	-	-	-	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH03	BH03	0.65-0.75	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH04	BH04	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH04	BH04	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH04	BH04	0.6-0.7	17/03/2018	natural	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH05	BH05	0.3-0.4	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH06	BH06	0-0.1	17/03/2018	filling	-	-	-	-	-	-	<50	140	<100	<50	<50	<100	130	140	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH07	BH07	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	110	220	<50	<50	<100	170	340	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH08	BH08	0-0.1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	110	160	<50	<50	<100	120	260	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH08	BH08	0.4-0.5	17/03/2018	filling	-	-	-	-	-	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH08	BH08	0.9-1	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH09	BH09	0.35-0.4	17/03/2018	filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH1	BH1	0.4-0.5	5/10/2016	filling	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
BH1	BH1	0.9-1	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
BH1	BH1	1.45-1.5	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
BH1	BH1	2.4-2.5	5/10/2016	natural	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
BH1 - [TRIPLICATE]	BH1 - [TRIPLICATE]	0.4-0.5	5/10/2016	filling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	BH2	0.1-0.2	30/09/2016	topsoil	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
BH2	BH2	0.4-0.5	30/09/2016	filling	<0.1	<0.1	<0.1	<0.1	<0.1	-	<50	<100	<100	<50	<50	<100	<100	-	<0.2	<1	<1	<0.5	<25	<2	<1	-	<25	<25
Statistical Summary																										
Number of Results							16	16	16	16	16	10	21	21	21	21	21	21	21	15	21	21	21	21	21	21	15	21	21
Number of Detects							0	0	0	0	0	0	0	3	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0
Minimum Concentration							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
Minimum Detect							ND	ND	ND	ND	ND	ND	ND	110	160	ND	ND	ND	120	140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration							<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<50	140	220	<50	<50	<100	170	340	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
Maximum Detect							ND	ND	ND	ND	ND	ND	ND	140	220	ND	ND	ND	170	340	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration							0.053	0.053	0.053	0.053	0.053	0.055	25	60	63	25	25	50	63	69	0.1	0.5	0.5	0.25	13	1	0.5	0.5	13	13
Median Concentration							0.05	0.05	0.05	0.05	0.05	0.05	25	50	50	25	25	50	50	25	0.1	0.5	0.5	0.25	12.5	1	0.5	0.5	12.5	12.5
Standard Deviation							0.013	0.013	0.013	0.013	0.013	0.016	0	26	43	0	0	0	33	99	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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CERTIFICATE OF ANALYSIS 187658

Client Details

Client	Douglas Partners Pty Ltd
Attention	Mike Nash
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**85658.02**
Number of Samples	20 Soil
Date samples received	20/03/2018
Date completed instructions received	20/03/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	21/03/2018
Date of Issue	21/03/2018

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vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	96	98	94	93

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	99	92	97	95	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	91	91	92	94	92

svTRH (C10-C40) in Soil						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	88	87	88	85	89

svTRH (C10-C40) in Soil						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	130
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	140
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	140
Surrogate o-Terphenyl	%	86	87	88	88	91

svTRH (C10-C40) in Soil						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	170	120	<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	110	110	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	220	160	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	340	260	<50	<50	<50
Surrogate o-Terphenyl	%	84	83	81	82	81

PAHs in Soil						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
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	0.4	0.4	0.2	0.2
Anthracene	mg/kg	<0.1	0.2	0.2	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.7	0.5	0.5	0.6
Pyrene	mg/kg	<0.1	0.7	0.5	0.5	0.6
Benzo(a)anthracene	mg/kg	<0.1	0.3	0.2	0.2	0.3
Chrysene	mg/kg	<0.1	0.3	0.3	0.3	0.3
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.6	0.5	0.6	0.7
Benzo(a)pyrene	mg/kg	<0.05	0.4	0.3	0.4	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.3	0.3	0.3	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.3	0.2	0.3	0.3
Total +ve PAH's	mg/kg	<0.05	4.0	3.4	3.3	3.8
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.5	<0.5	0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.6	0.5	0.6	0.6
Surrogate p-Terphenyl-d14	%	121	119	109	109	109

