Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Remediation Action Plan

Proposed University Facility Redevelopment
Building J03, Electrical Engineering, Darlington

Prepared for
Laing O'Rourke Australia Construction Pty Ltd

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

	Signature	Date
Author	pp: T. Beamer	29 March 2018
Reviewer	pp	29 March 2018

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Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666
Fax (02) 9809 4095

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Remediation Action Plan
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1. Introduction

Douglas Partners Pty Ltd (DP) has been commissioned by Laing O'Rourke Australia Construction Pty Ltd to prepare a Remediation Action Plan (RAP) for the above site. The objective of the RAP is to outline the methods and procedures necessary to remediate the subject site to a level suitable for the proposed development.

The project involves the demolition of the existing Electrical Engineering building and the construction of a ten level teaching facility building with one basement level 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.

This RAP details the methods and procedures by which the remediation and site validation will be achieved and has been prepared to address the requirements of *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land*. It is intended that following implementation of the RAP the site can be considered:

- Appropriately remediated to a condition which would prevent unacceptable risks to human health and/or the environment; and
- Suitable for the intended land-use.

It should be noted that this RAP does not form a detailed specification for the proposed site remediation works, but rather represents a planning document which outlines the means by which site remediation can render the site suitable for the intended land-use.

2. Methods and Objectives of this RAP

The objective of the RAP is to provide a mechanism by which the site can be remediated in an acceptable manner, with minimal environmental impact, and to a condition suitable for the proposed land-use. The main objective of this RAP is therefore to provide a strategy for site remediation which:

- Minimises impacts from the site on the environment and on public health and safety during site demolition, remediation and construction;
- Maximises the protection of workers involved with site demolition, remediation and construction;
- Renders the site safe for the proposed commercial/industrial use and minimises potential exposure pathways to contaminants present in filling, soil and groundwater; and
- Minimises impacts on the local environment during and following site remediation.

Additional objectives of the RAP are as follows:

- Set remediation goals that ensure the site is suitable for the proposed use and will not pose an unacceptable risk to human health or the environment;
- Document the remediation options that may be implemented to reduce risks to acceptable levels for the proposed site use;
- Provide information relating to a Construction Environmental Management Plan (CEMP) which will be required to detail the environmental safeguards necessary to complete the remediation in an environmentally acceptable manner;
- Identify the legislative requirements of the relevant regulatory authorities for the remediation works; and
- Comply with the relevant planning instruments and local government policies.

The general scope of work designed to achieve the RAP objectives stated above is described below:

- Provide an adequate description of the site, its history and available background information;
- Develop site criteria by identifying the chemicals of concern;
- Provide a summary of the results of the previous site investigations and assess the contamination status of the site;
- Identify remaining data gaps in regard to the site contamination status which will need to be incorporated into the remediation plan and be dealt with via an unexpected finds protocol;
- Identify potential remediation options available for the site and nominate the preferred remediation strategy;
- Develop contingency plans for the various situations that may arise during the remediation programme; and
- Highlight the requirement for the works to be undertaken in accordance with a CEMP and a Work Health and Safety Plan prepared for the remediation works.

Subject to concurrence by the approval authority, it is proposed that the remediation method will involve the removal of the contaminated filling/soil from within the basement excavation zone and, where necessary, removal and replacement of contaminated filling/soil from the zone outside the basement. It is necessary to excavate the majority of material and remove it from site for the purpose of creating the basement in any case and, therefore, the development works will effectively remediate the majority of the site.

3. Review of Site Information

3.1 Site 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, generally following the existing topography, and ground surface levels vary between about RL 24 m and RL 16 m AHD.

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

3.2 Proposed Development

The project involves the demolition of the existing Electrical Engineering building and the construction of a ten level teaching facility building with two 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.

Plans showing the proposed development are included in Appendix B.

3.3 Site History

A site history search was undertaken in the DP PSI undertaken in 2018 and provided in the DP DSI 2018. 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.'

3.4 Geology 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).

4. Previous Contamination Investigations

4.1 Summary of Previous Investigations

Previous investigations reviewed as part of the RAP include:

- 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;
- 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; and
- Douglas Partners (2018) *Report on Detailed Site Investigation, Proposed University Facility Redevelopment, Building J03, Electrical Engineering, Darlington* prepared for Laing O'Rourke Australia Construction Pty Ltd, Report 85658.02.R.001.Rev0 dated 26 March 2018.

The investigations included:

- The drilling of 11 boreholes: two boreholes were drilled through the filling material and into the underlying residual clays; and nine boreholes were drilled using hand tools in accessible landscaped areas across the site though filling only;
- Sampling of the filling and soil from within the boreholes; and
- Laboratory testing of 23 soil samples for a range of potential contaminants including BTEX, TRH, PAH, OCP, PCB, heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni & Zn) and asbestos.

The locations of the DP boreholes are shown on Drawing 1 in Appendix B. A summary table of analytical results is provided in Table F1 in Appendix C.

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. One sample in the previous waste classification report (2016) 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.

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. Hazardous building materials may also be present 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 in regard to excavation areas for the proposed basements.

4.2 Summary of Soil Contamination Conditions

A summary of the previous laboratory test results is provided in Table 2. Table F1 detailing individual results is included in Appendix C.

Table 2: Summary of Previous Laboratory Test Results for Soils

Analyte	No. of Samples	Maximum Concentration (mg/kg)	Minimum Concentration (mg/kg)
Benzene	21	<0.2	<0.2
Toluene	21	<0.5	<0.5
Ethylbenzene	21	<1	<1
Xylene	21	<1	<1
$TRH_{C10-C40}$	21	340	<50
F1	21	<25	<25
F2	21	<50	<50
Total PAH	22	22	NIL +ve
B.TEQ	22	3.1	<0.5
Naphthalene	22	0.1	<0.1
Phenols	16	<5	<5
OCP	6	NIL +ve	NIL +ve
PCB	10	NIL +ve	NIL +ve
Arsenic	23	52	<4
Cadmium	23	0.4	<0.4
Chromium	23	30	5
Copper	23	130	1
Lead	23	530	17
Mercury	23	0.7	<0.1
Nickel	23	26	<1
Zinc	23	640	<1
Asbestos	16	No detect	No detect

Notes: TRH = total recoverable hydrocarbons; F1 = C_6-C_{10} – BTEX; F2 = >C_{10}-C_{16} – Naphthalene;
PAH = polycyclic aromatic hydrocarbons; OCP = organochlorine pesticides; PCB = polychlorinated biphenyls;
B.TEQ = carcinogenic PAH; N/A = not applicable; [1] where sufficient sample population exists

5. Adopted Comparative Criteria - Remediation Action Criteria (RAC)

5.1 Soils

Analytical results from laboratory testing of soils are assessed against Remediation Action Criteria (RAC) and 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 RAC/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.

