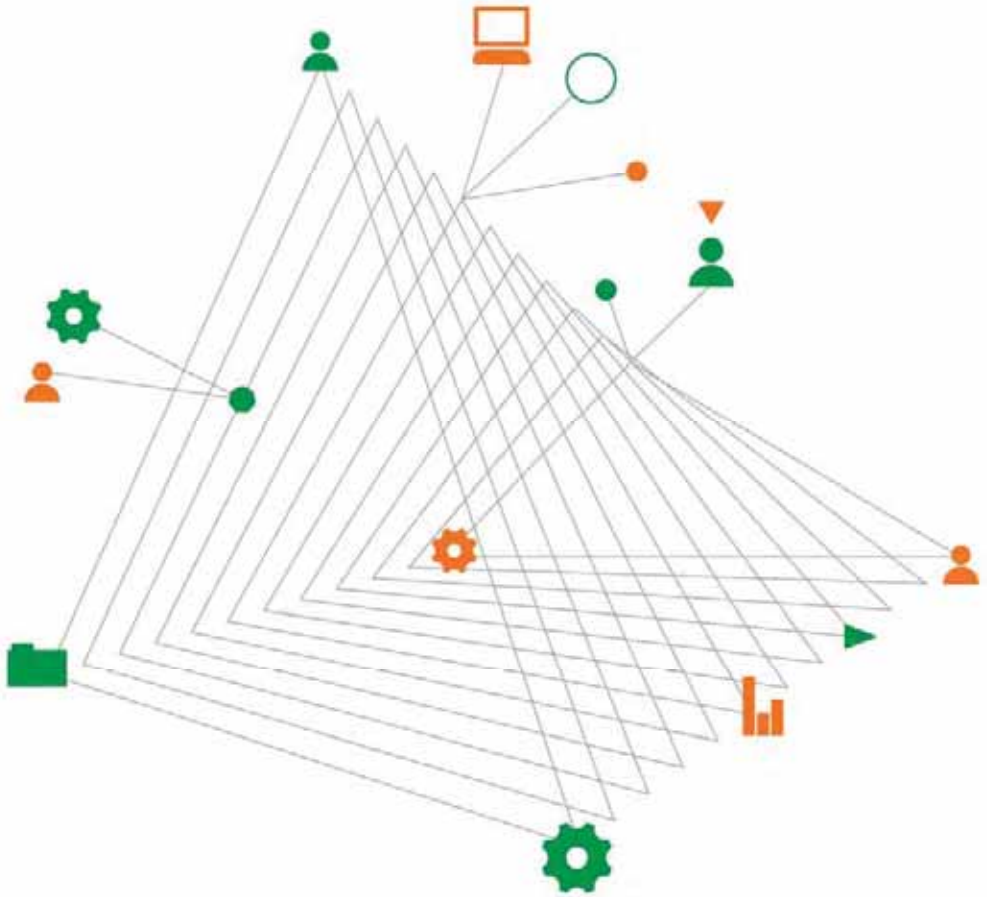
University of Sydney c/o Lend Lease Building

Detailed Site Contamination Investigation

University of Sydney - FASS Enabling Works

8 February 2016



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Detailed Site Contamination Investigation

Prepared for
University of Sydney c/o Lend Lease Building

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Final Rev1	GEOTLCOV25283AD-AF – Updated waste classification based on TCLP results	8/2/2016	Sally King	Michael Dunbavan

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Executive summary

This report presents the findings of a Detailed Site Contamination Investigation carried out by Coffey Geotechnics Pty Ltd (Coffey) as part of the Faculty of Arts and Social Sciences (FASS) Development Project at the University of Sydney (UoS), Camperdown Campus (the 'site'). The site forms part of an under-utilised area of UoS adjacent to Parramatta Road, surrounding and including the heritage listed RD Watt Building.

The rectangular site is located on Science Road, Camperdown NSW and has an approximate area of 0.8 hectares. The current site features include the RD Watt Building, the Ross Street Storage Facility, two demountable villages, four converted container rooms, and other outbuildings including a Native Animal House, Substation 54, switchroom and a pad-mounted kiosk substation.

Coffey understands that UoS is proposing to refurbish the heritage-listed RD Watt Building, and construct a new building immediately to the north of the RD Watt Building generally in the area of the Agricultural Research building. The proposed new structure is a five storey education and teaching building. No basement is currently proposed.

A Preliminary Site Contamination Assessment by Coffey (2015a) identified the following potential areas of environmental concern (AEC):

- potential weathering or remnants of hazardous building materials from historical and existing buildings;
- potentially contaminated fill;
- chemical storage areas;
- hazardous waste storage areas; and
- an electrical substation.

From this preliminary assessment, Coffey concluded that there was a low to moderate likelihood for ground contamination beneath the site. As such, intrusive investigation of the site was recommended with the aim of:

a. characterising and assessing the extent and significance of contamination present (if any) in the context of the proposed development; and

b. providing an opinion on the suitability of the site for the proposed redevelopment and recommendations to make the site suitable for proposed future land use, if required.

This Detailed Site Contamination Investigation was commissioned by Lend Lease Building (LLB) on behalf of UoS and undertaken in general accordance with Coffey's fee proposal dated 12 December 2015 (ref: GEOTLCOV25283AD-AA).

To achieve the project objectives, Coffey carried out intrusive site investigation works, including drilling of twelve boreholes, installation of three groundwater monitoring wells, collection and laboratory analysis of soil and groundwater samples.

The results of the Detailed Site Contamination Investigation indicate that:

- Fill material generally comprises the upper 0.02m to 0.12m of the subsurface of the site, underlain by low to high plasticity silty and gravelly clay and sand. Petroleum hydrocarbon staining and odour was not encountered within the subsurface of the site during fieldwork and no visible evidence of asbestos containing material was noted during fieldwork.
- Carcinogenic polycyclic aromatic hydrocarbons (PAHs) were reported at concentrations slightly above the health-based investigation level in one location in the southeastern corner of the site.

This impact is likely to be associated with the presence of bitumen fragments within the fill material forming the upper layer of soil. Given the likely source and isolated nature of the impact, it is considered not to present an unacceptable health risk to current or future site users, or future demolition, construction and maintenance workers.

- Contaminant concentrations exceeding the adopted ecological investigation and screening levels were identified across the site. These concentrations are considered unlikely to present an unacceptable risk to vegetation growth on-site under the future land use scenario.

- Copper and zinc concentrations slightly above the adopted groundwater investigation levels for fresh and marine water were reported in groundwater collected from the site. It is considered that these concentrations are likely to be representative of naturally occurrence in Ashfield shale and, therefore, do not present an unacceptable risk to the environment.

Given the results of soil and groundwater investigations undertaken as part of this Detailed Site Contamination Investigation, Coffey considers that the site is suitable from a contamination perspective for the proposed redevelopment.

The results of the investigation indicate that further investigation and / or remediation of the site is not required to permit the proposed FASS Enabling Works and, therefore, preparation of a Remediation Action Plan is not necessary.

However, Coffey recommends that an Unexpected Finds Procedure be prepared for the site and implemented during the proposed demolition and redevelopment works so that any localised area of contamination, or suspected contamination, can be appropriately managed.

Where visual (i.e. staining or discolouration, anthropogenic material, ash, etc) or olfactory (i.e. hydrocarbon or solvent odours) evidence of contamination is discovered, the locally affected area should be isolated and advice should be sought from a suitably qualified and experienced environmental professional prior to proceeding with further excavation and handling of soils.

This report should be read in conjunction with the attached “Important information about your Coffey Environmental Report”.

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Abbreviations

ABC	Ambient Background Concentration
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
bgs	below ground surface
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CEC	Cation Exchange Capacity
COPC	Chemical of potential concern
CSM	Conceptual Site Model
CT	Contaminant Threshold
EIL	Ecological Investigation Level
Envirolab	Envirolab Services Pty Ltd
ESL	Ecological Screening Level
Eurofins | MGT	Eurofins Environment Testing Australia Pty Ltd, trading as Eurofins MGT
FASS	Faculty of Arts and Social Sciences
GIL	Groundwater Investigation Level
HIL	Health-based Investigation Level
HSL	Health Screening Level
IP	Interface Probe
LLB	Lend Lease Building
LNAPL	Light Non-aqueous Phase Liquid
LOR	Limit of Reporting
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
MW	Monitoring Well
NAPL	Non Aqueous Phase Liquid
NATA	National Association of Testing Authorities

NEPC	National Environment Protection Council
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
NL	Non Limiting
NSW DEC	New South Wales Department of Environment and Conservation
NSW EPA	New South Wales Environment Protection Authority
NSW OEH	New South Wales Office of Environment and Heritage
OCP	Organochlorine Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PID	Photoionisation Detector
ppm	parts per million
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
SOP	Standard Operating Procedures
SVOC	Semi Volatile Organic Compounds
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solid
TEQ	Toxicity Equivalence Quotient
TRH	Total Recoverable Hydrocarbon
UCL	Upper Confidence Limit
UoS	University of Sydney
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound

1. Introduction

1.1. General

This report presents the findings of a Detailed Site Contamination Investigation carried out by Coffey Geotechnics Pty Ltd (Coffey) as part of the Faculty of Arts and Social Sciences (FASS) Development Project at the University of Sydney (UoS), Camperdown Campus (the 'site'). The site forms part of an under-utilised area of UoS adjacent to Parramatta Road, surrounding and including the heritage listed RD Watt Building.

The site location is shown in Figure 1.

This assessment was commissioned by Lend Lease Building (LLB) on behalf of UoS and undertaken in general accordance with Coffey's fee proposal dated 12 December 2015 (ref: GEOTLCOV25283AD-AA).

A detailed geotechnical investigation was also proposed by Coffey and approved by LLB. The geotechnical investigation will be reported separately.

1.2. Project background

The rectangular site is located on Science Road, Camperdown NSW and has an approximate area of 0.8 hectares. As shown in Figure 2, the site is characterised by the existing RD Watt Building (Building ref: A-04). Surrounding this building is the Ross Street Storage Facility (Building ref:A-04a), two demountable villages, four converted container rooms, and other outbuildings including a Native Animal House (Building ref:A40), Substation 54 (Building ref:A34a/b), switchroom and a pad-mounted kiosk substation.

Coffey understands that UoS is proposing to refurbish the heritage-listed RD Watt Building, and construct a new building immediately to the north of the RD Watt Building generally in the area of the Agricultural Research building. The proposed new structure is a five storey education and teaching building. No basement is currently proposed.

A Preliminary Site Contamination Assessment by Coffey (2015a) identified potential areas of environmental concern (AEC) and associated chemicals of potential concern (COPC).

The potential AECs on-site included:

- potential weathering or remnants of hazardous building materials from historical and existing buildings;
- potentially contaminated fill;
- chemical storage areas;
- hazardous waste storage areas; and
- an electrical substation.

From this preliminary assessment, Coffey concluded that there was a low to moderate likelihood for ground contamination beneath the site. Intrusive investigation of the site was recommended to assess potential ground contamination issues associated with the identified AECs with the aim of characterising and assessing the extent and significance of contamination present (if any) in the context of the proposed development.

1.3. Objectives

The objectives of this Detailed Site Contamination Investigation are to assess:

- Investigate potential surface and subsurface contamination in relation to the Areas of Environmental Concern identified by the Preliminary Site Contamination Assessment report (Coffey, 2015a);
- Interpret investigation findings and provide an opinion on the suitability of the site for the proposed redevelopment; and
- Assess what remediation works (if any) may be required to make the site suitable for proposed future land use.

1.4. Scope of assessment

To achieve the project objectives, Coffey carried out the following activities:

- Intrusive site investigation works, including:
    - Drilling of ten boreholes targeting identified AECs;
    - Collection of representative soil samples from each borehole;
    - Installation of three groundwater monitoring wells; and
    - Gauging, purging and sampling of each monitoring well.
- Laboratory analysis of selected soil and groundwater samples for a suite of COPC including heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), and volatile and semi volatile organic compounds (VOC / SVOCs). Laboratory analysis of selected soil samples for organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), and asbestos.
- Interpretation of the data and preparation of this Detailed Site Contamination Investigation report that summarises the results of the investigation works, and assesses the suitability of the site for the proposed redevelopment.

This report has been prepared in general accordance with industry and NSW EPA guidelines, particularly the *Guidelines for Consultants Reporting on Contaminated Sites* (NSW OEH, 2011) and relevant sections of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (the ASC NEPM) (NEPC 1999, amended 2013).

2. Site description

Site information provided in this section is based on observations made during a site walkover undertaken 12 March 2015 as part of the Preliminary Site Contamination Assessment, and supplemented by observations made during recent intrusive investigation works.

2.1. Site identification

Site identification details are summarised in Table 2.1. The location and site layout are shown in Figures 1 and 2, respectively.

Table 2.1: Site Identification

Site Address:	Science Road, Camperdown, NSW 2006
Site Area:	Approximately 0.8 hectares
Site Identification:	part Lot 1 in Deposited Plan 1171804 Lots 1 and 2 in Deposited Plan 154462
Current Zoning:	Zone SP2 – Infrastructure under the Sydney Local Environmental Plan 2012
Current Land Use:	Occupied by UoS

2.2. Site condition and surrounding environment

A site walkover survey was undertaken by an experienced Coffey environmental consultant, on 12 March 2015. The key observations made during the walkover survey included:

- The site comprises a rectangular-shaped parcel of land bound by Parramatta Road to the north, Agricultural Lane to the east, Science Road to the south, and Ross Street to the west.
- At the time of the walkover, the site was occupied by the University of Sydney and utilised for various purposes. Structures on the site included: RD Watt Building (A04), dangerous goods storage shed (A04 E-1), Ross St Storage Facility (A04a), Native Animal House (A40), storage containers (x4), substation and associated structures (A34a/b), demountable village (no building reference), cricket net, and the demountable village (A06).
- Buildings and hardstand surfaces (i.e. concrete and asphalt) cover the majority of the site. Gardens and vegetation surround the RD Watt Building, including large mature trees along the southern site boundary. Exposed fill containing building rubble (e.g. terracotta pipes, concrete pieces etc) was observed along the northern boundary adjacent to the demountable village. Artificial turf was located within the cricket net adjacent to Demountable Village (A06).
- The site ground level falls from east to west, and is formed into three levels . The eastern section of the site comprised the Native Animal House, car parks, containers, and substation. In the central section of the site, approximately 3m below the eastern section, was the RD Watt Building, Ross St Storage Facility, and Demountable Village. A 2-3m difference in level was observed between the central and the western sections of the site where the cricket net and Demountable Village (A06) were located.
- Two notable potential sources of contamination were identified during the site walkover. Firstly, the Ross St Storage Facility (A04a) had two chemical / hazardous waste storage areas. Several

drums of methanol, ethanol and acetone were stored in a well maintained and secure area. No odours or evidence of spillages were observed and the integrity of the floor of the storage area appeared intact. The second hazardous waste area in A04a, referred to as the sensitive storage area, was locked with no access. The dangerous good store shed (A04 E1) contains a number of chemicals was also locked with no access.