PAHs in Soil						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	20/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	0.2	0.5
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	0.8	1.5
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	0.6
Fluoranthene	mg/kg	0.1	0.2	<0.1	1.4	3.5
Pyrene	mg/kg	0.1	0.2	<0.1	1.4	3.7
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.7	2.0
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.5	1.5
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	1	3.2
Benzo(a)pyrene	mg/kg	0.06	0.06	<0.05	0.63	2.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.4	1.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	0.4	1.5
Total +ve PAH's	mg/kg	0.3	0.4	<0.05	7.8	22
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	0.8	3.1
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	0.9	3.1
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	1	3.1
Surrogate p-Terphenyl-d14	%	116	120	123	122	109

PAHs in Soil						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	0.2	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	0.5	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	0.2	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.5	1.3	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.6	1.3	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.4	0.8	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.3	0.6	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.6	1	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.4	0.83	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	0.5	<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	0.4	0.7	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	3.8	8.4	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	1.2	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.6	1.2	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.6	1.2	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	111	112	116	117	115

PAHs in Soil		
Our Reference		187658-16
Your Reference	UNITS	BD1/170318
Depth		-
Date Sampled		17/03/2018
Type of sample		Soil
Date extracted	-	20/03/2018
Date analysed	-	20/03/2018
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	109

Organochlorine Pesticides in soil						
Our Reference		187658-1	187658-3	187658-5	187658-6	187658-8
Your Reference	UNITS	BH01	BH02	BH03	BH04	BH04
Depth		0.0-0.1	0.4-0.5	0.65-0.75	0.0-0.1	0.6-0.7
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
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	%	91	107	111	93	100

Organochlorine Pesticides in soil						
Our Reference		187658-9	187658-11	187658-12	187658-14	187658-15
Your Reference	UNITS	BH05	BH07	BH08	BH08	BH09
Depth		0.3-0.4	0.0-0.1	0.0-0.1	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
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	%	90	92	90	91	91

Organophosphorus Pesticides						
Our Reference		187658-1	187658-3	187658-5	187658-6	187658-8
Your Reference	UNITS	BH01	BH02	BH03	BH04	BH04
Depth		0.0-0.1	0.4-0.5	0.65-0.75	0.0-0.1	0.6-0.7
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
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	%	91	107	111	93	100

Organophosphorus Pesticides						
Our Reference		187658-9	187658-11	187658-12	187658-14	187658-15
Your Reference	UNITS	BH05	BH07	BH08	BH08	BH09
Depth		0.3-0.4	0.0-0.1	0.0-0.1	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
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	%	90	92	90	91	91

PCBs in Soil						
Our Reference		187658-1	187658-3	187658-5	187658-6	187658-8
Your Reference	UNITS	BH01	BH02	BH03	BH04	BH04
Depth		0.0-0.1	0.4-0.5	0.65-0.75	0.0-0.1	0.6-0.7
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Aroclor 1016	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.2	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	107	111	93	100

PCBs in Soil						
Our Reference		187658-9	187658-11	187658-12	187658-14	187658-15
Your Reference	UNITS	BH05	BH07	BH08	BH08	BH09
Depth		0.3-0.4	0.0-0.1	0.0-0.1	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
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	%	90	92	90	91	91

Acid Extractable metals in soil						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Arsenic	mg/kg	<4	4	<4	52	10
Cadmium	mg/kg	<0.4	<0.4	<0.4	0.4	<0.4
Chromium	mg/kg	21	12	11	13	24
Copper	mg/kg	87	27	39	32	29
Lead	mg/kg	25	59	46	120	100
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	0.2
Nickel	mg/kg	24	20	26	7	10
Zinc	mg/kg	110	59	58	130	100

Acid Extractable metals in soil						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Arsenic	mg/kg	<4	5	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.4
Chromium	mg/kg	5	10	9	9	12
Copper	mg/kg	12	14	7	29	34
Lead	mg/kg	32	81	25	80	530
Mercury	mg/kg	<0.1	<0.1	<0.1	0.7	0.2
Nickel	mg/kg	3	2	<1	5	6
Zinc	mg/kg	56	56	7	61	230