Table 3 shows the health investigation levels (HIL) and HSL (depth 0 m to <1) m that have been adopted as RAC/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/HSL have been adopted from Column D (for commercial/industrial sites). The table does not contain the complete list of HIL provided in NEPC (2013).

The adopted comparative criteria for soils are shown in Table 3.

Table 3: Adopted Comparative Criteria

Contaminant	HIL & HSL (Commercial Industrial) (mg/kg)
Metals	
Arsenic	3000
Cadmium	900
Chromium (VI)	3600
Copper	240 000
Lead	1500
Mercury (inorganic)	730
Nickel	6000
Zinc	400 000
PAH	
B(a)P TEQ	40
Naphthalene	NL
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
TPH	
F1	250
F2	NL
Benzene	3
Toluene	NL
Ethylbenzene	NL
Xylenes	230

Notes: TRH = total recoverable hydrocarbons; F1 = C_6-C_{10} – BTEX; F2 = >C_{10}-C_{16} – Naphthalene;

PAHs = polycyclic aromatic hydrocarbons; OCPs = organochlorine pesticides; PCBs = polychlorinated biphenyls; B(a)P TEQ = carcinogenic PAHs based on Benzo(a)pyrene toxicity

6. Comparison of Known Concentrations to Comparative Criteria

No exceedances of the site assessment criteria (SAC) have been registered for the soil sampled in DP investigations for this site.

However, 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 in regard to spoil generated during basement excavations (in filling).

DP also that a data gap exists for the soil below building footprints and hardstand areas at the site and additional testing will be required following demolition of structures and removal of the items listed in the Worksafe NSW licence for hazardous, industrial or Group A waste generation or storage.

7. Remediation Requirements

As part of the remediation works, additional sampling following demolition is required to address data gaps beneath building footprints and hardstand at the site and in the vicinity of hazardous goods storage. This additional testing will be used for waste classification and contamination assessment in areas where there is no data from previous investigations.

The excavation and off-site disposal of soils for the formation of the basements across the majority of the site will result in the removal of the majority of fill across the site and will also be beneficial for the quality of groundwater at the site.

Any contaminated material discovered during additional sampling will be handled according to the unexpected finds protocol provided in Section 10.

8. Remediation Options

8.1 Remediation Hierarchy

The preferred remediation hierarchy for the soils on the site is based on Section 3.1.8 of the *Australia and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, ANZECC 1992. These guidelines state that the preferred order of options for site clean-up and management are:

- On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level; and

- Off-site treatment of excavated soil which, depending on the residual levels of contamination in the treated material is then returned to the site, removed to an approved waste disposal site or facility or used as fill or landfill.

Should it not be possible for either of these options to be implemented, then other options to be considered include:

- Removal of a contaminated soil to an appropriate site or facility, followed where necessary by replacement with clean fill;
- Isolation of the soil by covering with a properly designed barrier;
- Choosing a less sensitive land-use to minimise the need for remediation works which may include partial remediation; or
- Leaving contaminated material in-situ providing there is no immediate danger to the environment or community and the site has appropriate controls in place.

The broad categories of soil remediation options that may have the potential to accomplish the remediation objectives are listed below in the order of the preferred remediation hierarchy:

- Treatment;
- Removal to landfill;
- Physical barrier systems;
- Institutional controls; and
- No action.

The preferred remediation hierarchy for the site is based on Section 4.3 of *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)*, NSW EPA, 2017. These guidelines state that site auditors must ensure that adequate consideration has been given to the nature and extent of contamination, and the risks which the contamination may be posing to human health and the environment.

Information on each of the potential remediation options for the soil contamination is provided below.

8.2 Remediation Options

8.2.1 Removal to Landfill

Removal to landfill involves physically excavating and moving impacted soil to an off-site location for storage, treatment or disposal. Disposal to landfill may require prior treatment of the impacted soil if the chemical levels exceed landfill criteria as defined in the *Waste Classification Guidelines* (NSW EPA, 2014).

This type of treatment may cause potential impacts on the local community from waste transport, as well as imposing an unnecessary burden on the capacity of the receiving landfill. Essentially this option would only be suitable under circumstances where construction of basements was proposed and which would in any case require removal of the waste soils as part of the site formation process.

To undertake such removal when it is not necessary would contravene the principles of the *Waste Avoidance and Resource Recovery Act 2001*.

8.2.2 Physical Barrier Systems

Physical barrier systems limit access to the impacted soil/groundwater, mitigate surface water infiltration through the underlying material (where necessary) and control or reduce migration of the contaminants into the surrounding environment (where necessary). This option can include creating barriers around and/or on top of the impacted soil/groundwater, or relocating the contaminants on-site to a constructed entombment. In addition, the physical barrier can also be used to control the emission of odours or volatiles (if present) and to reduce erosion, infiltration and improve site aesthetics.

Physical barrier layers can include clean filling, low permeability soils such as clays, synthetic membranes such as high density polyethylene (HDPE), geotextile fabrics, bituminous materials, paving and concrete. Appropriate site grading and drainage systems may also be required to remove water from the capped areas (pavements and slabs) and to control surface run-off. Concrete barriers, bituminous pavements and various membranes may be vulnerable to cracking or shearing, depending on their proposed use, loading and exposure but these cracks or ruptures can be repaired providing appropriate inspection and maintenance is conducted as necessary.