- The electrical substations in the northern section of the site included a number of switchboards. No evidence oil being stored within the substation was found. Additionally, there was no apparent hydrocarbon or chemical staining on the surface surrounding the substation.
- Waste and rubbish items were observed in localised areas around the site, rather than on a widespread basis. The observed items comprised old keyboards, cardboard materials, wood, rusted steel, furniture, sand bags, etc. These materials were generally assessed to be relatively inert in nature.
- No evidence of underground tanks or storage vessels was found during the walkover, however several sewer and stormwater pits were located around of the site.
- No other visual or olfactory evidence of contamination was noted on surface soils during the site walkover.
- No materials suspected to contain asbestos were observed during the site walkover. However, it is noted that the former Ross Street Building demolished approximately four years ago, in the western section of the site, contained large quantities of asbestos, which Coffey understands was removed during the demolition.

2.3. Surrounding land use

Table 2.2 provides a summary of the land uses surrounding the site.

Table 2.2: Surrounding Land Uses

Direction	Land Uses
North	Parramatta Road with commercial premises beyond
East	Heydon Laurence Building (Building ref: A08) which forms part of the School of Biological Sciences
South	Science Road with sporting fields (University Oval No. 2) and University buildings beyond
West	Ross Street with a temporary greenhouse and the J.D. Stewart Building (used by the University of Veterinary Science) beyond

2.4. Topography and drainage

The NSW Department of Lands Spatial Information Exchange (http://imagery.maps.nsw.gov.au) indicates that the site has an elevation of approximately 30m Australian Height Datum (AHD).

The site slopes down from east to west and is formed into three levels. The eastern level is approximately 3m above the central level. A large retaining is located down to the western level which is also approximately 2-3m below the central level.

It is expected that surface water runoff would either percolate into sub-surface soils (where permeability allows) or become run-off and enter drainage channel which forms the northwestern boundary of the site, or stormwater drainage services via off-site kerbside drains along paved roads.

2.5. Hydrology

No creeks or rivers surround or dissect the site. The closest waterway to the site is Blackwattle Bay which is located approximately 1.15km to the north.

2.6. Regional geology and soils

The 1:100,000 Sydney Geology sheet indicates that the site is underlain by Ashfield Shale of the Wianamatta Group. This formation typically comprises dark grey to black shale, claystone-siltstone and fine sandstone-siltstone laminite.

The 1:100,000 Sydney Soil Landscape sheet indicates that the subsurface of the site comprises the Blacktown Soil Landscape Group. This group is typically characterised by shallow to moderately deep red and brown podzolic soils in well drained areas, and yellow podzolic soils and soloths is poorly drained areas. The soils may be prone to seasonal waterlogging.

2.7. Acid sulfate soil

The Botany Bay 1:25,000 Acid Sulfate Soil Risk Map (9130S3 Edition 2 1997) indicates that the site is within the area of no known occurrence of acid sulfate soils.

2.8. Regional hydrogeology

A search of groundwater bore licenses undertaken on 21 January 2016 using the Office of Water continuous water monitoring network (http://allwaterdata.water.nsw.gov.au/water.stm) indicated that there are three registered groundwater bores within a 500m radius of the site. All bores were installed for monitoring purposes, the measured standing water level was reported to be 2.07m below ground surface (bgs).

Previous geotechnical investigations carried out within the north-central portion of the site around the demountable village area encountered groundwater seepage at a depth of approximately 4.6m bgs (Coffey, 2015b).

3. Review of the preliminary contamination assessment

3.1. Site history

The site history summary is based on a review of the Preliminary Site Contamination Assessment (Coffey, 2015a) which accessed the following sources of information:

- Current and historical aerial photographs;
- NSW OEH online databases; and
- Land title information;
- WorkCover records pertaining to the storage of dangerous goods; and
- Information from discussions with the current site operator.

Historical information indicates that the RD Watt Building was established on-site in 1916. Aerial photographs indicate that further development of the eastern portion of the site occurred between 1930 and 1943, while development of the western portion occurred prior to 1978. No significant changes to the layout of the site occurred until 2011 when the western portion of the site was redeveloped as a car park prior to construction of a new building in 2013.

Land title records indicate that the site has been owned and occupied by the University of Sydney since 1855, with sections of the site leased from Sydney Council.

Dangerous goods records indicate that chemicals are stored in several locations within the site, including:

- RD Watt Chemical Storage Area (A04 E1) containing a mixture of dangerous goods in a roofed store, including N,N Dimethylformamide, Acetone, Isopropanol and cyclohexane, typically in volumes of approximately 150L.
- Ross St Storage facility (A04a) which stores up to 7,000L of dangerous goods, including acetone, ethanol, methanol, hexanes and ethyl acetate.

Records indicate that the former Ross St Building (A03) also stored numerous dangerous goods (i.e. various VOC, petroleum spirit, metal salts, various acids and alkalis) in two separate roofed stores and two separate storage cabinets.

The preliminary assessment indicated that AECs on the site were related to:

- potential weathering or remnants of hazardous building materials from historical and existing buildings;
- potentially contaminated fill;
- chemical storage areas;
- hazardous waste storage areas;
- an electrical substation.

4. Areas of environmental concern and chemicals of potential concern

Based on the site history information and site observations several potentially contaminating activities/sources were associated with potential AECs and COPCs.

These are summarised in Table 4.1.

Table 4.1: Areas of Environmental Concern

Potential Contaminating Activity/ Area of Environmental Concern	Contaminants of Potential Concern	Likelihood of Impact^	Comments
Potential weathering or remnants of hazardous building material from historic and existing buildings on site	Metals (e.g. copper, zinc, lead) and asbestos	Low to Moderate	Asbestos containing materials (ACM), copper, zinc and lead could have historically been present in building materials. Desk-based records and discussions with site personnel indicate this structure was demolished approximately four years ago. Impacts associated with weathering or remnants of building rubble containing hazardous materials (if present) would likely be within the near surface soils.
Potential contamination in fill	TRH, BTEX, PAH, Metals*, PCB, OCP and asbestos.	Low to Moderate	The source and quality of fill material present on site is unknown. Concrete and ceramic pipes were observed within the fill material exposed at surface in the central/northern part of the site.
Chemical Storage Areas (refer Figure 2)	VOC, Metals*, TRH, BTEX,	Low to Moderate	The sources of potential contamination are known and were observed in the A04a.
Hazardous Waste Storage Area	**	Low to High	The contents and exacts nature of hazardous waste stored within this area is unknown. The storage area was locked with limited access.
Substations	TRH, PCB, Asbestos	Low	Due to the age and nature of the substations and switchboards there is a possibility that asbestos and PCBs are present. The presence of oil was not observed during the site walkover.

Notes:

* Metals = arsenic, chromium, cadmium, copper, lead, nickel, mercury and zinc.
** COPCs associated with the storage of hazardous wastes are unknown to Coffey, and should be clarified through discussions with authorised UoS staff.

5. Assessment data quality objectives

As stated in Section 5 of Schedule B2 – Guideline on Site Characterisation in the ASC NEPM, the data quality objectives (DQO) process is used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site.

The seven-step DQO process adopted for this assessment is provided below:

Step 1: State the Problem

The primary objectives of this assessment are to assess:

- Investigate potential surface and subsurface contamination in relation to the Areas of Environmental Concern identified by the Preliminary Site Contamination Assessment report (Coffey, 2015a);
- Interpret investigation findings and provide an opinion on the suitability of the site for the proposed redevelopment; and
- Assess what remediation works may be required to make the site suitable for proposed future land use (if any).

Based on this, the main problems are:

- How many boreholes should be drilled, and where?
- How many groundwater monitoring wells should be installed, and where?
- Could access restrictions limit available location of boreholes and monitoring wells, and the method(s) used for drilling and installation?
- To what depths should the boreholes be drilled
- At what depth should soil samples be collected?
- At what depth should groundwater monitoring wells be installed?

Step 2: Identify the Decision

Is the site suitable for the proposed redevelopment, and if not, then what is the type and extent of contamination that requires remediation or management?

Step 3: Identify Inputs to the Decision

The primary inputs to assessing the above include:

- Information gathered as part of the Preliminary Site Contamination Assessment (Coffey, 2015a).
- Observations and soil headspace screening measurements made by Coffey during field investigations.
- Results of current soil and groundwater investigations undertaken on-site.
- Relevant legislation and regulatory guidelines.
- Likely future land use as indicated by the concept design for redevelopment.

Step 4: Define the Study Boundaries

The study boundaries are defined by the boundaries of the site as shown in Figure 2.

The vertical boundary is defined by the maximum vertical extent of soil and groundwater investigations, typically 2m below the top of an unconfined groundwater table.

Step 5: Develop a Decision Rule

The decision rule to assess the suitability of the site will be as follows:

- Quality Assurance / Quality Control (QA/QC) assessment indicates that the data is usable; and
- Where contaminant concentrations are reported to exceed the adopted investigation levels, then further consideration of the potential environmental and health risks in the context of the current and proposed future use of the site. Additional investigation and/or management (including remediation) may also be required.

Step 6: Specify Limits of Decision Errors

There are two sources of error for input to decisions:

- Sampling errors, which occur when the samples collected are not representative of the conditions within the investigation area; and
- Measurement errors, which occur during sample collection, handling, preparation, analysis and data reduction.

The null hypothesis for this study is:

- Contaminant concentrations within the soil beneath the site are more than the adopted investigation levels.

These errors may lead to the following decision errors:

- Type I - deciding that the soil and / or groundwater is not contaminated and, therefore, the site is suitable for the proposed residential development when the reverse is true; and
- Type II - deciding that the soil and / or groundwater is contaminated and, therefore, the site is not suitable for the proposed residential development when the reverse is true.

The acceptable limit on decision errors is a 5% probability of a false negative (i.e. assessing that the average concentrations of COPC in are less than the adopted soil and groundwater investigation levels when they are actually greater than the investigation levels).

Where data sets are sufficiently populated, the 95% Upper Confidence Limit (UCL) of the arithmetic mean will be used to calculate this probability. The 95% UCLs are to be less than the investigation level and standard deviation of the sample population shall be less than 50% of the investigation level.

The investigation levels for assessment are nominated in Section 7 of this report.

Step 7: Optimise the Design for Obtaining Data

Based on the previous Steps 1 to 6 of the DQO process, the optimal design for obtaining the required data is presented in the following sections (i.e. proposed field and laboratory programs).

6. Sampling plan and methodology

6.1. Soil sampling methodology

Soil sampling was undertaken on 18 and 19 January 2016 in accordance with the sampling methodology and QA / QC procedures summarised in Table 6.1.

Table 6.1: Soil Sampling Methodology

Activity	Details
Assessment Locations	Boreholes BH1, BH3, BH5 to BH7, BH9 to BH13 were drilled as part of the Detailed Site Contamination Investigation (boreholes BH2, BH4 and BH8 were drilled as part of the geotechnical investigation). Boreholes were drilled to target identified AECs including the dangerous goods and hazardous waste storage areas, electricity substations, and areas of fill. Additional boreholes were drilled to provide even coverage of the site.
Drilling	Boreholes, excluding BH7, were drilled to the target depth using a mechanical drill rig equipped with solid stem augers. Borehole BH7 was hand augered to a depth of 1m bgs, and continued to the target depth using a drilling rig. Boreholes were extended to depths between 2m and 5m bgs, which was sufficient to intercept natural material.
Soil Sampling	Soil samples were collected from the fill material (i.e. comprising the upper portion of the subsurface), and the underlying residual soils. Soil samples were collected from depths of 0.2m, 0.5m, 1.0m and every metre thereafter to the base of the borehole. Soil samples were collected directly from the augers following removal of the outer layer of soil to minimise the potential for cross contamination of samples.
Soil Logging	Soil was logged in general accordance with the relevant Coffey Standard Operating Procedure (SOP) and the Unified Soil Classification System (USCS) by a suitably qualified and experienced scientist. The presence of visible fragments of material suspected to contain asbestos, staining or odours was also noted on the field logs. Borehole logs are presented in Appendix A.
Sample Handling and Transportation	Sample collection, storage and transport were in general accordance with the relevant Coffey SOP. Soil samples collected for chemical analysis were immediately placed into laboratory supplied jars and filled to capacity, with Teflon lined seals to limit volatile loss and placed into an ice chilled cooler. Soil samples collected for asbestos analysis were placed into ziplock plastic bags and securely sealed. Samples were dispatched to NATA accredited laboratories under chain of custody control.

Activity	Details
Soil Screening	A portion of each soil sample collected for chemical analysis was placed inside a sealed plastic bag for field headspace screening for VOCs using a Photoionisation Detector (PID). The PID was calibrated by the equipment supplier prior to the commencement of the investigation fieldworks using 100ppm isobutylene calibration gas. Calibration certificates are presented in Appendix B. The PID readings, together with other field observations, were used to assess which samples should be analysed for volatile contaminants. The field screening results are included on the borehole logs presented in Appendix A.
QA/QC Samples	To measure the accuracy and precision of the data generated by the field and laboratory procedures carried out in this assessment, the following additional samples were collected for QA / QC purposes: • one intra-laboratory duplicate soil sample analysed by the project laboratory; and • one inter-laboratory triplicate soil sample analysed by a secondary laboratory.
Decontamination of sampling equipment	Non-disposable sampling equipment (i.e. hand auger) was decontaminated with approximately 5% Decon 90 solution in potable water, and rinsed with potable water prior to use and between each sample location. Soil samples were collected from the sampling equipment using a new pair of nitrile gloves for each sample.
Disposal of soil cuttings	Soil cuttings were used as backfill to reinstate each borehole upon completion of sampling, except where a groundwater monitoring well was installed in a borehole. Off-site disposal of excess soil was carried out by the drilling contractors.

6.2. Groundwater sampling methodology

Groundwater gauging and sampling was undertaken in accordance with the sampling methodology and QA / QC procedures summarised in Table 6.2. Monitoring wells were installed in boreholes drilled for soil sampling and were developed on 18 and 19 January 2016. Groundwater gauging and sampling occurred on 22 January 2016.