Acid Extractable metals in soil						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Arsenic	mg/kg	<4	6	<4	5	5
Cadmium	mg/kg	<0.4	0.5	<0.4	<0.4	<0.4
Chromium	mg/kg	19	16	7	13	25
Copper	mg/kg	55	57	5	11	31
Lead	mg/kg	93	320	47	88	41
Mercury	mg/kg	0.2	0.4	0.3	0.1	<0.1
Nickel	mg/kg	26	8	2	3	18
Zinc	mg/kg	220	270	16	640	91

Acid Extractable metals in soil		
Our Reference		187658-16
Your Reference	UNITS	BD1/170318
Depth		-
Date Sampled		17/03/2018
Type of sample		Soil
Date prepared	-	20/03/2018
Date analysed	-	20/03/2018
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	30
Copper	mg/kg	130
Lead	mg/kg	33
Mercury	mg/kg	0.1
Nickel	mg/kg	26
Zinc	mg/kg	160

CEC		
Our Reference		187658-5
Your Reference	UNITS	BH03
Depth		0.65-0.75
Date Sampled		17/03/2018
Type of sample		Soil
Date prepared	-	21/03/2018
Date analysed	-	21/03/2018
Exchangeable Ca	meq/100g	16
Exchangeable K	meq/100g	0.3
Exchangeable Mg	meq/100g	1.4
Exchangeable Na	meq/100g	0.12
Cation Exchange Capacity	meq/100g	18

Misc Soil - Inorg						
Our Reference		187658-1	187658-3	187658-5	187658-6	187658-8
Your Reference	UNITS	BH01	BH02	BH03	BH04	BH04
Depth		0.0-0.1	0.4-0.5	0.65-0.75	0.0-0.1	0.6-0.7
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference		187658-9	187658-11	187658-12	187658-14	187658-15
Your Reference	UNITS	BH05	BH07	BH08	BH08	BH09
Depth		0.3-0.4	0.0-0.1	0.0-0.1	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Inorg - Soil		
Our Reference		187658-5
Your Reference	UNITS	BH03
Depth		0.65-0.75
Date Sampled		17/03/2018
Type of sample		Soil
Date prepared	-	21/03/2018
Date analysed	-	21/03/2018
pH 1:5 soil:water	pH Units	6.9

Moisture						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Moisture	%	9.1	12	10	13	20

Moisture						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Moisture	%	15	13	16	12	18

Moisture						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Moisture	%	17	16	16	19	16

Moisture		
Our Reference		187658-16
Your Reference	UNITS	BD1/170318
Depth		-
Date Sampled		17/03/2018
Type of sample		Soil
Date prepared	-	20/03/2018
Date analysed	-	21/03/2018
Moisture	%	14

Asbestos ID - soils						
Our Reference		187658-1	187658-2	187658-3	187658-4	187658-5
Your Reference	UNITS	BH01	BH02	BH02	BH03	BH03
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.0-0.1	0.65-0.75
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Sample mass tested	g	Approx. 35g	Approx. 35g	Approx. 35g	Approx. 30g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown sandy soil	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		187658-6	187658-7	187658-8	187658-9	187658-10
Your Reference	UNITS	BH04	BH04	BH04	BH05	BH06
Depth		0.0-0.1	0.4-0.5	0.6-0.7	0.3-0.4	0.0-0.1
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Sample mass tested	g	Approx. 25g	Approx. 30g	Approx. 30g	Approx. 35g	Approx. 25g
Sample Description	-	Brown sandy soil	Brown clayey soil	Brown clayey soil	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		187658-11	187658-12	187658-13	187658-14	187658-15
Your Reference	UNITS	BH07	BH08	BH08	BH08	BH09
Depth		0.0-0.1	0.0-0.1	0.4-0.5	0.9-1.0	0.35-0.4
Date Sampled		17/03/2018	17/03/2018	17/03/2018	17/03/2018	17/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	21/03/2018	21/03/2018	21/03/2018	21/03/2018	21/03/2018
Sample mass tested	g	Approx. 25g	Approx. 35g	Approx. 30g	Approx. 25g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

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-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	21/03/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	95	98
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	95	98
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	75	77
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	91	94
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	101	104
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	103	107
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	103	107
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	99	1	92	95	3	100	101