8.2.3 Institutional Controls

Institutional controls include measures such as land-use restrictions through zoning controls to preclude certain types of land use, mechanisms of notification such as the Planning Certificate or land title information, site access restrictions, restriction on long term intrusive works or redevelopment and relocation or isolation of potential receptors. Although exposure can be reduced by these means, the impacted media (contaminants) are not directly affected or treated. Generally, development control is exercised through the development approval process, and any restriction in land-use or the need for ongoing site management can be flagged via the site audit system.

8.2.4 No Action

No action means that no response is considered necessary to remediate the site as there is not considered to be a risk to the environment or the community from the contamination identified.

8.3 Preferred Remediation Strategies

The majority of the fill soils on the site will be excavated as part of the proposed basement construction or for general site formation.

Only the soils outside the basement footprint and on site boundaries will remain and, if the soils contain elevated concentrations of contaminants, a risk assessment may need to be undertaken to determine whether the soils will require remediation or whether the associated risks are acceptable.

The preferred remediation strategies are therefore a follows:

1. Excavation of filling/soils from within the new basement zone (i.e. the majority of the site) and off-site disposal; and
2. Validation and assessment of contaminants remaining outside the basement footprint and along the site boundaries.

9. Remediation Strategy

9.1 Sequence of Remediation

The proposed methodology comprises the following sequence of steps:

- Demolition of existing structures on the site;
- Sampling, testing and validation of soil contaminants under demolished building footprints and hardstand (including the vicinity of hazardous goods storage); DP propose a minimum of 10 additional sample locations below the building footprint, including 6 targeted sample locations and 4 grid sample locations;
- Any contaminated material discovered during additional sampling will be handled according to the unexpected finds protocol provided in Section 10;
- Confirmation of the classification of all soils to be removed from the site prior to the commencement of excavation;
- Excavation of soil/fill from within the basement zone and disposal of materials at a suitably licenced facility;
- If required, sampling, testing and validation of soil contaminants below the bulk excavation level across the basement footprint; and
- Provide a Validation Report for the site and, if required, an Environmental Management Plan (EMP) which includes any future long-term (ongoing) management requirements post development.

The basement footprint is shown on Proposed Development Plans provided in Appendix B.

Following the completion of the remediation works and the receipt of any related analytical results from the validation sampling, a Validation Report will be prepared in general accordance with the requirements of the NSW OEH *Guidelines for Consultants Reporting on Contaminated Sites* (2011).

This report will include:

- Details of the implementation of the RAP and any variations to the remediation strategy including unexpected finds;
- A rationale and justification for the validation strategy adopted;
- Results of any additional sampling undertaken during the remediation works;
- Evaluation against the site criteria (where appropriate);

- Verification of regulatory compliance;
- A clear statement on whether the site is considered suitable for its intended land-use; and
- Any limitations, assumptions and uncertainties relevant to the conclusions of the report.

9.2 Waste Disposal

Any excavated spoil or surplus materials which require disposal off-site will need to be classified in accordance with *Waste Classification Guidelines* (NSW EPA, 2014). Any groundwater/seepage which requires removal during construction will also need to be assessed to determine appropriate treatment and/or disposal options.

9.3 Loading and Transport of Contaminated Material

Transport of contaminated material from the site shall be via a clearly delineated haul route and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site.

Removal of waste materials from the site shall only be carried out by a contractor holding an appropriate license, consent or approvals (where required) to dispose the waste materials according to the classification outlined in *Waste Classification Guidelines* (NSW EPA, 2014) and with the appropriate approvals obtained from the NSW EPA, if required.

Details of all contaminated and spoil materials removed from the site (including VENM) shall be documented by the contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the Principal's Representative (PR). A site log shall be maintained by the PR based on discrete excavation (numbered) locations to track disposed loads against on-site origin, location of the materials and sample numbers.

The proposed waste transport route will be outlined in the CEMP and truck dispatch shall be logged and recorded by the contractor for each load leaving the site. A record of the truck dispatch will be provided to the Environmental Consultant via the PR.

9.4 Disposal of Contaminated Material

All contaminated materials excavated and removed from the site shall be disposed of to an appropriately licensed landfill. Copies of all necessary approvals shall be given to the Environmental Consultant via the PR prior to any contaminated material being removed from the site. Copies of all consignment notes for the transport, receipt and disposal of the materials will be maintained as part of the site log and made available to the Environmental Consultant for inspection and reporting purposes upon request.

9.5 Imported Fill

Material imported to site shall be clean filling, which is to be certified as VENM, as well as meeting the remediation acceptance criteria (Section 5) via a validation certificate by the contractor. The material should also comply with relevant legislation e.g. *Protection of Environment (Operations) Act 1997*.

Analytical results presented by the contractor to validate imported fill shall be NATA accredited and obtained at an appropriate frequency and sampling density according to the NSW EPA guidelines. Sampling density is discussed in Section 12.1.

Validation results will be presented in the final validation report along with details of site of origin, volume and date of receipt on the site.

10. Unexpected Finds and Contingency Plans

If unexpected conditions with respect to contamination are encountered by the Contractor during the earthworks (such as fragments of suspected ACM, buried structures or unexpected contaminated soil or contaminants), the following general approach will be adopted:

- Upon discovery of a unexpected find (UF), works will cease in that area, the Contractor's Site Manager (CR) is to be notified and the affected area closed off by the use of barrier tape;
- If possible, the location of the UF should be surveyed using dGPS with sub-meter accuracy;
- The Site Manager is to contact the CR, and the CR is to notify an appropriately qualified Environmental Consultant;
- The Environmental Consultant will inspect the area and make an assessment of the significance of the find in terms of the potential impact to human health and the environment with reference to NSW EPA endorsed guidelines including NEPC (2013);
- Provision of advice from the Environmental Consultant to the CR regarding the recommended course of action, following discussion and agreement with the Site Auditor;
- The Environmental Consultant will prepare a report detailing their assessment including the extent and methods of remediation, as required. The report will be reviewed by the Site Auditor; and
- The agreed management/remedial strategy shall be implemented and documented in the site validation report.