Table 6.2: Groundwater Sampling Methodology

Activity	Detail / Comments
Well locations	Groundwater monitoring wells were installed in boreholes BH2 (geotechnical borehole), BH9 and BH12. Groundwater monitoring wells BH9 and BH12 were constructed of screw threaded PVC casing from the surface to depths of 2m bgs. These were extended to the base of each monitoring well (5m bgs) with lengths of machine slotted 50mm diameter PVC screen. The well annulus was backfilled with 2mm to 3mm gravel from the base of the well to the top of the screen, and capped with a 0.5m bentonite seal. The remainder of the well annulus was backfilled to the surface with soil cuttings and completed at the surface with a gatic cover.

Activity	Detail / Comments
	Monitoring well BH2 was constructed of screw threaded PVC casing from the surface to a depth of 0.15m bgs. This was extended to the base of the monitoring well (3m bgs) with lengths of machine slotted 50mm diameter PVC screen. The well annulus was backfilled with 2mm to 3mm gravel from the base of the well to the top of the screen, and capped with a 0.15m bentonite seal. The well was completed at the surface with a gatic cover. Wells were developed at the completion of installation. A stainless steel bailer was used to surge the well to agitate the water column and remove sediment. Development continued until the wells were purged dry.
Well Gauging	Monitoring wells were gauged using an oil/water interface probe (IP) to assess the depth to groundwater and the presence (and apparent thickness, if any) of light non-aqueous phase liquid (LNAPL). The IP was calibrated prior to use. Calibration certificates are presented in Appendix B. If LNAPL was detected, it would be confirmed by collection using a bailer. The presence of LNAPL would preclude purging and sampling of that well. The IP was decontaminated between each monitoring well.
Well Purging and Sampling	Monitoring wells were purged and sampled in general accordance with the relevant Coffey SOP, which are consistent with current Australian standards and guidelines. Prior to sampling, monitoring wells were purged using a disposable bailer. Field groundwater quality parameters were recorded between each well volume removed from the well. The water quality meter was calibrated prior to use. Calibration certificates are presented in Appendix B. Purging continued until the wells were dry (between one and three well volumes).
Sample Handling and Transportation	Sample collection, storage and transport were conducted in general accordance with the relevant Coffey SOP. Groundwater samples were immediately placed into laboratory supplied bottles, with Teflon lined seals and placed into chilled storage. Sample containers for analysis of volatile compounds were filled to eliminate headspace. Groundwater samples collected for analysis for heavy metals were filtered in the field using a 0.45µm filter. Samples were dispatched to the NATA accredited project laboratory under chain of custody control.
QA/QC Samples	To measure the accuracy and precision of the data generated by the field and laboratory procedures carried out in this assessment, the following additional samples were collected for QA/QC purposes: • one intra-laboratory duplicate groundwater sample; and • one trip blank and one trip spike.
Decontamination of sampling	All non-disposable sampling equipment was decontaminated with approximately 5% Decon 90 solution in potable water, and rinsed with potable water prior to use and between each

Activity	Detail / Comments
equipment	sample location.
Disposal of purged groundwater	Purged groundwater was placed in sealed drums for appropriate off-site disposal by a licensed contractor.

6.3. Laboratory analysis

Laboratory analysis of soil samples was carried out by NATA accredited laboratories as follows:

- Primary laboratory: Eurofins | MGT at Lane Cove West, NSW
- Secondary laboratory: Envirolab at Chatswood, NSW

A selection of primary soil samples from 12 boreholes and groundwater samples were submitted for laboratory analysis for a suite of COPCs as summarised in Table 6.3.

Table 6.2: Summary of Analysis

Chemical of Potential Concern	Number of Soil Samples	Number of Groundwater Samples
Total Recoverable Hydrocarbon (TRH)	2 per borehole	3 samples
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	2 per borehole	3 samples
Polycyclic Aromatic Hydrocarbons (PAH)	2 per borehole	3 samples
Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)	2 per borehole	3 samples
Volatile Organic Compounds (VOC)	1 per borehole	3 samples
Semi-volatile Organic Compounds (SVOC)	1 per borehole	3 samples
Polychlorinated Biphenyls (PCB)	1 per borehole	-
OC Pesticides	1 per borehole	-
Asbestos	1 per borehole, fill material only	-

Sample holding times were within acceptable range (Schedule B3 of the ASC NEPM) from collection to extraction:

- metals ≤ 6 months (except mercury & chromium VI – 28 days) for soil and groundwater.
- TRH (C_6-C_9) and BTEX ≤ 14 days at 6^{o}C for soil and groundwater.
- TRH (C_{10}-C_{36}) ≤ 7 days at 6^{o}C for soil and groundwater.
- PAH ≤ 14 days at 6^{o}C for soils and ≤ 7 days at 6^{o}C for groundwater.
- VOC ≤ 14 days at 6^{o}C for soil and groundwater.
- SVOC ≤ 14 days at 6^{o}C for soil and ≤ 7 days at 6^{o}C for groundwater

- OCP ≤ 14 days at 6^{o}C for soil.
- PCB ≤ 28 days at 6^{o}C for soil.

7. Investigation levels

7.1. Soil investigation levels

The soil investigation levels presented in the following reference are the primary criteria used in NSW when establishing assessment criteria for chemical contaminants in soil:

- Schedule B1 'Guideline on the Investigation Levels for Soil and Groundwater' of the ASC NEPM.

7.1.1. Health-based investigation and screening levels

Section 3.2.4 of Schedule B7 of the ASC NEPM states that the "commercial / industrial" health investigation levels (HIL D) do not allow for more sensitive land uses, such as educational facilities, which may be an allowable use under commercial or industrial zoning. HILs for residential land use are recommended as reasonable alternatives, depending on the sensitivity of receptors, even though actual residential use is not proposed. Thus, use of HIL D investigation and screening levels was considered inappropriate for the purposes of this investigation.

For assessing contamination levels in soil in urban settings, Schedule B1 in the ASC NEPM presents health based investigation levels (HILs) and health screening levels (HSLs) for different generic land uses (e.g. industrial/commercial, residential, recreational etc).

Contaminant concentrations, excluding TRH, BTEX and naphthalene, were assessed against the HILs applicable to "Residential B" (HIL B) from Schedule B1 of the ASC NEPM.

The HILs for heavy metals, PAH, OCP and PCBs in soils are summarised in Table 7.1.

Table 7.1: Summary of HILs in Soil

Analyte	HILs for Residential B (mg/kg)
Arsenic (total)	500
Cadmium	150
Chromium (Total)[1]	500
Copper	30,000
Lead	1,200
Mercury (inorganic)	120
Nickel	1,200
Zinc	60,000
Carcinogenic PAHs[2]	4
Total PAHs	400
Aldrin + Dieldrin	10
Chlordane	90
DDT+DDD+DDE	600
Endosulfan	400
Endrin	20
Heptachlor	10
HCB	15
Methoxchlor	50
Toxaphene	30

Analyte	HILs for Residential B (mg/kg)
PCB (any single compound)	1

1. HIL for hexavalent chromium used as a conservative level
2. Expressed as Benzo(a)pyrene Toxicity Equivalence Quotient (BaP TEQ)

TRH, BTEX and naphthalene concentrations were assessed against the soil HSLs for vapour intrusion from the depth and soil matrix relevant to the site and applicable to "Low to high density residential" land use (HSL A & HSL B) from Table 1A(3) in Schedule B1 of the ASC NEPM.

The adopted screening levels were selected in consideration of the sandy soil texture which occurred commonly in the fill material overlying natural clay residual soils.

The HSLs for TRH, BTEX and naphthalene in sand are summarised in Table 7.2.

Table 7.2: Summary of HSLs in Soil

Chemical	HSL A & HSL B – Low to high density residential (sand) (mg/kg)	HSL A & HSL B – Low to high density residential (sand) (mg/kg)
	0m to <1m	1m to <2m
Benzene	0.5	0.5
Toluene	160	220
Ethylbenzene	55	NL
Xylenes	40	60
Naphthalene	3	NL
TRH C_6-C_{10} (less BTEX)	45	70
TRH >C_{10}-C_{16} (less naphthalene)	110	240

NL: non-limiting (i.e. contaminant is not considered to pose a risk to human health through vapour intrusion to indoor air).

7.1.2. Ecological investigation and screening levels

To assess the impact on ecosystems including site vegetation from contamination within the upper 2m of the subsurface, Schedule B1 of the ASC NEPM presents Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for different land uses (e.g. areas of ecological significance, urban residential/public open space, commercial).

EILs are listed for certain heavy metals, DDT and naphthalene in soils and those relevant to site conditions are summarised in Table 7.3.

Table 7.3: Summary of EILs in Soil

Chemical	Urban residential and public open space (mg/kg)
Arsenic	100 [1]
Chromium	260 [2,7]
Copper	240 [3,7]
Lead	1,260 [4]
Nickel	280 [5]
Zinc	720 [6,7]
DDT	180 [1]
Naphthalene	170 [1]

1. Table 1B(5) - Schedule B(1), Guideline on the Investigation Levels for Soil and Groundwater of the ASC NEPM

2. The Added Contaminant Limit (ACL) selected for Chromium III conservatively assumes a clay content of 2.5%.
3. The ACL selected for Copper uses an estimated soil pH of 6.5, an estimated cation exchange capacity (CEC) of 20cmol$_c$/kg and an estimated Total Organic Carbon of 0.1%.
4. Table 1B(4) - Schedule B(1), Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999).
5. The ACL selected for Nickel uses an estimated CEC of 20cmol$_c$/kg.
6. The ACL selected for Zinc uses an estimated soil pH of 6.5, and an estimated CEC of 20cmol$_c$/kg.
7. Ambient Background Concentration (ABC) was adopted for NSW assuming an old suburb with high traffic volume, where relevant.

The ESLs for TRH, BTEX and benzo(a)pyrene in soils from Schedule B1 of the ASC NEPM are summarised in Table 7.4.

The adopted screening levels were selected in consideration of the sandy soil texture typical of the upper metre of the soil / fill profile.

Table 7.4: Summary of ESLs in Soil

Chemical	ESL – Urban residential and public open space (coarse grained soils) (mg/kg)
TRH C_6-C_{10} (less BTEX)	180
TRH >C_{10}-C_{16}	120
TRH >C_{16}-C_{34}	300
TRH >C_{34}-C_{40}	2800
Benzene	50
Toluene	85
Ethylbenzene	70
Xylenes	45
Benzo(a)pyrene	0.7

7.1.3. Asbestos

Selected soils samples were submitted to the laboratory for identification of asbestos in accordance with AS4964-2004 ‘Method for the qualitative identification in bulk samples” which includes polarized light microscopy with dispersion staining for identification of asbestos mineral fibres.

For the purpose of this investigation, a conservative criterion of “no asbestos fibres or asbestos containing materials detected in soils” has been adopted as screening criteria.

7.1.4. Aesthetic criteria

Although no specific numeric aesthetic guideline values are provided, Schedule B1 of the ASC NEPM requires the consideration of aesthetic issues (as a result of contamination) arising from soils within the site. The following assessment criteria were adopted when considering soil aesthetics:

- no persistently malodourous soils, taking into consideration the natural state of the soil at the site;
- no staining or discolouration in soils, taking into consideration the natural state of the soil; and
- no large or frequently occurring anthropogenic materials present (to the extent practicable).

7.2. Groundwater investigation levels

To assess groundwater quality, reference needs to be made to environmental and/or human health threshold levels or acceptance criteria. Groundwater Investigation Levels (GILs) are selected based on published criteria for beneficial use of groundwater and potential environmental impact.

7.2.1. Assessment of environmental values

NSW EPA *Contaminated Sites, Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007) describes the process involved in identifying the likely environmental values which must be considered during groundwater investigations at contaminated sites. Based on this, assessment of relevant environmental values follows the steps below:

- Determine whether the aquifer beneath the site is included in the NSW Office of Water list of major aquifers of drinking water quality;
- Assess the identified uses of groundwater from the aquifer; and
- Use groundwater indicators to assess whether the aquifer is suitable for use as a drinking water source (i.e. based on measured concentrations of total dissolved solids (TDS) within the groundwater).

Based on these steps, Coffey identified the following:

- The groundwater underlying the site is not considered to be part of the NSW Office of Water list of protected aquifers as an actual or potential drinking water supply.
- The closest identified potential receptor to groundwater contamination underlying the site is Blackwattle Bay which is located over 1km to the north.
- A review of the NSW Natural Resources Atlas found three registered bores within a 500m radius of the site, each of which was registered as a monitoring well.
- Field measurements indicate that TDS at the site ranges from 528mg/L to 1,096mg/L, which is indicative of freshwater environments (NSW DEC, 2007).

Based on the above, Coffey considers that potential beneficial uses of groundwater are:

- Sustaining freshwater aquatic ecosystems.

The presence of a reticulated water supply to the area is expected to preclude use of the local groundwater as a drinking water supply. In addition, Ashfield shale is known to have a very low yield therefore extraction of groundwater for beneficial use is considered impracticable. Given that no evidence has been identified that groundwater in the vicinity of the site is currently utilised as a drinking water, Coffey excluded the aquifer as a potential drinking water supply. Therefore, potable use was not considered when selecting GILs for comparison against the groundwater results.

7.2.2. Protection of aquatic ecosystems

Chemical concentrations in groundwater are assessed against criteria from the following guidelines:

- Schedule B1 ‘Guideline on the Investigation Levels for Soil and Groundwater’ of the the ASC NEPM.

- ANZECC & ARMCANZ (2000). *National Water Quality Management Strategy. Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Assuming slightly to moderately disturbed ecosystems, freshwater criteria for protection of 95% of species are applied, except where contaminants are potentially bio-accumulative in which case the trigger values for protection of 99% of species are recommended. Given that the closest likely receiving water body to the site is Blackwattle Bay which is a marine environment, criteria for the protection of 95% of species in marine waters have also be considered.

The GILs for heavy metals, BTEX and PAH in groundwater are summarised in Table 7.5.