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	21/03/2018	21/03/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	91	96	5	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	21/03/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	128	78
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	82
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	89	108
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	128	78
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	111	82
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	89	108
Surrogate o-Terphenyl	%		Org-003	92	1	88	85	3	92	88

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	21/03/2018	21/03/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	11	170	210	21	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	11	110	200	58	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	11	220	210	5	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	84	123	38	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	21/03/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	99	83
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	100	89
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	104	93
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	93	83
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	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	82	77
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	81	97
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	120	1	121	110	10	100	91

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	0.1	0.2	67	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.4	67	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	0.1	0.2	67	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	0.5	0.7	33	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	0.6	0.8	29	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	0.4	0.5	22	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	0.3	0.4	29	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	0.6	0.8	29	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	0.4	0.5	22	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	0.3	0.3	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	0.4	0.4	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	111	112	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	100	100
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	90	88
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	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	82	80
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	84
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	100	97
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	105	103
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	97	94
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	81	84
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	81	85
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	103	1	91	91	0	112	109

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	11	92	90	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	90	87
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	81	99
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	91	84
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	102	94
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	88	85
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	113	105
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	94
Surrogate TCMX	%		Org-008	103	1	91	91	0	109	93

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	11	92	90	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date extracted	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	100	100
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	103	1	91	91	0	109	93

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	11	92	90	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date prepared	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Date analysed	-			20/03/2018	1	20/03/2018	20/03/2018		20/03/2018	20/03/2018
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	99	77
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	91	73
Chromium	mg/kg	1	Metals-020	<1	1	21	23	9	98	82
Copper	mg/kg	1	Metals-020	<1	1	87	86	1	101	93
Lead	mg/kg	1	Metals-020	<1	1	25	25	0	101	92
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	98	96
Nickel	mg/kg	1	Metals-020	<1	1	24	20	18	96	85
Zinc	mg/kg	1	Metals-020	<1	1	110	100	10	97	77

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2018	20/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	19	17	11	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	55	52	6	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	93	96	3	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	0.2	0.2	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	26	22	17	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	220	210	5	[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]	14	20/03/2018	20/03/2018		[NT]	[NT]
Date analysed	-			[NT]	14	20/03/2018	20/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	14	5	<4	22	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	14	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	14	13	9	36	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	14	11	10	10	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	14	88	63	33	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	14	0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	14	3	2	40	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	14	640	770	18	[NT]	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date prepared	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	187658-3
Date prepared	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	21/03/2018
Date analysed	-			21/03/2018	1	21/03/2018	21/03/2018		21/03/2018	21/03/2018
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	98	97

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-13	[NT]
Date prepared	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
Date analysed	-			21/03/2018	[NT]	[NT]	[NT]	[NT]	21/03/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[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 187658-1 to 15 were sub-sampled from jars provided by the client.

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

CoC 20/3 09:07

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
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Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
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Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: Douglas Partners	Client Project Name / Number / Site etc (ie report title): 85658.02
Contact Person: Michael Whittaker	
Project Mgr: Mike Nash	PO No.:
Sampler: MW	Envirolab Quote No. :
Address:	Date results required: ~~24hr turnaround~~
	Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: Mob: 0403 875 756	Report format: esdat / equis /
Email: mike.nash@douglaspartners.com.au	Lab Comments: ~~Charged at 48hr turnaround~~ as discussed with Jess

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample		Combo 8a	Combo 3a	pH, CEC	metals	PAH									Provide as much information about the sample as you can
1	BH01/0.0-0.1		17.3.18	Soil		X													
2	BH02/0.0-0.1		17.3.18	Soil			X												
3	BH02/0.4-0.5		17.3.18	Soil		X													
4	BH03/0.0-0.1		17.3.18	Soil			X												
5	BH03/0.65-0.75		17.3.18	Soil		X		X											
6	BH04/0.0-0.1		17.3.18	Soil		X													
7	BH04/0.4-0.5		17.3.18	Soil			X												
8	BH04/0.6-0.7		17.3.18	Soil		X													
9	BH05/0.3-0.4		17.3.18	Soil		X													
10	BH06/0.0-0.1		17.3.18	Soil			X												
11	BH07/0.0-0.1		17.3.18	Soil		X													
12	BH08/0.0-0.1		17.3.18	Soil		X													
13																			