In the event that the UF relates to the identification of ACM the following protocol will also apply:

- Upon discovery of suspected ACM, the site foreman is to be notified and the affected area closed off by the use of barrier tape and warning signs. Warning signs shall be specific to Asbestos Hazards and shall comply with the Australian Standard 1319-1994 *Safety Signs for the Occupational Environment*;
- The Environmental Consultant or Occupational Hygienist is to be notified to inspect the area and confirm the presence of asbestos and determine extent of remediation or management works to be undertaken, again in consultation with the Site Auditor. An assessment report detailing this

information will be compiled by the Environmental Consultant or Occupational Hygienist and provided to the CR and Site Auditor;

- The assessment results together with a suitable management plan shall be provided by the CR to the Site Auditor for written approval prior to the removal or treatment of ACM; and
- The agreed management/remedial strategy shall be implemented and documented in the validation report.

11. Community Consultation

Community consultation (if required) will be undertaken in accordance with the planning approval for the project and any associated legislation and planning instruments referenced therein.

12. Site Validation Plan

12.1 Validation Sample Collection and Analysis

It is proposed that any validation, waste classification or additional site characterisation samples be collected and analysed at the following frequency:

- STOCKPILED MATERIAL – one sample per 25 m^3 should be taken (or minimum of three samples). Sample materials to be logged and described in each case;
- SAMPLES FROM SMALL EXCAVATIONS – one sample per 25 m^2 on the excavation base and one sample per 15 lineal metres along the excavation side walls. Sample depths and materials to be logged in each case;
- SAMPLES FROM LARGE EXCAVATIONS – one sample per 100 m^2 on the excavation base and one sample per 25 lineal metres along the excavation side walls. Sample depths and materials to be logged in each case; and
- IMPORTED VENM – one sample per 100 m^3 of imported fill plus certification that the material comprises VENM including details of the source site. Materials approved under a Resource Recovery Order may also be permitted to be used on site, pending validation testing.

12.2 Sample Collection and Handling

Sampling will be, in the case of stockpiles, from at least 0.5 m within the stockpile. Sampling data shall be recorded to comply with routine Chain of Custody requirements.

The general sampling, handling, transport and tracking procedures comprises:

- The use of stainless steel sampling equipment;

- Washing of all sampling equipment, including drills or excavator parts in contact with the sample, in a 3% solution of phosphate-free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected; transfer of the sample into new glass jars, sealed with a lid to eliminate cross-contamination during transportation to the laboratory;
- Labelling of the sample containers with individual and unique identification including Project No. and Sample No.;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of chain of custody documentation so that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

12.3 Quality Assurance Plan

12.3.1 Field QA/QC

Quality assurance (QA) and quality control (QC) procedures should be adopted throughout the field sampling programme to assess sampling precision and accuracy and prevent cross contamination.

This should include confirmation of sampling accuracy and precision through the analysis of 10% field duplicate/replicate samples as well as the collection of field rinsate samples of sampling equipment at a rate of one sample per day of sampling operations. Appropriate sampling procedures should be undertaken to prevent cross-contamination. These should include:

- Following standard operating procedures developed for such testing;
- Site safety plans are developed prior to commencement of works;
- Duplicate or replicate field samples are collected and analysed;
- Equipment rinsate samples are analysed as part of the QA/QC programme;
- Samples are stored under secure, temperature controlled conditions;
- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory; and
- Proper disposal of contaminated soil, fill or groundwater originating from the site area is completed.

12.3.2 Laboratory QA/QC

The laboratory engaged for the testing should undertake in-house QA/QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;
- Laboratory duplicate analysis;
- Analysis of control standards;

- Calibration standards and blanks; and
- Statistical analysis of QC data including control standards and recovery plots.

12.4 Achievement of Data Quality Objectives

The scope of remediation works has been devised broadly in accordance with the seven step data quality objective process, as defined in Australian Standard *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and semi-volatile compounds* (AS 4482.1 – 1997). The DQO process is outlined as follows:

(a) State the Problem

The site will require to be rendered suitable for the proposed University facility redevelopment (commercial/industrial).

(b) Identify the Decision

Soil that exceeds the adopted assessment criteria will need to be removed from the site and disposed of at an appropriately licensed landfill/treatment facility.

(c) Identify Inputs to the Decision

Findings of the previous assessments have been used to characterise the site with regard to the likely nature and extent of the contamination. These will be supplemented with additional results when full access to the site is available (i.e. demolition has been undertaken).

(d) Define the Boundary of the Assessment

The boundary of the assessment is defined by the boundary of the site, as summarised in Section 3.

(e) Develop a Decision Rule

The progress and completeness of the site remediation works should be verified on the basis of the validation analyses. Remediation is deemed to be complete when confirmation that the soil and groundwater to be disposed of off-site has been disposed of appropriately and the soils remaining on the site are validated as being within the adopted assessment criteria.

Based on the analysis of quality control samples i.e. duplicates/replicates, equipment rinsates and in-house laboratory QA/QC procedures, the following data quality objectives will be required to be achieved:

- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
- Field and laboratory duplicates and replicates samples will have a precision average of +/- 30% relative percent difference (RPD) for inorganic analytes and +/- 50% RPD for organic analytes;

- Field duplicates/replicates will be collected at a frequency of 10% of all samples, and rinsate samples of field equipment will be collected at one per day of sampling; and
- Rinsate samples will show that the sampling equipment is free of introduced contaminants, i.e. the analytes show that the rinsate is within the normal range for deionised water.

Based on a fulfilment of the data quality objectives an assessment of the overall data quality will be presented in the final validation report.

12.5 Validation Reporting

A validation assessment report must be prepared by a qualified environmental consultant in accordance with NSW OEH Contaminated Sites *Guidelines for Consultants Reporting on Contaminated Sites* (2011) and other appropriate guidance documentation.

The validation report shall confirm that the site has been remediated to a suitable standard for the proposed land-use and that no related adverse human health and environmental effects have occurred as a result of the temporary works. The validation report shall also include a summary of the information from previous investigations, particularly the materials that remain on-site.

The validation report shall include details of the total volume of contaminated materials removed from site, present detailed analytical results where applicable, confirm that placed fill (if any) is clean and indicate the final disposal destination of the materials removed from site.