Table 7.5: Summary of GILs

Analyte	GILs for Freshwater (µg/L)	GILs for Marine Water (µg/L)
Arsenic (V)	13 [a]	4.5 [a,b]
Cadmium	0.2	0.7
Chromium (III)	3.3 [c]	27
Copper	1.4	1.3
Lead	3.4	4.4
Mercury (total)	0.06	0.1
Nickel	11	7
Zinc	8	15
TRH C_6-C_{10}	20 [d]	20 [d]
TRH >C_{10}-C_{16}	50 [d]	50 [d]
TRH >C_{16}-C_{34}	100 [d]	100 [d]
TRH >C_{34}-C_{40}	100 [d]	100 [d]
Benzene	950	500
Toluene	180	180
Ethylbenzene	80	5
o-Xylenes	350	350
m&p-Xylene	75 [e]	75 [e]
Naphthalene	16	70
Anthracene	0.4	0.4
Phenanthrene	2	2
Fluoranthene	1.4	1.4
Benzo(a)pyrene	0.2	0.2

1. Australian and New Zealand Environment and Conservation (2000) National Water Quality Management Strategy – Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Where insufficient data is available to derive a reliable trigger value, low reliability values have been adopted from Section 8.3.7 of ANZECC/ARMCANZ (2000)

(a) The GIL for Arsenic (V) has been adopted.
(b) Low reliability value for Arsenic (V) has been adopted.
(c) Low reliability value adopted for Chromium (III).
(d) In the absence of a nominated guideline value, the laboratory LOR has been taken as the nominal trigger value for the presence of TRH compounds in groundwater as will be used as the GIL (NSW DEC, 2007).
(e) GIL for m&p Xylene is based on the m-Xylene, which is the lowest trigger value for the two Xylene isomers.

In the absence of a listed GIL, the laboratory limit of reporting (LOR) has been taken as the nominal GIL for the presence of VOC and SVOC compounds in groundwater as will be used as the GIL (NSW DEC, 2007).

TRH, BTEX and naphthalene concentrations were assessed against the groundwater HSLs for vapour intrusion from the relevant depth and soil matrix applicable to “Low to high density residential” (HSL A & HSL B) land use.

The HSLs for TRH, BTEX and naphthalene in groundwater are summarised in Table 7.6.

Based on the dominant soil texture and the measured standing water level, the HSLs for sandy soils with groundwater at depths between 2m and <4m have been adopted.

Table 7.6: Summary of HSLs in Groundwater

Chemical	HSL A & B (µg/L)
	2m to <4m
Benzene	800
Toluene	NL
Ethylbenzene	NL
Xylenes	NL
Naphthalene	NL
F1 (C_6-C_{10} minus BTEX)	1,000
F2 (>C_{10}-C_{16} minus naphthalene)	1,000

NL: non-limiting (i.e. dissolved phase contaminant is considered not to pose an unacceptable risk to human health).

Note: HSLs in groundwater are only applicable where the standing water level is greater than 2m below the lowest floor level of a building.

8. Quality assurance / quality control

The following QA / QC assessment addresses data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations and the processes for assessment of data quality provided in Section 19 (Appendix C) of Schedule B2 'Guideline on Site Characterisation' of the ASC NEPM.

8.1. Field QA/QC measures

The following QA / QC measures were implemented by Coffey in carrying out the investigation fieldworks described herein:

- All fieldworks were undertaken by experienced and appropriately qualified scientists / engineers.
- Fieldworks were undertaken in general accordance with Coffey's (SOP) which are based on guidance presented in relevant industry standards, including the relevant schedules of the ASC NEPM and AS4482 *Guide to the Investigation and Sampling of Site with Potentially Contaminated Soil* (Standards Australia, 2005; Parts 1 and 2).
- The PID were calibrated by the equipment supplier prior to use. Calibration records are provided in Appendix B.
- Quality control samples were collected and analysed as part of the sampling program. This included duplicate and triplicate samples, trip spike and trip blank samples. A discussion of these results is provided in the following sections.

8.2. Field duplicate and triplicate samples

Twenty (20) primary soil samples were collected from the site and submitted for analysis. One duplicate and one triplicate soil sample were also collected and analysed.

Three (3) primary and one duplicate groundwater samples were collected from the site and submitted for analysis.

The number of duplicate soil and groundwater samples achieved the target sampling rate of 5% of the total number of primary samples analysed.

The number of triplicate soil samples achieved the target sampling rate of 5% of the total number of primary samples analysed, however no triplicate groundwater samples were analysed. Given that only three primary groundwater samples were collected for analysis, and the laboratory results reported contaminant concentrations close to or below the laboratory limit of reporting (LOR), the absence of a triplicate groundwater sample is not considered to affect the useability of the data.

Primary, duplicate and triplicate sample combinations are summarised in Table 8.1.

Table 8.1: Duplicate and Triplicate Samples

Primary Sample	Sample Type	Duplicate Sample	Laboratory	Triplicate Sample	Laboratory
BH12 0.9-1.0	Soil	TRIP2	Eurofins | MGT	DUP2	Envirolab
BH12	Groundwater	DUP1	Eurofins	-	-

Relative Percentage Difference (RPD) results for the above samples were calculated as shown in Table 1 (soil) and Table 2 (groundwater), attached.

Acceptable limits for RPD results are 30% - 50%, with results at the higher range expected for organic analytes. However, no RPD acceptance limit is considered to apply in the following situations where exaggerated RPD results may be expected:

- QC sample pairs where one sample reported a detectable concentration and the alternate sample reported a concentration below the laboratory LOR.
- QC sample pairs where one or more of the primary and/or secondary samples reported contaminant concentration less than, or equal to, ten times the laboratory LOR as no RPD acceptance limit applies.

The duplicate and triplicate pair reported RPD values below the acceptable limit of 50% for all soil and groundwater samples with the exception of lead with a RPD of 52% in the triplicate soil sample pair.

Given that this RPD only marginally exceeds the acceptable limit, and lead concentrations within soil were reported to be substantially below the adopted investigation levels, this occurrence is considered not to affect the precision of the soil data or the results of the investigation.

Based on the above, the analytical results are considered acceptable for the purposes of this assessment.

8.3. Field QC samples

One trip blank sample was collected during soil fieldwork to assess whether contamination may have been introduced to samples during shipping and field handling activities. The trip blank sample reported concentrations below the laboratory LOR.

One trip spike sample was collected during soil fieldwork to assess loss of volatiles from samples during transit. The trip spike sample reported recoveries within the acceptable range.

Although rinsate samples were not collected as part of the field activities, care was taken to minimise the potential for cross-contamination of samples. The outer layer of soil was removed from soil samples collected from the auger and non-dedicated sampling equipment was decontaminated prior to use and between each sampling location. The results of the laboratory analysis suggest that cross-contamination of samples in the field is unlikely.

Laboratory results for field QC samples are summarised in Table 3.

8.4. Laboratory QA/QC

In accordance with standard industry practice, the project laboratories performed an internal QA / QC assessment. The assessment is typically described as a multi-level approach whereby standard laboratory control procedures are implemented, including laboratory duplicates, method blanks, matrix spikes and surrogate spikes.

Laboratory QC analytical results are summarised below:

- Laboratory analysis of samples was undertaken by NATA accredited environmental testing laboratories.
- All samples were extracted and analysed within holding times.

- No target analytes were detected in any of the method blanks.
- RPDs for the laboratory duplicate samples were within the acceptable range for all samples, when the LOR was considered.
- Percentage recovery results for laboratory control samples were within the acceptable range for all samples.
- Percentage recovery results for surrogate samples were within the acceptable range for all samples with the exception of:
    - Dibutylchlordate with recoveries of 56% is soil (Eurofins | MGT report 486089-S);
    - Tertrachloro-m-xylene with recoveries between 53% and 56% in soil (Eurofins | MGT report 486089-S); and
    - 2-Fluorobiphenyl with recoveries of 52% and 53% in groundwater (Eurofins | MGT report 486493-W);
    - Phenol-d6 with recoveries of 26% and 38% in groundwater (Eurofins | MGT report 486493-W);

    With the exception of DDD and DDE in soil, corresponding primary samples reported contaminant concentrations below the laboratory LOR. Surrogate samples that report recoveries below the acceptable range suggest that the reported concentration in the primary sample may be less than that actually present in the environment. Given that DDD and DDE in soil were reported to only marginally exceeded the laboratory LOR, and were significantly less than the adopted investigation levels, these outliers are not considered to affect the accuracy of the laboratory data or the overall conclusions of the investigation.
- Percentage recovery results for matrix spikes were within the acceptable range for all samples.
- The laboratory internal standards, calibration blanks and mid-range calibration verifications were all within the acceptable range.

8.5. Data quality assessment

Based on an assessment of the field and laboratory QA / QC data, Coffey considers that the data obtained is representative of subsurface conditions at the sampling locations, and the soil and groundwater results are acceptable for the purposes of this assessment.

9. Field observations and analytical results

The following provides a summary of the results of the fieldwork and laboratory analysis of soil samples collected from the site in January 2016.

9.1. Site specific geology

The inferred subsurface profile encountered on-site is summarised in Table 9.1.

Table 9.1: Subsurface Profile

Material	Description	Depth to Top of Unit[2] (m)	Approximate Thickness (m)
Pavement	Concrete/Asphalt	0	0.02 – 0.12
Fill	Silty and Gravelly Clay and Gravelly Sand Low to high plasticity clay, fine to coarse grained sand	0.02 – 0.12	0.07 – 1.34
Residual Soil	Silty Clay Medium and high plasticity Very stiff to hard consistency	0.2 – 1.4	0 – 0.8
Bedrock	Shale Extremely weathered	0.7 – 2	Beyond investigation depth, typically 2 to 3m below surface, except at BH9 and BH12 which extended to 5m depth

Borehole logs are presented in Appendix A.

9.2. Field screening and observations

Soil samples collected from the site were assessed in the field using a PID for the presence of ionisable VOCs using procedures consistent with headspace testing described in Section 7.4.3 in Schedule B2 of the ASC NEPM.

PID readings ranged from 1.1ppm to 26.1ppm which suggests that there is a low potential for detectable concentrations of ionisable VOCs to be present within the soil samples collected from the site.

PID results are provided on borehole logs presented in Appendix A.

Field observations indicated that no staining or odours were apparent in materials brought to the surface during drilling.

Anthropogenic materials were observed within the fill material comprising the upper portion of the subsurface of the site. The material typically comprised construction rubble (brick and glass fragments, concrete), bitumen fragments and roadbase.

No fragments of potential ACM were observed on the surface of the site or within the fill material brought to the surface during drilling.

9.3. Site specific hydrogeology

Gauging data for each monitoring well is summarised in Table 4 and recorded on the field data sheets presented in Appendix C.

Site-specific hydrogeology is summarised in Table 9.2.

Table 9.2: Site Specific Hydrogeology

Item	Description
Standing Water Level	Standing water levels were measured between 1.421m bgs in BH12 and 3.575m bgs in BH9.
Groundwater flow direction	Based on the local hydrology, groundwater flow is expected to be in a generally northerly direction towards Blackwattle Bay.
LNAPL and sheens	LNAPL was not encountered within any of the groundwater monitoring wells during monitoring and sampling. No hydrocarbon sheens were observed during purging and sampling.
Odours	No hydrocarbon odours were encountered within any of the groundwater monitoring wells during purging and sampling.

Groundwater quality parameters measured during purging are summarised in Table 5 and repeated in Table 9.3. Due to the slow recharge rate of groundwater into wells, post purge water quality parameters were collected from monitoring well BH12 only.

Table 9.3: Field Groundwater Quality Parameters (BH12)

Parameter	Measurement	Comment
Dissolved Oxygen (DO)	4.30 mg/L	Indicative of medium oxygen content
Redox Potential (eH)	301mV	Indicative of oxidising conditions
Electrical Conductivity (EC)	1,686μScm^{-1} (TDS* 1,096mg/L)	Indicative of brackish water
pH	6.04	Indicative of a slightly acidic condition
Temperature	22.5^{o}C	-

* = TDS calculated by multiplying electrical conductivity by 0.65

9.4. Results

Soil and groundwater analytical results are summarised in Tables 1 and 2, respectively. Laboratory certificates and chain of custody records are presented in Appendix D.

9.4.1. Human health

In summary, the soil analytical results reported concentrations of the COPC below the adopted health investigation and screening levels for Residential B with the exception of:

- Carcinogenic PAHs in sample BH9 0.5-0.6 with a concentration of 6.3mg/kg reported as Benzo(a)pyrene TEQ, compared with an investigation level of 4mg/kg.

This result was reported in fill material from a borehole drilled in the southeastern corner of the site. Based on the subsurface lithology encountered within this location, it is considered that the reported impact is likely to be associated with the presence of bitumen fragments within the fill.

Given the isolated nature and likely source of the identified contamination, it is considered not to present an unacceptable risk to the health of current or future site users, demolition or construction workers.

Other samples reported chemical concentrations less than the adopted health-based investigation levels for Residential B land use.

In addition, asbestos was not identified in any of the soil samples submitted for laboratory analysis.

9.4.2. Ecological health

In summary, the soil analytical results reported concentrations of the COPC below the adopted ecological investigation and screening levels for urban open space land use, except for:

- Benzo(a)pyrene in samples BH7 0.2-0.3 (1.8mg/kg), BH7 0.5-0.6 (1.3mg/kg), BH9 0.2-0.3 (1.9mg/kg) and BH9 0.5-0.6 (4.5mg/kg); and

- Zinc in sample BH3 0.2-0.3 with a concentration of 14,000mg/kg.

Chemical concentrations exceeding the ecological investigation or screening levels may present a risk to terrestrial ecosystems, and therefore require further consideration in the context of the proposed development. Where the surface will be covered with pavements or buildings, consideration of ecological impacts is not relevant. Given the concept design for the proposed development, areas not covered by pavement or buildings are likely to be landscaped to support grass or shallow rooted shrubs. Coffey considers that the EIL exceedances pose a low ecological risk to future use of the site.

Zinc in sample BH3 0.2-0.3 was reported at a concentration significantly higher than that reported in the remainder of the site, and Coffey considers that this result is localised and is unlikely to pose an unacceptable risk to future use of the site..

9.4.3. Soil aesthetics

No hydrocarbon staining or odours were observed during investigation of the subsurface of the site.

Minor quantities of anthropogenic material were observed within the fill material comprising the upper layer of the subsurface. These materials are not expected to affect he suitability of the site for the proposed land use.

9.4.4. Preliminary waste classification

A preliminary waste classification of subsurface material, which may require off-site disposal following excavation, using results from boreholes drilled on-site was made in general accordance with the six

step process for classifying waste as described in NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste*.