Relinquished by (Company):	DP	Received by (Company):	ELS
Print Name:	Michael Whittaker	Print Name:	Andy Zhang
Date & Time:	20.3.17 8:00am	Date & Time:	18/3 15:00 CoC: 20/3 ~~10:00~~ 11:00
Signature:		Signature:	AZ

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

White - Lab copy / Blue - Client copy / Pink - Retain in Book

COC 20/3 09:07.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

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Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
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Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: Douglas Partners
Contact Person: Michael Whittaker
Project Mgr: Mike Nash
Sampler: MW
Address:

Phone: Mob: 0403 875 756
Email: mike.nash@douglaspartners.com.au

Client Project Name / Number / Site etc (ie report title): 85658.02
PO No.:
Envirolab Quote No. :
Date results required: 24hr turnaround
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Report format: esdat / equis /
Lab Comments: ~~Changed at 48hr turnaround~~ as discussed with Jess

Sample information					Tests Required													Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample		Combo 8a	Combo 3a	metals	PAH									Provide as much information about the sample as you can
16 13	BH08/0.4-0.5		17.3.18	Soil			X											
16 14	BH08/0.9-1.0		17.3.18	Soil		X.												
16 15	BH09/0.35-0.4		17.3.18	Soil		X												
17 16	**BD1/170318**		17.3.19	Soil				X	X									
~~CBH~~	BD3/170318		17.3.20	Soil				X	X									Interlab to ALS
Extra:																		
17	BH03/0.4-0.5.																	
18	BH05/0.0-0.1																	
19	BH09/0.0-0.1																	
20	BD2/170318.																	

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

Job No: 187628
Date Received: 18/3 ~~15:00~~ COC: 20/3 ~~11:00~~
Time Received: 15:00 COC: 11:00
Received by: AZ
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (Company):	Received by (Company): EAS	*Lab use only:*
Print Name:	Print Name: Andy Zhang	Samples Received: Cool or Ambient (circle one)
Date & Time:	Date & Time: 18/3 15:00 COC: 20/3 11:00	Temperature Received at: (if applicable)
Signature:	Signature: AZ.	Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Mike Nash

Sample Login Details

Your reference	85658.02
Envirolab Reference	187688
Date Sample Received	20/03/2018
Date Instructions Received	20/03/2018
Date Results Expected to be Reported	21/03/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	20 Soil
Turnaround Time Requested	1 day
Temperature on Receipt (°C)	27.4
Cooling Method	None
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	CEC	Total Phenolics (as Phenol)	pH1:5 soil:water	Asbestos ID - soils	On Hold
BH01-0.0-0.1	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH02-0.0-0.1	✓	✓	✓				✓				✓	
BH02-0.4-0.5	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH03-0.0-0.1	✓	✓	✓				✓				✓	
BH03-0.65-0.75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH04-0.0-0.1	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH04-0.4-0.5	✓	✓	✓				✓				✓	
BH04-0.6-0.7	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH05-0.3-0.4	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH06-0.0-0.1	✓	✓	✓				✓				✓	
BH07-0.0-0.1	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH08-0.0-0.1	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH08-0.4-0.5	✓	✓	✓				✓				✓	
BH08-0.9-1.0	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BH09-0.35-0.4	✓	✓	✓	✓	✓	✓	✓		✓		✓	
BD1/170318			✓				✓					
BH03-0.4-0.5												✓
BH05-0.0-0.1												✓
BH09-0.0-0.1												✓
BD2/170318												✓

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.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1808698**

Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR MIKE NASH	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: mike.nash@douglaspartners.com.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 02 98090666	Telephone	: +61-3-8549 9630
Facsimile	: +61 02 98094095	Facsimile	: +61-2-8784 8500
Project	: 85658.02	Page	: 1 of 2
Order number	:	Quote number	: EM2017DOUPAR0002 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: MW		