13. Environmental Management Plan During Remediation

The work shall be undertaken with all due regard to the minimisation of environmental effects and to meet all statutory requirements. The successful contractor shall have in place a CEMP such that work on the site complies with the requirements of the following Acts:

- Hazardous Chemicals Act;
- Environmentally Hazardous Chemicals Act;
- Dangerous Goods Act;
- Protection of the Environment Operations Act;
- Construction Safety Act; and
- Work Health and Safety Act (SafeWork NSW).

The contractor shall also be responsible to ensure that the site works comply with the following conditions:

- Fugitive dust leaving the confines of the site is minimised;
- No water containing any suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles shall be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas; and
- Noise and vibration levels at the site boundaries comply with the legislative requirements.

The CEMP should also make provision for unexpected finds (e.g. tanks, asbestos etc.) to allow an appropriate response to such finds to be made.

14. Work Health and Safety Plan During Remediation

The remediation works contractor will be required to develop a Work Health and Safety Plan for the project. This plan should be developed in accordance with the relevant Work Health and Safety legislation and guidelines for NSW.

15. Conclusion

Subject to proper implementation of the RAP and validation reporting, DP considers that the site can be made suitable for the proposed University facility redevelopment. The short term exposure during remediation and construction works should not pose an unacceptable risk to workers. A long-term EMP should only be necessary for the site in the event that the material on site boundaries or in untested areas of the site requires a management strategy to deal with residual contamination in the soils.

If required, the EMP should contain the following information:

- Purpose, structure, context and legal status of the document;
- Description of the subsurface conditions on the site and the exposure pathways;
- Management strategies for regular maintenance activities (e.g. gardening etc.);
- Management strategies for major activities (e.g. service trenching, excavation etc.);
- Documented community liaison and complaints handling procedures;
- Work Health and Safety Plan; and
- Details of EMP implementation such as roles and responsibilities, monitoring and auditing requirements, training, record keeping, review requirements and document distribution.

The EMP will need to be applied to the site by the organisation responsible for site management (e.g. Body Corporate of the Strata Plan, or by means of development conditions under the forthcoming version of SEPP 55).

It is noted that notification of an EMP will need to be made on the land titles by way of the Section 149 Certificate (now Section 10.7) under the *Environmental Planning and Assessment Act 1979*. This will ensure future owners/managers of the site are aware of its contamination status.

16. Limitations

Douglas Partners (DP) has prepared this report for Building J03, Electrical Engineering, Darlington in accordance with DP's proposal dated 21 March 2018, and email acceptance from the Laing O'Rourke Australia Construction Pty Ltd (dated 22 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 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

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.

Appendix B

Drawings

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

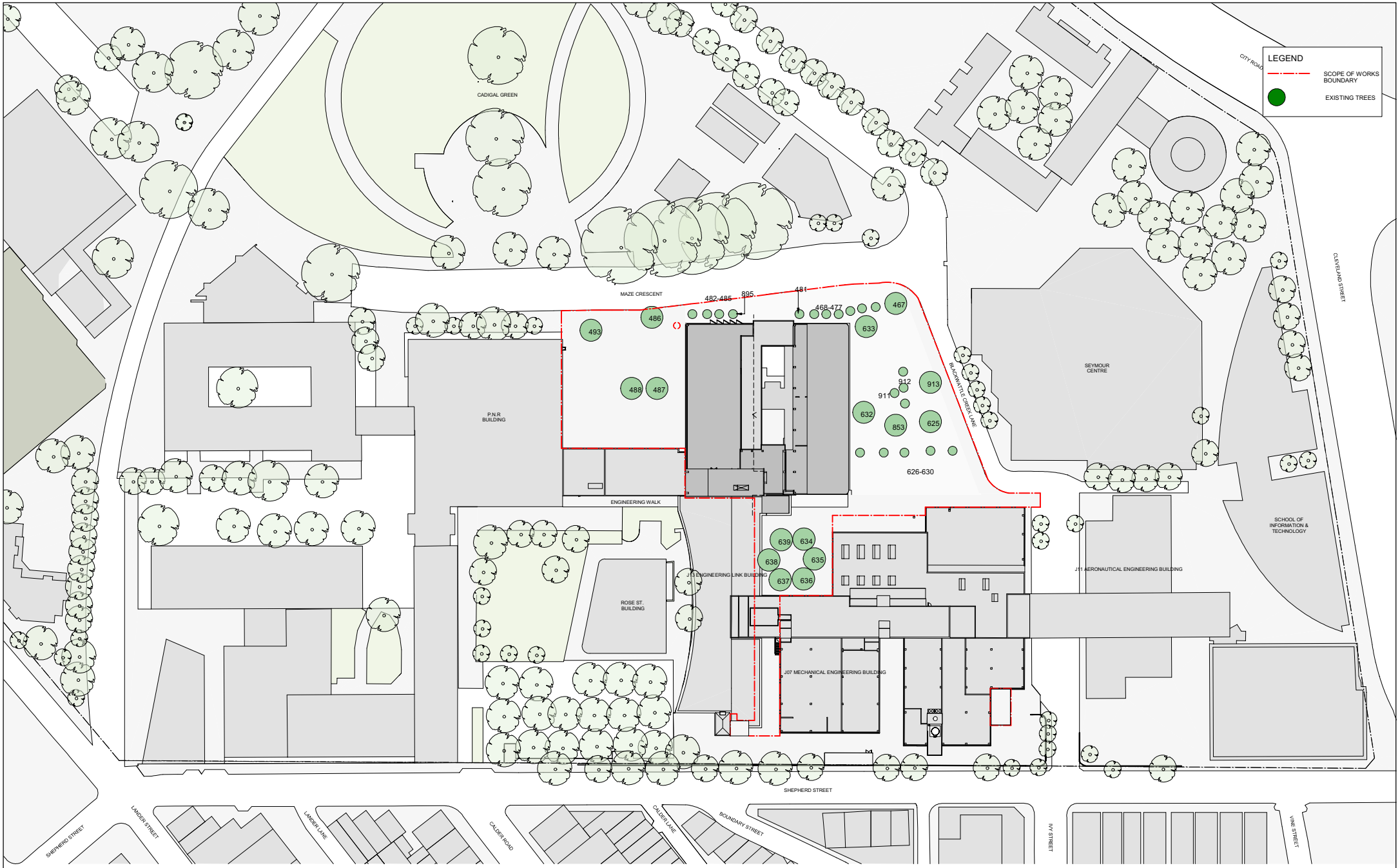
LEGEND
- Test bore location (DP 2016)
- Dynamic cone penetrometer test location (DP 2016)
- Current borehole location