According to the waste classification procedure:

- Step 1: No asbestos was identified in any sample collected from the site, and no visible fragments of potential ACM were observed on the surface of the site. On this basis, the soils are not considered 'special waste'.
- Step 2: The material assessed is not a 'liquid waste'.
- Step 3: Asphalt and concrete surfacing present on-site is pre-classified as General Solid Waste (non-putrescible), where these materials are segregated from the underlying soil. Soil materials encountered within the site are not considered to be a 'pre-classified' waste, as set out within the *Waste Classification Guidelines*.
- Step 4: The material assessed does not appear to possess hazardous characteristics.
- Step 5: The material has been assessed by chemical analyses. The detected concentrations of heavy metals, TPH, BTEX, PAH, PCBs, VOCs and SVOCs in the samples analysed were compared against the relevant contaminant threshold values (CT1 and CT2) listed in Table 1 of NSW EPA (2014). The following samples reported contaminant concentrations above the CT1 values:
    - sample BH3_0.2-0.3 reported lead with a concentration of 370mg/kg;
    - sample BH7_0.2-0.3 reported lead with a concentration of 440mg/kg, and benzo(a)pyrene with a concentration of 1.8mg/kg;
    - sample BH7_0.5-0.6 reported lead with a concentration of 270mg/k, and benzo(a)pyrene with a concentration of 1.3mg/kg;
    - sample BH9_0.2-0.3 reported benzo(a)pyrene with a concentration of 1.9mg/kg;
    - sample BH9_0.5-0.6 reported lead with a concentration of 150mg/kg, and benzo(a)pyrene with a concentration of 4.5mg/kg; and
    - sample BH13 0.2-0.3 reported nickel with a concentration of 43mg/kg.

    Based on these concentrations, fill material excavated from these parts of the site has a preliminary classification as Restricted Solid Waste. As such, further chemical assessment through toxicity characteristic leaching procedure (TCLP) was undertaken for these analytes within the soil samples that reported concentrations above the CT1 threshold. The concentrations of lead, nickel and benzo(a)pyrene were reported below the relevant contamination threshold (TCLP1 and SCC1) values listed in Table 2 of NSW EPA (2014), classifying the material as General Solid Waste.

    Soil across the remainder of the site is also provisionally classified as General Solid Waste.
- Step 6: The material comprises soil material. NSW EPA (2014) notes that materials that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials. Based on observations by Coffey, the material is considered to be non-putrescible.

It is recommended that the waste classification of soil materials is confirmed by supplementary sampling and analysis of soils excavated during site demolition and redevelopment.

9.4.5. Groundwater

In summary, the groundwater analytical results reported concentrations of the COPC below the adopted groundwater investigation levels for fresh and marine water, and the health screening levels for Residential land use, with the exception of:

- Copper in samples BH2 and DUP01, the duplicate of BH12, each with a concentration of 0.002mg/L which is marginally above the GILs for fresh and marine water.
- Zinc in all samples with concentrations between 0.024mg/L and 0.058mg/L which is within a factor of 10 of the GILs for fresh and marine water. The highest concentration was reported in sample BH2.

The reported copper and zinc concentrations are considered to be representative of naturally occurring concentrations in groundwater found in Ashfield shale, rather than a result of current and historical occupation of the site. Based on this, these levels are not considered to present an unacceptable risk to the environment.

Acetone was detected in all samples at concentrations between 0.013mg/L and 0.019mg/L. These concentrations may be associated with the registered storage and use of acetone on-site. Given that the reported concentrations only marginally exceed the laboratory LOR, they are not considered to present a risk to the environment.

10. Conceptual site model

10.1. General

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 following sections summarises the known potential sources of contamination, receptors and presents a discussion on the plausible linkages between sources and receptors via contaminant transport and exposure mechanisms.

10.2. Contaminant sources

The primary sources of contamination impact at the site are considered to be:

- chemical characteristics of and anthropogenic material within the fill material comprising the top layer of the subsurface of the site, particularly bitumen fragments resulting in isolated occurrences of elevated concentrations of carcinogenic PAHs; and
- soil samples with concentrations of benzo(a)pyrene (BH7 and BH9) and zinc (BH3 only) above the adopted ecological assessment criteria.

10.3. Contaminant transport and exposure mechanisms

The primary transport mechanisms for migration of contamination at the site include:

- Transport of contamination as dust during redevelopment or future maintenance activity involving excavation;
- Contaminant migration along preferential flow pathways (e.g. intermittent gravel layers within the fill layer, existing or new service corridors, building foundations, etc);
- Contaminated soil particles moved by surface runoff / overland flow;
- Infiltration and vertical and lateral contaminant migration; and
- Plant uptake.

Exposure pathways to possible human receptors include:

- Inhalation of dust;
- Incidental ingestion of soils; and
- Dermal contact with soils.

10.4. Potential receptors

The following potentially sensitive areas and possible receptors have been considered during site development and future uses:

- Demolition and construction worker involved in redevelopment of the site; and
- Future maintenance workers involved in subsurface excavations.

10.5. Plausible pollutant linkages

Following from the above, certain complete source – pathway – receptor relationships were identified in the context of the proposed redevelopment and future use of the site:

- Near surface soils in the vicinity of borehole BH9 reported carcinogenic PAH (expressed as benzo(a)pyrene TEQ) at a concentration above HIL B for residential uses. Soils impacted with PAH have the potential to pose risks to site users via dermal contact pathways. The investigation findings indicate that the identified impacts are surficial and localised and likely to be associated with the presence of bitumen fragments within the fill material. Given that the average concentration of carcinogenic PAH (expressed as benzo(a)pyrene TEQ) is less than the adopted HIL, no unacceptable risk is considered to exist at the site and, therefore, further investigation or management is not warranted.

- In the case that previously unidentified areas of contamination are encountered on-site during redevelopment works, construction workers involved in the redevelopment of the site and workers conducting future maintenance and construction work may also be exposed to fill materials retained within the site via ingestion, inhalation and dermal contact. A procedure for managing any such unexpected contamination should be included in the Construction Environmental Management Plan for the works.

- Elevated benzo(a)pyrene and zinc concentrations may have the potential to affect terrestrial ecosystems at the site, particularly vegetation and landscaping. Coffey notes that locations of EIL exceedances are likely to be within the footprint of the new building planned for construction immediately to the north of the RD Watt Building. Thus, the likely future impact of these occurrences is negligible.

11. Conclusions and recommendations

The results of the Detailed Site Contamination Investigation undertaken as part of the FASS Enabling Works at the University of Sydney indicate the following:

- Fill material generally comprises the upper 0.02m to 0.12m of the subsurface of the site, underlain by low to high plasticity silty and gravelly clay and sand. No petroleum hydrocarbon staining or odour was observed within the subsurface of the site during fieldwork and no visible evidence of ACM was found.

- Carcinogenic PAHs slightly above the health-based investigation level was reported in one location in the southeastern corner of the site. This impact is likely to be associated with the presence of bitumen fragments within the fill material forming the upper layer of soil. Given the likely source and isolated nature of the impact, this impact is considered not to present an unacceptable health risk to current or future site users, or future demolition, construction and maintenance workers.

- Contaminant concentrations exceeding the adopted ecological investigation and screening levels were identified across the site. These concentrations are considered unlikely to present an unacceptable risk to vegetation growth on-site under the future land use scenario.

- Copper and zinc concentrations slightly above the adopted groundwater investigation levels for fresh and marine water were reported in groundwater collected from the site. It is considered that these concentrations are likely to be representative of naturally occurrence in Ashfield shale and, therefore, do not present an unacceptable risk to the environment.

Given the results of soil and groundwater investigations undertaken as part of this Detailed Site Contamination Investigation, Coffey considers that the site is suitable from a contamination perspective for the proposed redevelopment.

The results of the investigation indicate that further investigation and / or remediation of the site is not required to permit the proposed FASS Enabling Works and, therefore, preparation of a Remediation Action Plan is not necessary.

However, Coffey recommends that an Unexpected Finds Procedure be prepared for the site and implemented during the proposed demolition and redevelopment works so that any localised area of unknown contamination, or suspected contamination, can be appropriately managed.

Where visual (i.e. staining or discolouration, anthropogenic material, ash, etc) or olfactory (i.e. hydrocarbon or solvent odours) evidence of contamination is discovered, the locally affected area should be isolated and advice should be sought from a suitably qualified and experienced environmental professional prior to proceeding with further excavation and handling of soils.

This report should be read in conjunction with the attached “Important information about your Coffey Environmental Report”.

12. References

ANZECC/ARMCANZ (2000). *Australian Water Quality Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.

Australian Standards AS4964-2004. *Method for the qualitative identification of asbestos in bulk samples.*

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NEPC (1999). *National Environmental Protection (Assessment of Site Contamination) Measure amended 2013*. National Environment Protection Council.

NSW DEC (2007). *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*. New South Wales Department of Environment and Conservation.

NSW EPA (2014). *Waste Classification Guidelines, Part 1: Classifying Waste*. New South Wales Environment Protection Authority.

NSW OEH (2011). *Guidelines for Consultants Reporting on Contaminated Sites*. New South Wales Office of Environment and Heritage.

Important information about your **Coffey** Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but

steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

This report should be reproduced in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Tables

										Field ID	BH1 0.2-0.3	BH1 0.5-0.6	BH3 0.2-0.3	BH3 0.5-0.6	BH5 0.2-0.3	BH5 0.5-0.6	BH6 0.2-0.3	BH6 0.5-0.6	BH7 0.2-0.3	BH7 0.5-0.6	BH9 0.2-0.3	BH9 0.5-0.6	BH10 0.2-0.3
										Sample Date	18/01/2016	18/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016
										Laboratory ID	S16-Ja09053	S16-Ja09054	S16-Ja09088	S16-Ja09089	S16-Ja09055	S16-Ja09056	S16-Ja09086	S16-Ja09087	S16-Ja09080	S16-Ja09081	S16-Ja09057	S16-Ja09058	S16-Ja09083
Chemical Group	**Chemical Name**	**Units**	**EQL**	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil																
Metals	Arsenic	mg/kg	2	500			100			12	3.2	4.5	4.5	3.8	3	4.3	2.1	5.6	6	9.9	18	5.3
	Cadmium	mg/kg	0.4	150						1.1	<0.4	7.8	<0.4	<0.4	<0.4	<0.4	<0.4	0.5	<0.4	<0.4	<0.4	<0.4
	Chromium	mg/kg	5	500			260			33	8.5	11	13	18	18	11	5.2	23	19	33	20	20
	Copper	mg/kg	5	30000			240			92	15	18	24	41	75	47	28	68	46	34	28	29
	Lead	mg/kg	5	1200			1260			99	22	370	60	98	34	100	26	440	270	72	150	9.9
	Mercury	mg/kg	0.05	120						0.44	<0.05	0.3	0.18	0.09	0.08	0.62	0.1	0.66	0.54	0.29	0.35	<0.05
	Nickel	mg/kg	5	1200			280			17	<5	<5	5.2	11	14	<5	<5	15	15	5.2	<5	37
	Zinc	mg/kg	5	60000			720			160	21	14,000	59	74	76	80	19	180	100	39	88	24
TPH	C6-C10 less BTEX (F1)	mg/kg	20		45	70				<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	F2-NAPHTHALENE	mg/kg	50		110	240				<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C6 - C10	mg/kg	20					180	700	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	C10-C16	mg/kg	50					120	1000	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C16-C34	mg/kg	100					300	2500	<100	<100	<100	<100	160	110	<100	<100	200	<100	140	280	<100
	C34-C40	mg/kg	100					2800	10000	<100	<100	<100	<100	110	<100	<100	<100	100	<100	<100	<100	<100
BTEX	Benzene	mg/kg	0.1		0.5	0.5		50		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Ethylbenzene	mg/kg	0.1		55	NL		70		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Toluene	mg/kg	0.1		160	220		85		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene (m & p)	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Xylene (o)	mg/kg	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Xylene Total	mg/kg	0.3		40	60		45		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
PAH	Acenaphthene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Anthracene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5
	Benzo(a)anthracene	mg/kg	0.5							<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	1	2	2.5	<0.5
	Benzo(a)pyrene	mg/kg	0.5					0.7		<0.5	<0.5	0.6	0.6	<0.5	<0.5	<0.5	<0.5	1.8	1.3	1.9	4.5	<0.5
	Benzo(a)pyrene TEQ (lower bound) *	mg/kg	0.5							<0.5	<0.5	0.7	0.6	<0.5	<0.5	<0.5	<0.5	2.4	1.7	2.6	6.3	<0.5
	Benzo(a)pyrene TEQ (medium bound) *	mg/kg	0.5	4						0.6	0.6	1	1	0.6	0.6	0.6	0.6	2.6	2	2.8	6.3	0.6
	Benzo(a)pyrene TEQ (upper bound) *	mg/kg	0.5							1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.2	2.9	2.2	3.1	6.3	1.2
	Benzo(g,h,i)perylene	mg/kg	0.5							<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	0.6	1.8	2.6	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1.3	1.3	2.5	<0.5
	Chrysene	mg/kg	0.5							<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.2	1.6	3.1	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5							<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	1.2	1.9	2.8	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5
	Fluoranthene	mg/kg	0.5							<0.5	<0.5	1.5	0.9	0.6	<0.5	<0.5	<0.5	3.5	2	3.8	5.4	<0.5
	Fluorene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	1.2	2	<0.5
	Naphthalene	mg/kg	0.5				170			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Phenanthrene	mg/kg	0.5							<0.5	<0.5	0.8	0.5	<0.5	<0.5	<0.5	<0.5	1.4	0.8	1.3	2.3	<0.5
	Pyrene	mg/kg	0.5							<0.5	<0.5	1.5	0.9	0.6	<0.5	<0.5	<0.5	3.5	2	3.9	5.5	<0.5
	Total PAHs	mg/kg	0.5	400						<0.5	<0.5	6.9	2.9	1.2	<0.5	<0.5	<0.5	19	12	21	35	<0.5
OCP	4,4-DDE	mg/kg	0.05							<0.5 - 0.06	-	<0.05	-	<0.05	-	<0.05	-	<0.5 - 0.06	-	<0.05	-	<0.05
	a-BHC	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Aldrin	mg/kg	0.05							<0.05	-	<0.05	-	<0.5 - 0.06	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Aldrin + Dieldrin	mg/kg		10						<0.1	-	<0.1	-	0.085	-	<0.1	-	<0.1	-	<0.1	-	<0.1
	b-BHC	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Chlordane	mg/kg	0.1	90						<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1
	d-BHC	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	DDD	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.5 - 0.06	-	<0.05	-	<0.05
	DDT	mg/kg	0.05				180			<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	DDT+DDE+DDD	mg/kg		600						0.11	-	<0.15	-	<0.15	-	<0.15	-	0.145	-	<0.15	-	<0.15
	Dieldrin	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endosulfan I	mg/kg	0.05	400						<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endosulfan II	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endosulfan sulphate	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endrin	mg/kg	0.05	20						<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endrin aldehyde	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Endrin ketone	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	g-BHC (Lindane)	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Heptachlor	mg/kg	0.05	10						<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Heptachlor epoxide	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Hexachlorobenzene	mg/kg	0.05	15						<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
	Methoxychlor	mg/kg	0.2	500						<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2
	Toxaphene	mg/kg	1	30						<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1