Dates

Date Samples Received	: 22-Mar-2018 09:30	Issue Date	: 23-Mar-2018
Client Requested Due Date	: 26-Mar-2018	Scheduled Reporting Date	: **26-Mar-2018**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 14.9 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - S-02 8 Metals (incl. Digestion)
ES1808698-001	17-Mar-2018 00:00	BD3/170318	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	accounts@douglaspartners.com.au

MIKE NASH

- *AU Certificate of Analysis - NATA (COA)	Email	mike.nash@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mike.nash@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mike.nash@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mike.nash@douglaspartners.com.au
- A4 - AU Tax Invoice (INV)	Email	mike.nash@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	mike.nash@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	mike.nash@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	mike.nash@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	mike.nash@douglaspartners.com.au

CoC 20/3 09:0

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: Douglas Partners	Client Project Name / Number / Site etc (ie report title): 85658.02
Contact Person: Michael Whittaker	
Project Mgr: Mike Nash	PO No.:
Sampler: MW	Envirolab Quote No. :
Address:	Date results required: 24hr turnaround Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: Mob: 0403 875 756	Report format: esdat / equis /
Email: mike.nash@douglaspartners.com.au	Lab Comments: Charged at 48hr turnaround as discussed with Jess

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample		Combo 8a	Combo 3a	pH, CEC	metals	PAH									Provide as much information about the sample as you can
1	BH01/0.0-0.1		17.3.18	Soil		X													
2	BH02/0.0-0.1		17.3.18	Soil			X												
3	BH02/0.4-0.5		17.3.18	Soil		X													
4	BH03/0.0-0.1		17.3.18	Soil			X												
5	BH03/0.65-0.75		17.3.18	Soil		X		X											
6	BH04/0.0-0.1		17.3.18	Soil		X													
7	BH04/0.4-0.5		17.3.18	Soil			X												
8	BH04/0.6-0.7		17.3.18	Soil		X													
9	BH05/0.3-0.4		17.3.18	Soil		X													
10	BH06/0.0-0.1		17.3.18	Soil			X												
11	BH07/0.0-0.1		17.3.18	Soil		X													
12	BH08/0.0-0.1		17.3.18	Soil		X													
13																			

TAT

Environmental Division
Sydney
Work Order Reference
ES1808698

Telephone : +61-2-8784 8555

Relinquished by (Company):	DP	ELS
Print Name:	Michael Whittaker	Uncle Emblen
Date & Time:	20.3.17 8:00am	21.3.18 12:45
Signature:		

Received by (Company):	ELS
Print Name:	Andy Zhang
Date & Time:	18/3 15:00 CoC: 20/3 ~~10:00~~ 11:40
Signature:	AZ

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

J. Cureatty ALS
22/3/18 09:30

COC 20/3 09:0

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: Douglas Partners	Client Project Name / Number / Site etc (ie report title): 85658.02
Contact Person: Michael Whittaker	
Project Mgr: Mike Nash	PO No.:
Sampler: MW	Envirolab Quote No. :
Address:	Date results required: 24hr turnaround Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: Mob: 0403 875 756	Report format: esdat / equis /
Email: mike.nash@douglaspartners.com.au	Lab Comments: Charged at 48hr turnaround as discussed with Jess

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample		Combo 8a	Combo 3a	8 metals	PAH										
13	BH08/0.4-0.5		17.3.18	Soil			X												
14	BH08/0.9-1.0		17.3.18	Soil		X													
15	BH09/0.35-0.4		17.3.18	Soil		X													
16	**BD1/170318**		17.3.19	Soil				X	X										
17	BD3/170318		17.3.20	Soil				X	X										Interlab to ALS
Extra:																			
17	BH03/0.4-0.5																		
18	BH05/0.0-0.1																		
19	BH09/0.0-0.1																		
20	BD2/170318																		

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

Job No: 187628
Date Received: 18/3 COC: 20/3
Time Received: 15:00 COC: 11:00
Received by: AZ.
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (Company): ELS	Received by (Company): ELS
Print Name: JACK EMBLEN	Print Name: Andy Zhang
Date & Time: 21/03/18 12:45	Date & Time: 18/3 15:00 COC: 20/3 11:00
Signature:	Signature: AZ.

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