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

Contractor: LAING O'ROURKE

Architect: COX

Level 6, 155 Clarence Street,
Sydney, NSW 2000, Australia
T + 61 2 9267 9599
F + 61 2 9264 5844
www.coxarchitecture.com.au

Nominated Architects
Jins Agius no. 6491
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

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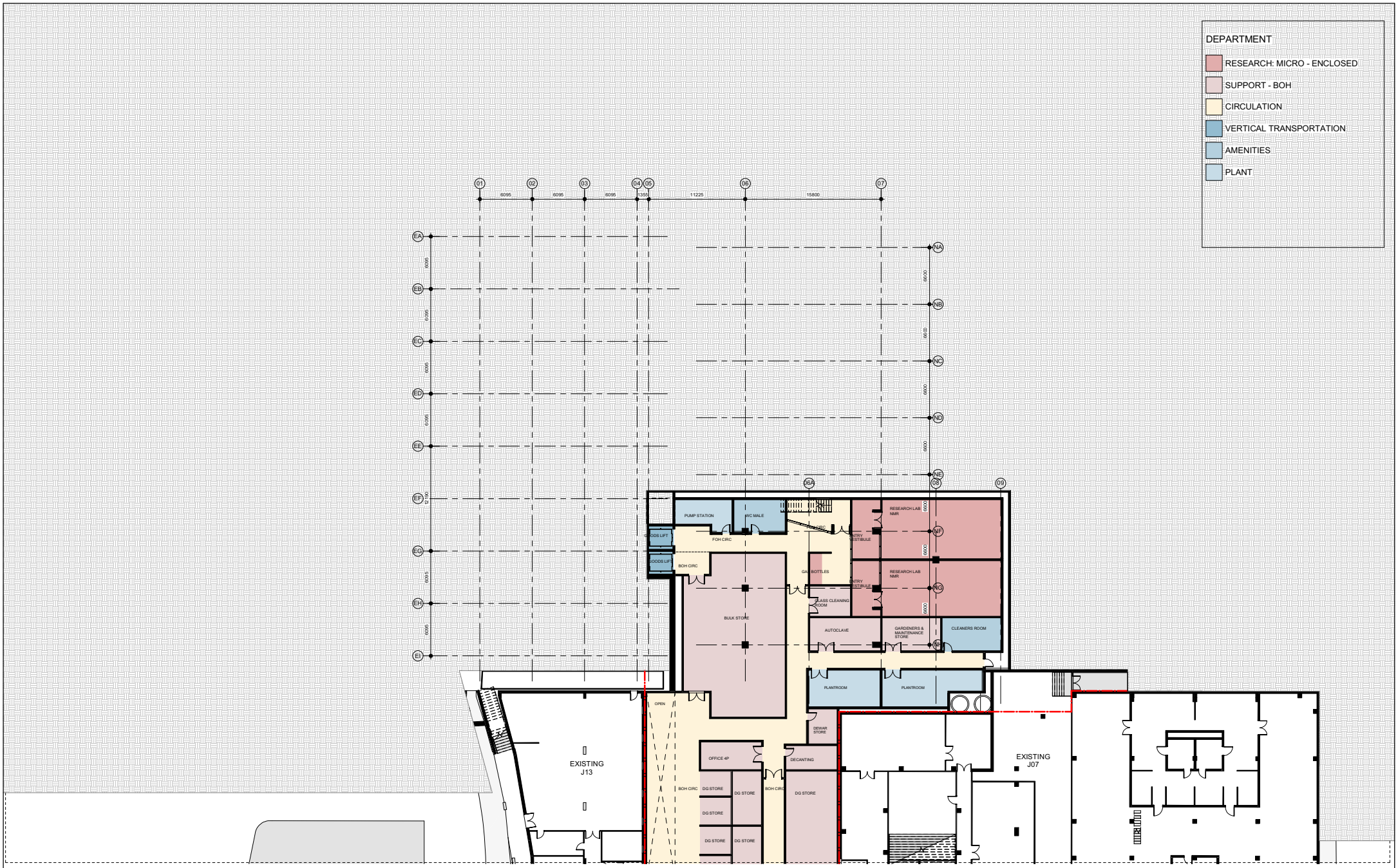

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Principal

THE UNIVERSITY OF SYDNEY

Contractor

LAING O'ROURKE

Architect

COX

Level 6, 155 Clarence Street,
Sydney, NSW 2000, Australia
T + 61 2 9267 9599
F + 61 2 9264 5844
www.coxarchitecture.com.au