										Field ID	BH1 0.2-0.3	BH1 0.5-0.6	BH3 0.2-0.3	BH3 0.5-0.6	BH5 0.2-0.3	BH5 0.5-0.6	BH6 0.2-0.3	BH6 0.5-0.6	BH7 0.2-0.3	BH7 0.5-0.6	BH9 0.2-0.3	BH9 0.5-0.6	BH10 0.2-0.3
										Sample Date	18/01/2016	18/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016
										Laboratory ID	S16-Ja09053	S16-Ja09054	S16-Ja09088	S16-Ja09089	S16-Ja09055	S16-Ja09056	S16-Ja09086	S16-Ja09087	S16-Ja09080	S16-Ja09081	S16-Ja09057	S16-Ja09058	S16-Ja09083
Chemical Group	Chemical Name	Units	EQL	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil															
OPP	Azinophos methyl	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Chlorpyrifos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Coumaphos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Demeton-O	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Demeton-S	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Diazinon	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Dichlorvos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Dimethoate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Disulfoton	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Ethoprop	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Fenitrothion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Fensulfothion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Fenthion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Malathion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Methyl parathion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Mevinphos (Phosdrin)	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Monocrotophos	mg/kg	10							<10	-	<10	-	<10	-	<10	-	<10	-	<10	-	<10	<10
	Parathion	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Phorate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Prothiofos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Ronnel	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Stirophos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Trichloronate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Profenofos	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
PCB	Aroclor 1016	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Aroclor 1232	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Aroclor 1242	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Aroclor 1248	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Aroclor 1254	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Aroclor 1260	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	PCBs (Sum of total)	mg/kg	0.5	1						<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
VOC / SVOC	2-chloronaphthalene	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	2-methylnaphthalene	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Acetophenone	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	2-chlorophenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	2-methylphenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	2-nitrophenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	3-&4-methylphenol	mg/kg	1							<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	<1
	4-chloro-3-methylphenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	4-nitrophenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Pentachlorophenol	mg/kg	1							<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1	<1
	Phenol	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Bis(2-ethylhexyl) phthalate	mg/kg	5							<5	-	<5	-	<5	-	<5	-	<5	-	<5	-	<5	<5
	Butyl benzyl phthalate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Diethylphthalate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Dimethyl phthalate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Di-n-butyl phthalate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Di-n-octyl phthalate	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Methyl Ethyl Ketone	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	4-Methyl-2-pentanone	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Acetone	mg/kg	5							<5	-	<5	-	<5	-	<5	-	<5	-	<5	-	<5	<5
	Allyl chloride	mg/kg	0.05							<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05
	Carbon disulfide	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	4-bromophenyl phenyl ether	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	4-chlorophenyl phenyl ether	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Bis(2-chloroethoxy) methane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Bis(2-chloroethyl)ether	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Carbazole	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	Dibenzofuran	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	N-nitrosopiperidine	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1,1,2-tetrachloroethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1,1-trichloroethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1,2,2-tetrachloroethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1,2-trichloroethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1-dichloroethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,1-dichloroethene	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,2,3-trichloropropane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5
	1,2-dibromoethane	mg/kg	0.5							<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	<0.5

										Field ID	BH1 0.2-0.3	BH1 0.5-0.6	BH3 0.2-0.3	BH3 0.5-0.6	BH5 0.2-0.3	BH5 0.5-0.6	BH6 0.2-0.3	BH6 0.5-0.6	BH7 0.2-0.3	BH7 0.5-0.6	BH9 0.2-0.3	BH9 0.5-0.6	BH10 0.2-0.3
										Sample Date	18/01/2016	18/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	18/01/2016	18/01/2016	19/01/2016
										Laboratory ID	S16-Ja09053	S16-Ja09054	S16-Ja09088	S16-Ja09089	S16-Ja09055	S16-Ja09056	S16-Ja09086	S16-Ja09087	S16-Ja09080	S16-Ja09081	S16-Ja09057	S16-Ja09058	S16-Ja09083
Chemical Group	**Chemical Name**	**Units**	**EQL**	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil															
VOC / SVOC	1,2-dichlorobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,2-dichloroethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,2-dichloropropane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,3-dichlorobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,3-dichloropropane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,4-dichlorobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	4-chlorotoluene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Bromobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Bromochloromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Bromodichloromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Bromoform	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Bromomethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Carbon tetrachloride	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Chlorobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Chlorodibromomethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Chloroethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Chloroform	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Chloromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	cis-1,2-dichloroethene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	cis-1,3-dichloropropene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Dibromomethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Dichlorodifluoromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Dichloromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Hexachlorobutadiene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Iodomethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Trichloroethene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Tetrachloroethene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	trans-1,2-dichloroethene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	trans-1,3-dichloropropene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Trichlorofluoromethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Vinyl chloride	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	N-nitrosodi-n-butylamine	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	N-nitrosodi-n-propylamine	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	2-naphthylamine	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Diphenylamine	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	2-nitroaniline	mg/kg	1								<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1
	3-nitroaniline	mg/kg	1								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Aniline	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Hexachlorocyclopentadiene	mg/kg	1								<1	-	<1	-	<1	-	<1	-	<1	-	<1	-	<1
	Hexachloroethane	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Nitrobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Pentachlorobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,2,4-trimethylbenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	1,3,5-trimethylbenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Isopropylbenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Styrene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	4-aminobiphenyl	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5
	Pentachloronitrobenzene	mg/kg	0.5								<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5	-	<0.5

									Field ID	BH10 0.5-0.6	BH11 0.2-0.3	BH11 0.5-0.6	BH12 0.2-0.3	BH12 0.9-1.0	TRIP 2		DUP 1		BH13 0.2-0.3	BH13 0.5-0.6
									Sample Date	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016		19/01/2016		19/01/2016	19/01/2016
									Laboratory ID	S16-Ja09084	S16-Ja09091	S16-Ja09092	S16-Ja09094	S16-Ja09096	S16-Ja09102		140514-1		S16-Ja09098	S16-Ja09099
Chemical Group	**Chemical Name**	**Units**	**EQL**	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil						Duplicate of BH12 0.9-1.0	RPD	Triplicate of BH12 0.9-1.0	RPD		
Metals	Arsenic	mg/kg	2	500			100			4.4	4.7	3.1	4.6	5.4	5.4	0%	5	8%	3.8	4.2
	Cadmium	mg/kg	0.4	150						<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	na	0.8	na	<0.4	<0.4
	Chromium	mg/kg	5	500			260			11	11	5.6	11	18	20	11%	17	6%	41	14
	Copper	mg/kg	5	30000			240			14	21	17	39	27	31	14%	23	16%	36	25
	Lead	mg/kg	5	1200			1260			16	26	19	55	65	62	5%	38	*52%*	42	42
	Mercury	mg/kg	0.05	120						<0.05	0.08	<0.05	0.55	0.31	0.34	9%	0.3	3%	0.17	0.22
	Nickel	mg/kg	5	1200			280			14	<5	<5	9.4	7.2	7.1	1%	5	36%	43	16
	Zinc	mg/kg	5	60000			720			12	8.9	<5	66	65	60	8%	39	50%	83	92
TPH	C6-C10 less BTEX (F1)	mg/kg	20		45	70				<20	<20	<20	<20	<20	<20	na	<25	na	<20	<20
	F2-NAPHTHALENE	mg/kg	50		110	240				<50	<50	<50	<50	<50	<50	na	<50	na	<50	<50
	C6 - C10	mg/kg	20					180	700	<20	<20	<20	<20	<20	<20	na	<25	na	<20	<20
	C10-C16	mg/kg	50					120	1000	<50	<50	<50	<50	<50	<50	na	<50	na	<50	<50
	C16-C34	mg/kg	100					300	2500	<100	<100	<100	<100	<100	<100	na	<100	na	<100	120
	C34-C40	mg/kg	100					2800	10000	<100	<100	<100	<100	<100	<100	na	<100	na	240	140
BTEX	Benzene	mg/kg	0.1		0.5	0.5		50		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	na	<0.2	na	<0.1	<0.1
	Ethylbenzene	mg/kg	0.1		55	NL		70		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	na	<1	na	<0.1	<0.1
	Toluene	mg/kg	0.1		160	220		85		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	na	<0.5	na	<0.1	<0.1
	Xylene (m & p)	mg/kg	0.2							<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	na	<2	na	<0.2	<0.2
	Xylene (o)	mg/kg	0.1							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	na	<1	na	<0.1	<0.1
	Xylene Total	mg/kg	0.3		40	60		45		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	na	-	-	<0.3	<0.3
PAH	Acenaphthene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Acenaphthylene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Anthracene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Benzo(a)anthracene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Benzo(a)pyrene	mg/kg	0.5					0.7		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	0.09	na	<0.5	<0.5
	Benzo(a)pyrene TEQ (lower bound) *	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.5	na	<0.5	<0.5
	Benzo(a)pyrene TEQ (medium bound) *	mg/kg	0.5	4						0.6	0.6	0.6	0.6	0.6	0.6	0%	<0.5	na	0.6	0.6
	Benzo(a)pyrene TEQ (upper bound) *	mg/kg	0.5							1.2	1.2	1.2	1.2	1.2	1.2	0%	<0.5	na	1.2	1.2
	Benzo(g,h,i)perylene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Benzo(k)fluoranthene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Chrysene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	0.1	na	<0.5	<0.5
	Benzo[b+j]fluoranthene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Dibenz(a,h)anthracene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Fluoranthene	mg/kg	0.5							<0.5	<0.5	<0.5	0.8	<0.5	<0.5	na	0.2	na	<0.5	0.5
	Fluorene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Naphthalene	mg/kg	0.5				170			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	<0.1	na	<0.5	<0.5
	Phenanthrene	mg/kg	0.5							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	na	0.1	na	<0.5	<0.5
	Pyrene	mg/kg	0.5							<0.5	<0.5	<0.5	0.8	<0.5	<0.5	na	0.2	na	0.5	0.6
	Total PAHs	mg/kg	0.5	400						<0.5	<0.5	<0.5	1.6	<0.5	<0.5	na	0.62	na	0.5	1.1
OCP	4,4-DDE	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	a-BHC	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Aldrin	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Aldrin + Dieldrin	mg/kg		10						-	<0.1	-	<0.1	-	-	-	-	-	<0.1	-
	b-BHC	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Chlordane	mg/kg	0.1	90						-	<0.1	-	<0.1	-	-	-	-	-	<0.1	-
	d-BHC	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	DDD	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	DDT	mg/kg	0.05				180			-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	DDT+DDE+DDD	mg/kg		600						-	<0.15	-	<0.15	-	-	-	-	-	<0.15	-
	Dieldrin	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endosulfan I	mg/kg	0.05	400						-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endosulfan II	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endosulfan sulphate	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endrin	mg/kg	0.05	20						-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endrin aldehyde	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Endrin ketone	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	g-BHC (Lindane)	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Heptachlor	mg/kg	0.05	10						-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Heptachlor epoxide	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Hexachlorobenzene	mg/kg	0.05	15						-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Methoxychlor	mg/kg	0.2	500						-	<0.2	-	<0.2	-	-	-	-	-	<0.2	-
	Toxaphene	mg/kg	1	30						-	<1	-	<1	-	-	-	-	-	<1	-

										Field ID	BH10 0.5-0.6	BH11 0.2-0.3	BH11 0.5-0.6	BH12 0.2-0.3	BH12 0.9-1.0	TRIP 2		DUP 1		BH13 0.2-0.3	BH13 0.5-0.6
										Sample Date	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016		19/01/2016		19/01/2016	19/01/2016
										Laboratory ID	S16-Ja09084	S16-Ja09091	S16-Ja09092	S16-Ja09094	S16-Ja09096	S16-Ja09102		140514-1		S16-Ja09098	S16-Ja09099
Chemical Group	Chemical Name	Units	EQL	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil						Duplicate of BH12 0.9-1.0	RPD	Triplicate of BH12 0.9-1.0	RPD		
OPP	Azinophos methyl	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chlorpyrifos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Coumaphos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Demeton-O	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Demeton-S	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Diazinon	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dichlorvos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dimethoate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Disulfoton	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Ethoprop	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Fenitrothion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Fensulfothion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Fenthion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Malathion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Methyl parathion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Mevinphos (Phosdrin)	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Monocrotophos	mg/kg	10							-	<10	-	<10	-	-	-	-	-	<10	-
	Parathion	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Phorate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Prothiofos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Ronnel	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Stirophos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Trichloronate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Profenofos	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
PCB	Aroclor 1016	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aroclor 1232	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aroclor 1242	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aroclor 1248	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aroclor 1254	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aroclor 1260	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	PCBs (Sum of total)	mg/kg	0.5	1						-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
VOC / SVOC	2-chloronaphthalene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-methylnaphthalene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Acetophenone	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-chlorophenol	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-methylphenol	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-nitrophenol	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	3-&4-methylphenol	mg/kg	1							-	<1	-	<1	-	-	-	-	-	<1	-
	4-chloro-3-methylphenol	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-nitrophenol	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Pentachlorophenol	mg/kg	1							-	<1	-	<1	-	-	-	-	-	<1	-
	Phenol	mg/kg	0.5							-	<0.5	-	1.1	-	-	-	-	-	<0.5	-
	Bis(2-ethylhexyl) phthalate	mg/kg	5							-	<5	-	<5	-	-	-	-	-	<5	-
	Butyl benzyl phthalate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Diethylphthalate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dimethyl phthalate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Di-n-butyl phthalate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Di-n-octyl phthalate	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Methyl Ethyl Ketone	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-Methyl-2-pentanone	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Acetone	mg/kg	5							-	<5	-	<5	-	-	-	-	-	<5	-
	Allyl chloride	mg/kg	0.05							-	<0.05	-	<0.05	-	-	-	-	-	<0.05	-
	Carbon disulfide	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-bromophenyl phenyl ether	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-chlorophenyl phenyl ether	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bis(2-chloroethoxy) methane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bis(2-chloroethyl)ether	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Carbazole	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dibenzofuran	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	N-nitrosopiperidine	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1,1,2-tetrachloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1,1-trichloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1,2,2-tetrachloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1,2-trichloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1-dichloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,1-dichloroethene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,2,3-trichloropropane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,2-dibromoethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-