Nominated Architects
Jina Agius no. 6491
Russell Lee no. 6367

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

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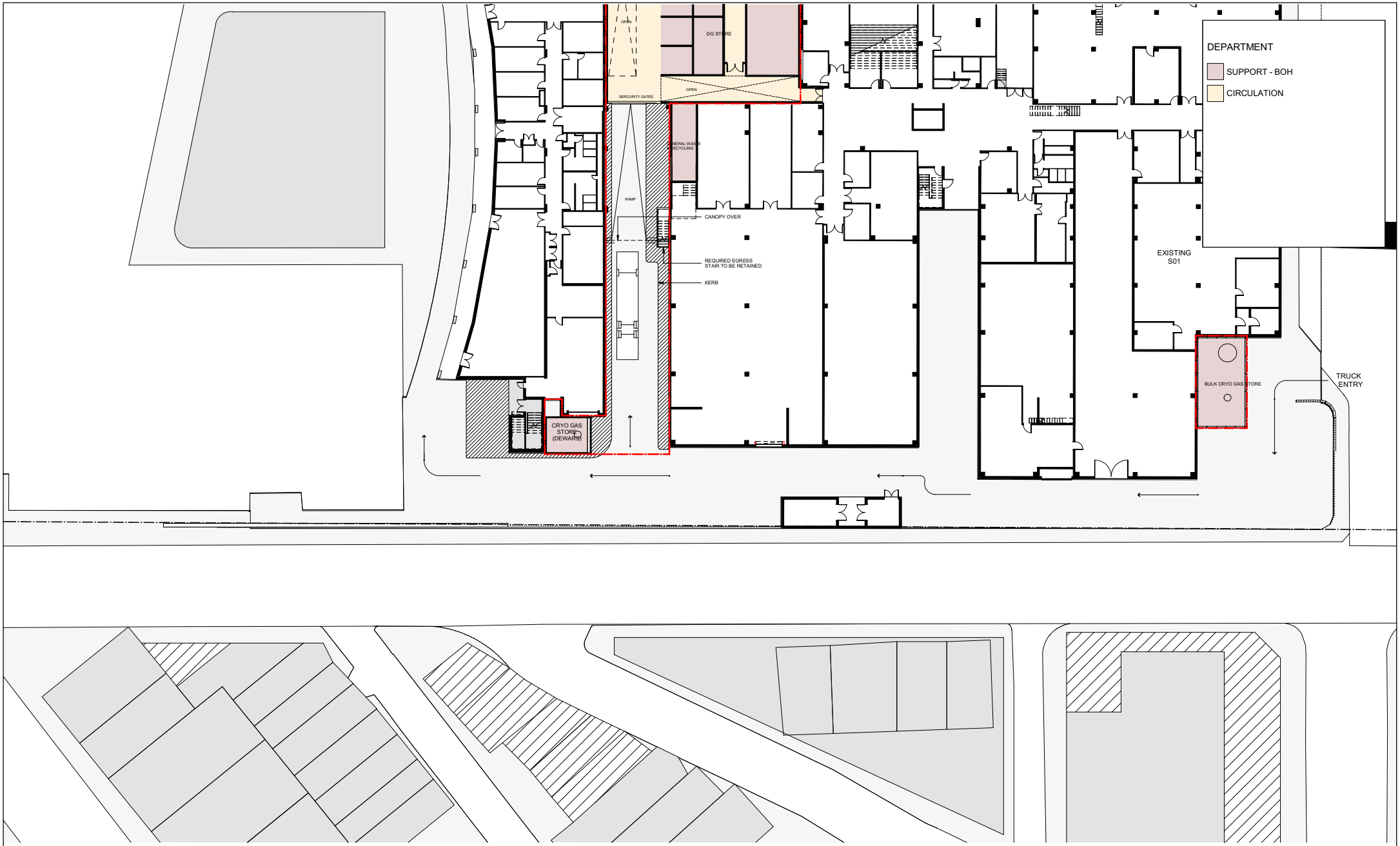

Rev	Description	By	Date
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B	FOR INFORMATION	SPG	15.11.2017
C	SSDA	SPG	31.01.2018

Principal

THE UNIVERSITY OF SYDNEY

Contractor

LAING O'ROURKE

Architect

COX

Level 6, 155 Clarence Street,
Sydney, NSW 2000, Australia
T + 61 2 9267 9599
F + 61 2 9264 5844
www.coxarchitecture.com.au

Nominated Architects
Jina Agius no. 6491
Russell Lee no. 6367

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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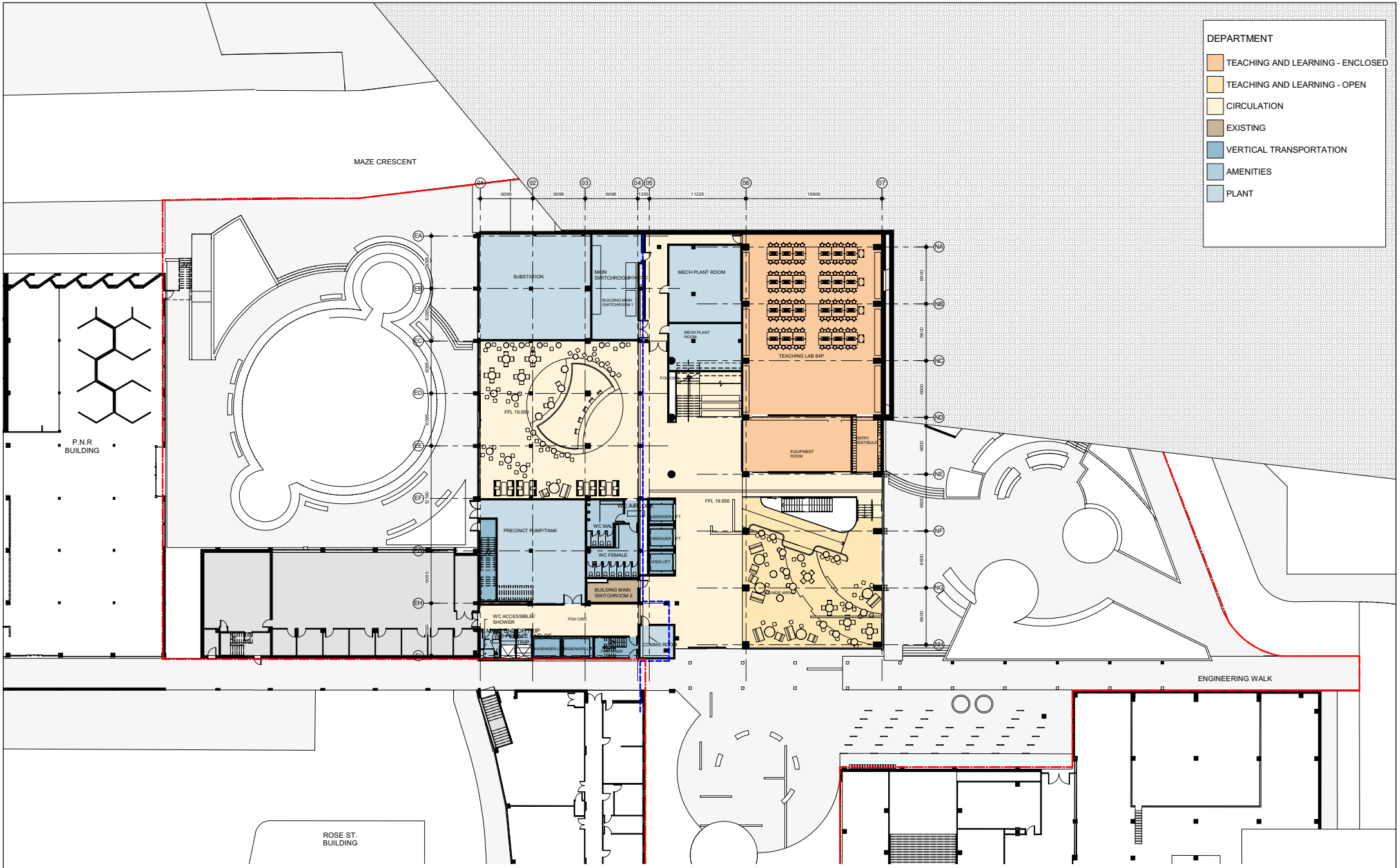