										Field ID	BH10 0.5-0.6	BH11 0.2-0.3	BH11 0.5-0.6	BH12 0.2-0.3	BH12 0.9-1.0	TRIP 2		DUP 1		BH13 0.2-0.3	BH13 0.5-0.6
										Sample Date	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016	19/01/2016		19/01/2016		19/01/2016	19/01/2016
										Laboratory ID	S16-Ja09084	S16-Ja09091	S16-Ja09092	S16-Ja09094	S16-Ja09096	S16-Ja09102		140514-1		S16-Ja09098	S16-Ja09099
Chemical Group	**Chemical Name**	**Units**	**EQL**	NEPM 2013 HILs Residential B Soil	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 0 to <1m, Sand	NEPM 2013 Residential Soil HSL A/B for Vapour Intrusion, 1m to <2m, Sand	NEPM 2013 EIL	NEPM 2013 ESLs Urban residential and public open space, Coarse Soil	NEPM 2013 Mgmt Limits Residential, parkland, public open space, Coarse Soil						Duplicate of BH12 0.9-1.0	RPD	Triplicate of BH12 0.9-1.0	RPD			
VOC / SVOC	1,2-dichlorobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,2-dichloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,2-dichloropropane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,3-dichlorobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,3-dichloropropane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,4-dichlorobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-chlorotoluene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bromobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bromochloromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bromodichloromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bromoform	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Bromomethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Carbon tetrachloride	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chlorobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chlorodibromomethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chloroform	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Chloromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	cis-1,2-dichloroethene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	cis-1,3-dichloropropene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dibromomethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dichlorodifluoromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Dichloromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Hexachlorobutadiene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Iodomethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Trichloroethene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Tetrachloroethene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	trans-1,2-dichloroethene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	trans-1,3-dichloropropene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Trichlorofluoromethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Vinyl chloride	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	N-nitrosodi-n-butylamine	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	N-nitrosodi-n-propylamine	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-naphthylamine	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Diphenylamine	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	2-nitroaniline	mg/kg	1							-	<1	-	<1	-	-	-	-	-	<1	-
	3-nitroaniline	mg/kg	1							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Aniline	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Hexachlorocyclopentadiene	mg/kg	1							-	<1	-	<1	-	-	-	-	-	<1	-
	Hexachloroethane	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Nitrobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Pentachlorobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,2,4-trimethylbenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	1,3,5-trimethylbenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Isopropylbenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Styrene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	4-aminobiphenyl	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-
	Pentachloronitrobenzene	mg/kg	0.5							-	<0.5	-	<0.5	-	-	-	-	-	<0.5	-

							BH2	BH9	BH12	DUP01	
						Sample ID	BH2	BH9	BH12	DUP01	
						Sample Date	22/01/2016	22/01/2016	22/01/2016	22/01/2016	
						Laboratory ID	S16-Ja12401	S16-Ja12402	S16-Ja12403	S16-Ja12404	
Chemical Group	**Chemical Name**	**Units**	**EQL**	ANZECC 2000 Freshwater 95% Trigger Values	ANZECC 2000 Marine water 95% Trigger Values	NEPM 2013 Residential GW HSL A/B Vapour Intrusion, 2m to <4m, Sand				Duplicate of BH12	RPD
Metals	Arsenic (Filtered)	mg/L	0.001	0.013	0.0045		<0.001	<0.001	<0.001	<0.001	na
	Cadmium (Filtered)	mg/L	0.0001	0.0002	0.0007		<0.0001	0.0001	0.0001	0.0001	0%
	Chromium (Filtered)	mg/L	0.001	0.0033	0.027		<0.001	<0.001	<0.001	<0.001	na
	Copper (Filtered)	mg/L	0.001	0.0014	0.0013		0.002	<0.001	0.001	0.002	67%
	Lead (Filtered)	mg/L	0.001	0.0034	0.0044		<0.001	<0.001	<0.001	<0.001	na
	Mercury (Filtered)	mg/L	0.0001	0.0006	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	na
	Nickel (Filtered)	mg/L	0.001	0.011	0.07		0.002	0.002	0.01	0.009	11%
	Zinc (Filtered)	mg/L	0.005	0.008	0.015		0.058	0.04	0.027	0.024	12%
TPH	C6-C10 less BTEX (F1)	mg/L	0.02	0.02	0.02	1	<0.02	<0.02	<0.02	<0.02	na
	F2-NAPHTHALENE	mg/L	0.05	0.05	0.05	1	<0.05	0.06	<0.05	<0.05	na
	C6 - C10	mg/L	0.02	0.02	0.02		<0.02	<0.02	<0.02	<0.02	na
	C10-C16	mg/L	0.05	0.05	0.05		<0.05	0.06	<0.05	<0.05	na
	C16-C34	mg/L	0.1	0.1	0.1		<0.1	<0.1	<0.1	<0.1	na
	C34-C40	mg/L	0.1	0.1	0.1		<0.1	<0.1	<0.1	<0.1	na
BTEX	Benzene	µg/L	1	950	500	800	<1	<1	<1	<1	na
	Ethylbenzene	µg/L	1	80	5	NL	<1	<1	<1	<1	na
	Toluene	µg/L	1	180	180	NL	<1	<1	<1	<1	na
	Xylene (m & p)	µg/L	2	75	75		<2	<2	<2	<2	na
	Xylene (o)	µg/L	1	350	350		<1	<1	<1	<1	na
	Xylene Total	µg/L	3			NL	<3	<3	<3	<3	na
PAH	3-methylcholanthrene	µg/L	2				<2	<2	<2	-	na
	Acenaphthene	µg/L	1				<1	<1	<1	<1	na
	Acenaphthylene	µg/L	1				<1	<1	<1	<1	na
	Anthracene	µg/L	1	0.4	0.4		<1	<1	<1	<1	na
	Benzo(a)anthracene	µg/L	1				<1	<1	<1	<1	na
	Benzo(a)pyrene	µg/L	1	0.2	0.2		<1	<1	<1	<1	na
	Benzo(g,h,i)perylene	µg/L	1				<1	<1	<1	<1	na
	Benzo(k)fluoranthene	µg/L	1				<1	<1	<1	<1	na
	Chrysene	µg/L	1				<1	<1	<1	<1	na
	Benzo[b+j]fluoranthene	mg/L	0.001				<0.001	<0.001	<0.001	<0.001	na
	Dibenz(a,h)anthracene	µg/L	1				<1	<1	<1	<1	na
	Fluoranthene	µg/L	1	1.4	1.4		<1	<1	<1	<1	na
	Fluorene	µg/L	1				<1	<1	<1	<1	na
	Indeno(1,2,3-c,d)pyrene	µg/L	1				<1	<1	<1	<1	na
	Naphthalene	µg/L	1	16	70		<1	<1	<1	<1	na
	Phenanthrene	µg/L	1	2	2		<1	<1	<1	<1	na
	Pyrene	µg/L	1				<1	<1	<1	<1	na
	Total PAHs	µg/L	1				<1	<1	<1	<1	na

						Sample ID	BH2	BH9	BH12	DUP01	
						Sample Date	22/01/2016	22/01/2016	22/01/2016	22/01/2016	
						Laboratory ID	S16-Ja12401	S16-Ja12402	S16-Ja12403	S16-Ja12404	
Chemical Group	**Chemical Name**	**Units**	**EQL**	ANZECC 2000 Freshwater 95% Trigger Values	ANZECC 2000 Marine water 95% Trigger Values	NEPM 2013 Residential GW HSL A/B Vapour Intrusion, 2m to <4m, Sand				Duplicate of BH12	RPD
OCP	4,4-DDE	µg/L	2				<2	<2	<2	-	-
	Aldrin	µg/L	2				<2	<2	<2	-	-
	d-BHC	µg/L	2				<2	<2	<2	-	-
	DDD	µg/L	2				<2	<2	<2	-	-
	DDT	µg/L	4	0.006			<4	<4	<4	-	-
	Dieldrin	µg/L	2				<2	<2	<2	-	-
	Endosulfan sulphate	µg/L	2				<2	<2	<2	-	-
	Endrin	µg/L	2	0.01	0.0004		<2	<2	<2	-	-
	Endrin aldehyde	µg/L	2				<2	<2	<2	-	-
	Endrin ketone	µg/L	2				<2	<2	<2	-	-
	g-BHC (Lindane)	µg/L	2	0.2			<2	<2	<2	-	-
	Heptachlor	µg/L	2	0.01			<2	<2	<2	-	-
	Heptachlor epoxide	µg/L	2				<2	<2	<2	-	-
	Hexachlorobenzene	µg/L	2				<2	<2	<2	-	-
	Methoxychlor	µg/L	1				<1	<1	<1	-	-
OPP	Azinophos methyl	µg/L	2				<2	<2	<2	-	-
	Chlorpyrifos	µg/L	2	0.01	0.009		<2	<2	<2	-	-
	Coumaphos	µg/L	2				<2	<2	<2	-	-
	Demeton-O	µg/L	2				<2	<2	<2	-	-
	Demeton-S	µg/L	2				<2	<2	<2	-	-
	Diazinon	µg/L	2	0.01			<2	<2	<2	-	-
	Dichlorvos	µg/L	2				<2	<2	<2	-	-
	Dimethoate	µg/L	2	0.15			<2	<2	<2	-	-
	Disulfoton	µg/L	2				<2	<2	<2	-	-
	Ethoprop	µg/L	2				<2	<2	<2	-	-
	Fenitrothion	µg/L	2	0.2			<2	<2	<2	-	-
	Fensulfothion	µg/L	2				<2	<2	<2	-	-
	Fenthion	µg/L	2				<2	<2	<2	-	-
	Malathion	µg/L	2	0.05			<2	<2	<2	-	-
	Methyl parathion	µg/L	2				<2	<2	<2	-	-
	Mevinphos (Phosdrin)	µg/L	2				<2	<2	<2	-	-
	Monocrotophos	µg/L	20				<20	<20	<20	-	-
	Parathion	µg/L	2	0.004			<2	<2	<2	-	-
	Phorate	µg/L	2				<2	<2	<2	-	-
	Prothiofos	µg/L	2				<2	<2	<2	-	-
	Ronnel	µg/L	2				<2	<2	<2	-	-
	Stirophos	µg/L	2				<2	<2	<2	-	-
	Trichloronate	µg/L	2				<2	<2	<2	-	-

						Sample ID	BH2	BH9	BH12	DUP01	
						Sample Date	22/01/2016	22/01/2016	22/01/2016	22/01/2016	
						Laboratory ID	S16-Ja12401	S16-Ja12402	S16-Ja12403	S16-Ja12404	
Chemical Group	**Chemical Name**	**Units**	**EQL**	ANZECC 2000 Freshwater 95% Trigger Values	ANZECC 2000 Marine water 95% Trigger Values	NEPM 2013 Residential GW HSL A/B Vapour Intrusion, 2m to <4m, Sand				Duplicate of BH12	RPD
VOC / SVOC	N-nitrosodi-n-butylamine	µg/L	2				<2	<2	<2	-	-
	N-nitrosodi-n-propylamine	µg/L	2				<2	<2	<2	-	-
	2-naphthylamine	µg/L	2				<2	<2	<2	-	-
	Diphenylamine	µg/L	2				<2	<2	<2	-	-
	2-nitroaniline	µg/L	4				<4	<4	<4	-	-
	3-nitroaniline	µg/L	4				<2	<2	<4	-	-
	Aniline	µg/L	2	250			<2	<2	<2	-	-
	Hexachlorocyclopentadiene	µg/L	4				<4	<4	<4	-	-
	Hexachloroethane	µg/L	2	290			<2	<2	<2	-	-
	Nitrobenzene	µg/L	2	550			<2	<2	<2	-	-
	Pentachlorobenzene	µg/L	2				<2	<2	<2	-	-
	1,2,4-trimethylbenzene	µg/L	1				<1	<1	<1	-	-
	1,3,5-trimethylbenzene	µg/L	1				<1	<1	<1	-	-
	Isopropylbenzene	µg/L	1				<1	<1	<1	-	-
	Styrene	µg/L	1				<1	<1	<1	-	-
	4-aminobiphenyl	µg/L	2				<2	<2	<2	-	-
	Pentachloronitrobenzene	µg/L	2				<2	<2	<2	-	-
	2-chloronaphthalene	µg/L	2				<2	<2	<2	-	-
	2-methylnaphthalene	µg/L	2				<2	<2	<2	-	-
	Acetophenone	µg/L	2				<2	<2	<2	-	-
	Profenofos	µg/L	2				<2	<2	<2	-	-
	2-chlorophenol	µg/L	2	340			<2	<2	<2	-	-
	2-methylphenol	µg/L	2				<2	<2	<2	-	-
	2-nitrophenol	µg/L	2				<2	<2	<2	-	-
	3-&4-methylphenol	µg/L	4				<4	<4	<4	-	-
	4-chloro-3-methylphenol	µg/L	2				<2	<2	<2	-	-
	4-nitrophenol	µg/L	2				<5	<5	<5	-	-
	Pentachlorophenol	µg/L	10	3.6	11		<10	<10	<10	-	-
	Phenol	µg/L	2	320	400		<2	<2	<2	-	-
	Bis(2-ethylhexyl) phthalate	µg/L	20				<20	<20	<20	-	-
	Butyl benzyl phthalate	µg/L	2				<2	<2	<2	-	-
	Diethylphthalate	µg/L	2	1000			<2	<2	<2	-	-
	Dimethyl phthalate	µg/L	2	3700			<2	<2	<2	-	-
	Di-n-butyl phthalate	µg/L	2				<2	<2	<2	-	-
	Di-n-octyl phthalate	µg/L	2				<2	<2	<2	-	-
	Methyl Ethyl Ketone	µg/L	1				<1	<1	<1	-	-
	4-Methyl-2-pentanone	µg/L	1				<1	<1	<1	-	-
	Acetone	mg/L	0.001				0.017	0.019	0.013	-	-
	Allyl chloride	mg/L	0.001				<0.001	<0.001	<0.001	-	-
	Carbon disulfide	µg/L	1				<1	<1	<1	-	-
	4-bromophenyl phenyl ether	µg/L	2				<2	<2	<2	-	-
	4-chlorophenyl phenyl ether	µg/L	2				<2	<2	<2	-	-
	Bis(2-chloroethoxy) methane	µg/L	2				<2	<2	<2	-	-
	Bis(2-chloroethyl)ether	µg/L	2				<2	<2	<2	-	-