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Principal: THE UNIVERSITY OF SYDNEY

Contractor: LAING O'ROURKE

Architect: COX

Level 6, 155 Clarence Street,
Sydney, NSW 2000, Australia
T + 61 2 9267 9599
F + 61 2 9264 5844
www.coxarchitecture.com.au

Nominated Architects
Jina Agius no. 6491
Russell Lee no. 6367

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	
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Project Architect: Michael Bradburn	Scale: 1 : 200 @ A1
Project Director: David Holm	Date: 31/01/18
Drawing Number: A-DA-2102	Revision: C
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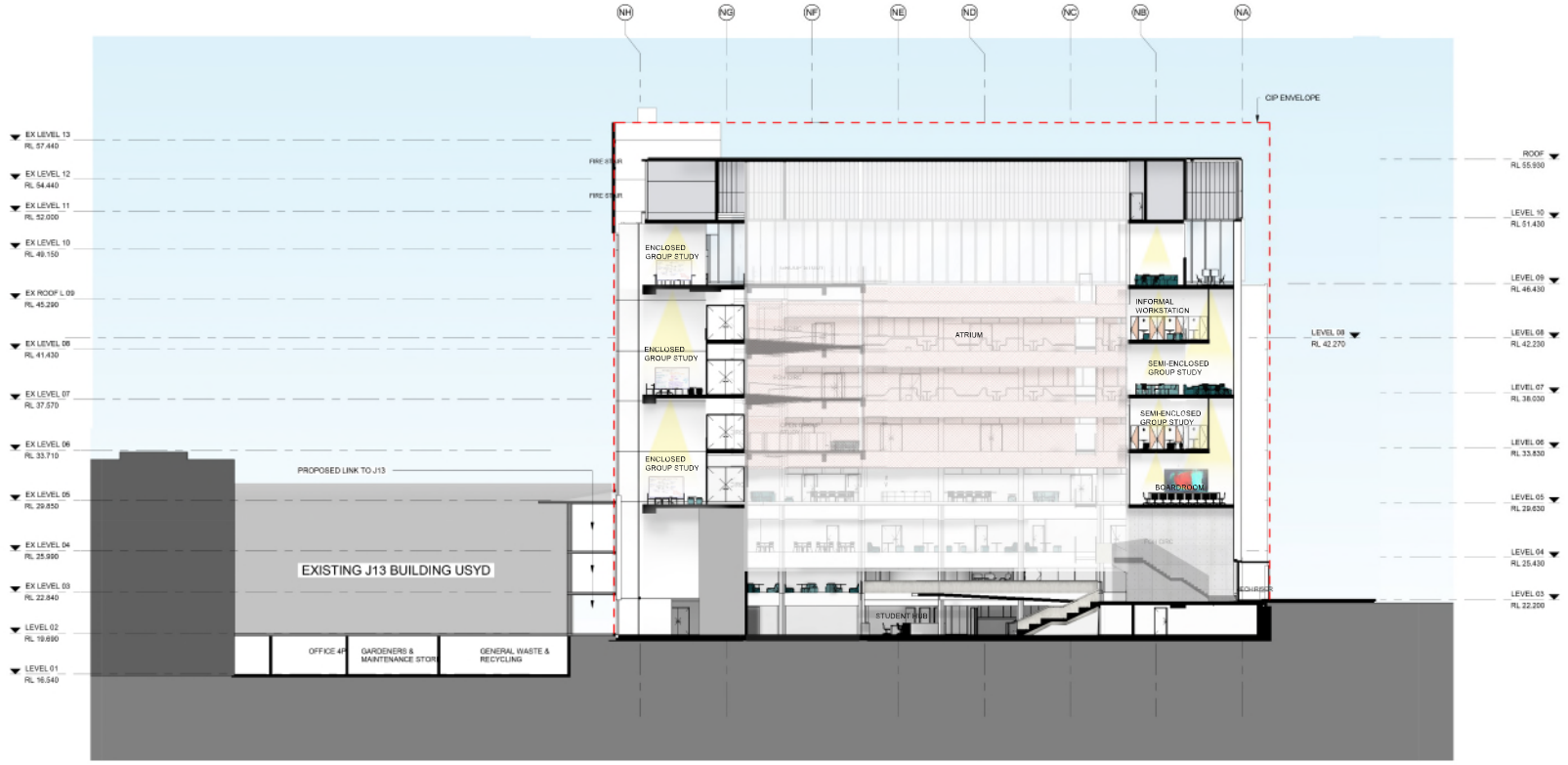

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SCALE 1 : 200

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Principal: THE UNIVERSITY OF SYDNEY

Contractor: LAING O'ROURKE

Architect
COX
Level 6, 155 Clarence Street,
Sydney, NSW 2000, Australia
T + 61 2 9267 9599
F + 61 2 9264 5844
www.coxarchitecture.com.au

Nominated Architects
Jon Agius no. 6491
Russell Lee no. 6367

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
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Project Architect: Michael Bradburn	Date: 31/01/18
Project Director: David Holm	Revision: C
Drawing Number: A-DA-4001	North:

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Appendix C

Previous Laboratory Test Results

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