						Sample ID	BH2	BH9	BH12	DUP01	
						Sample Date	22/01/2016	22/01/2016	22/01/2016	22/01/2016	
						Laboratory ID	S16-Ja12401	S16-Ja12402	S16-Ja12403	S16-Ja12404	
Chemical Group	**Chemical Name**	**Units**	**EQL**	ANZECC 2000 Freshwater 95% Trigger Values	ANZECC 2000 Marine water 95% Trigger Values	NEPM 2013 Residential GW HSL A/B Vapour Intrusion, 2m to <4m, Sand				Duplicate of BH12	RPD
VOC / SVOC	Carbazole	µg/L	2				<2	<2	<2	-	-
	Dibenzofuran	µg/L	2				<2	<2	<2	-	-
	N-nitrosopiperidine	µg/L	2				<2	<2	<2	-	-
	1,1,1,2-tetrachloroethane	µg/L	1				<1	<1	<1	-	-
	1,1,1-trichloroethane	µg/L	1				<1	<1	<1	-	-
	1,1,2,2-tetrachloroethane	µg/L	5				<5	<5	<5	-	-
	1,1,2-trichloroethane	µg/L	1	6500	1900		<1	<1	<1	-	-
	1,1-dichloroethane	µg/L	1				<1	<1	<1	-	-
	1,1-dichloroethene	µg/L	1				<1	<1	<1	-	-
	1,2,3-trichloropropane	µg/L	1				<1	<1	<1	-	-
	1,2-dibromoethane	µg/L	1				<1	<1	<1	-	-
	1,2-dichlorobenzene	µg/L	1	160			<1	<1	<1	-	-
	1,2-dichloroethane	µg/L	1				<1	<1	<1	-	-
	1,2-dichloropropane	µg/L	1				<1	<1	<1	-	-
	1,3-dichlorobenzene	µg/L	1	260			<1	<1	<1	-	-
	1,3-dichloropropane	µg/L	1				<1	<1	<1	-	-
	1,4-dichlorobenzene	µg/L	1	60			<1	<1	<1	-	-
	4-chlorotoluene	µg/L	1				<1	<1	<1	-	-
	Bromobenzene	µg/L	1				<1	<1	<1	-	-
	Bromochloromethane	µg/L	1				<1	<1	<1	-	-
	Bromodichloromethane	µg/L	1				<1	<1	<1	-	-
	Bromoform	µg/L	1				<1	<1	<1	-	-
	Bromomethane	µg/L	1				<1	<1	<1	-	-
	Carbon tetrachloride	µg/L	1				<1	<1	<1	-	-
	Chlorobenzene	µg/L	1				<1	<1	<1	-	-
	Chlorodibromomethane	µg/L	1				<1	<1	<1	-	-
	Chloroethane	µg/L	1				<1	<1	<1	-	-
	Chloroform	µg/L	5				<5	<5	<5	-	-
	Chloromethane	µg/L	1				<1	<1	<1	-	-
	cis-1,2-dichloroethene	µg/L	1				<1	<1	<1	-	-
	cis-1,3-dichloropropene	µg/L	1				<1	<1	<1	-	-
	Dibromomethane	µg/L	5				<5	<5	<5	-	-
	Dichlorodifluoromethane	µg/L	1				<1	<1	<1	-	-
	Dichloromethane	µg/L	1				<1	<1	<1	-	-
	Hexachlorobutadiene	µg/L	2				<2	<2	<2	-	-
	Iodomethane	µg/L	1				<1	<1	<1	-	-
	Trichloroethene	µg/L	1				<1	<1	<1	-	-
	Tetrachloroethene	µg/L	1				<1	<1	<1	-	-
	trans-1,2-dichloroethene	µg/L	1				<1	<1	<1	-	-
	trans-1,3-dichloropropene	µg/L	1				<1	<1	<1	-	-
	Trichlorofluoromethane	µg/L	1				<1	<1	<1	-	-
	Vinyl chloride	µg/L	1				<1	<1	<1	-	-

		Sample ID	TB	TS	TB	TS
		Sample Date	18/01/2016	18/01/2016	22/01/2016	22/01/2016
		Laboratory ID	S16-Ja09224	S16-Ja09225	S16-Ja12405	S16-Ja12406
		Sample Type	trip blank	trip spike	trip blank	trip spike
		Units	mg/L	%	mg/L	%
Chemical Group	**Chemical Name**	**EQL**				
BTEX	Benzene	1	<1	86	<1	112
	Ethylbenzene	1	<1	120	<1	83
	Toluene	1	<1	120	<1	91
	Xylene (m & p)	2	<2	120	<2	84
	Xylene (o)	1	<1	121	<1	85
	Xylene Total	3	<3	121	<3	84

Well ID	Date Measured	Height of Well Stick-up (m)	Depth to Screen Interval (mbtoc)	Total Well Depth (mbtoc)	Depth to Water (mbtoc)	Depth to LNPAL (mbtoc)	PSH Thickness (m)	Corrected Depth to Water (m bgs)
BH2	22/01/2016	0.0	0.7	2.960	2.640	-	-	2.640
BH9	22/01/2016	0.0	2.4	4.530	3.575	-	-	3.575
BH12	22/01/2016	0.0	3.0	4.895	1.421	-	-	1.421

Notes:
btoc = below top of well casing
bgs = below ground surface (btoc minus height of well stick up)
ID = identification
m = metres
LNPAL = light non aqueous phase liquid

Well ID	Date Measured	Event	Dissolved Oxygen	Electrical Conductivity	Total Dissolved Solids*	pH	Redox Potential**	Temperature	Purge Volume	Comments
			mg/L	(uS/cm)	(mg/L)		(mV)	(^{o}C)	(L)	
BH2	22/01/2016	pre	slow recharge - insufficient water volume in well to allow screening of water quality parameters							Brown, no odour or sheen
		post								
BH9	22/01/2016	pre	5.10	812	528	5.64	328	21.1	1	Pale brown, no odour or sheen
		post	slow recharge - insufficient water volume in well to allow screening of water quality parameters							
BH12	22/01/2016	pre	3.89	1339	870	6.23	313	24.0	1	Brown, no odour or sheen
		post	4.30	1686	1096	6.04	301	22.5	15	

Notes:
ID = identification
nm = not measured
mg/L = milligrams per litre
L = litres
uS/cm = microsiemen per centimetre
mV = millivolts
^{o}C = degrees Celsius
* Approximate value determined using the following equation: TDS (mg/L) = EC x 0.65
** Includes conversion to Standard Hydrogen Electrode (+199mV)

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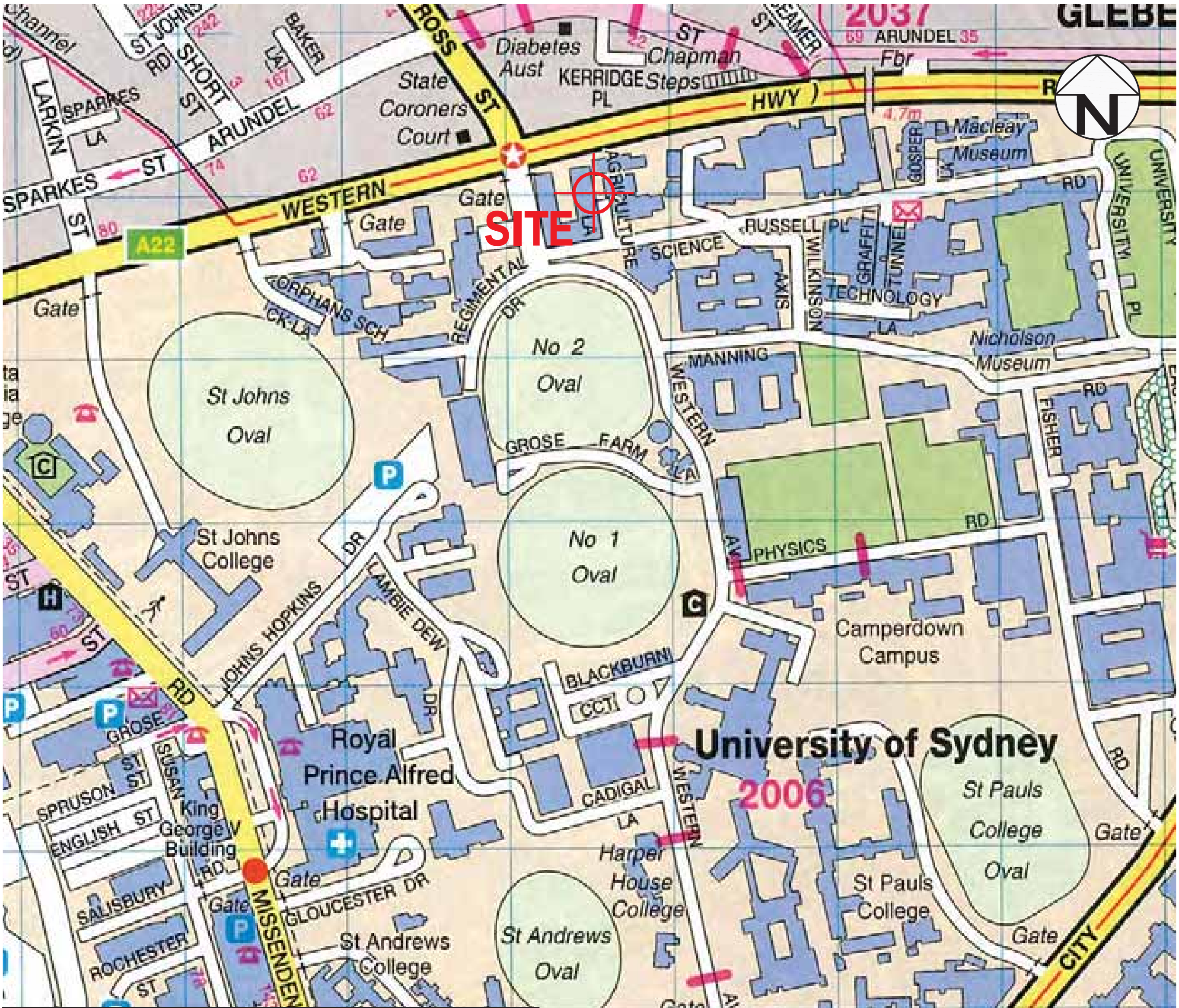
Figures



0 0.05 0.1 0.15 0.2 0.25

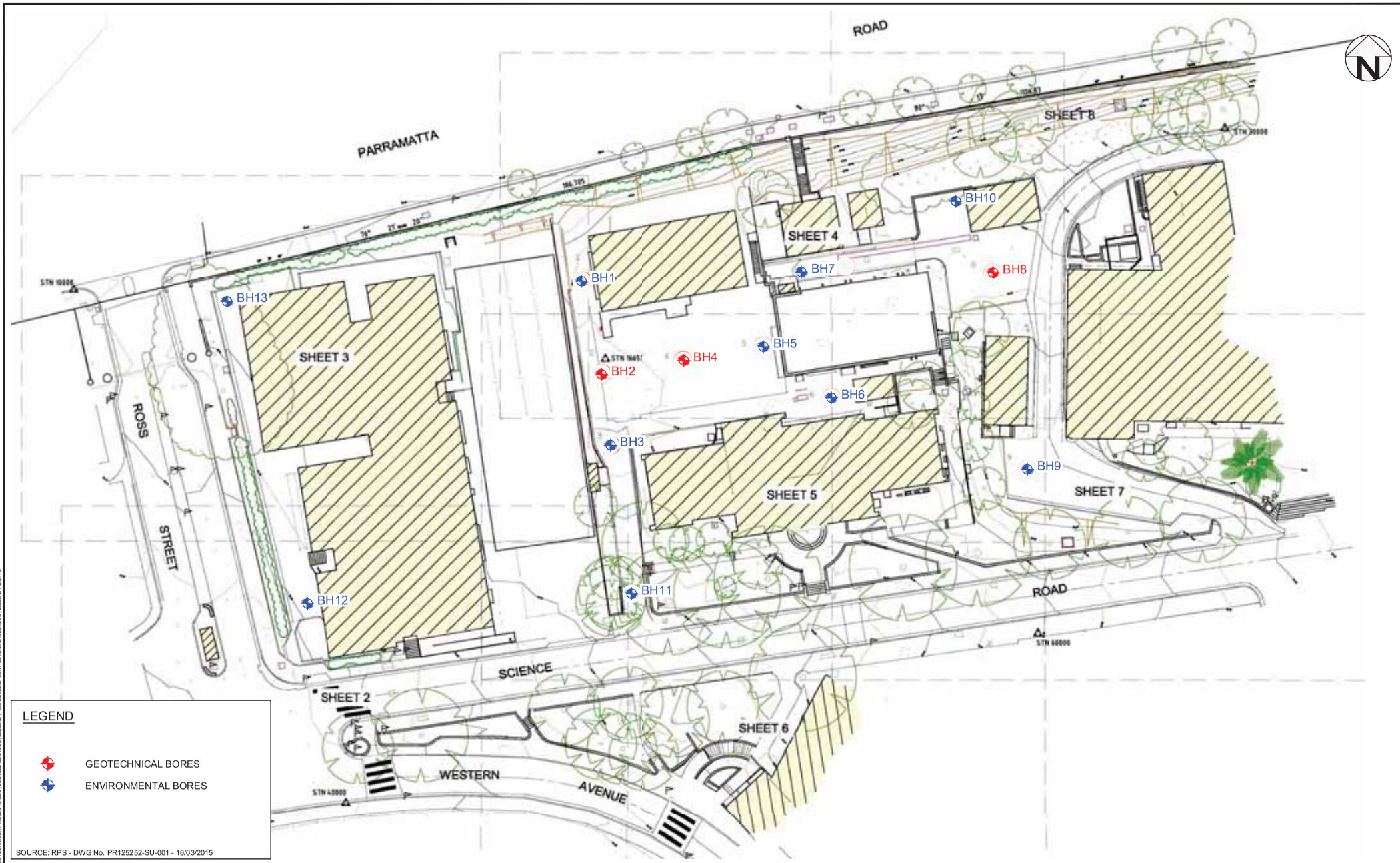
SCALE 1:5000 (A3) KILOMETRES

SOURCE: UBD STREET DIRECTORY GREGORYS SYDNEY & BLUE MOUNTAINS, NEW SOUTH WALES EDITION 51, 2015, MAP: 14

drawn	MV	client:	UNIVERSITY OF SYDNEY C/O LEND LEASE BUILDING
approved	SK	project:	DETAILED SITE COMTAMINATION ASSESSMENT FASS ENABLING WORKS UNIVERSITY OF SYDNEY, NSW
date	27/01/16	title:	SITE LOCATION PLAN
scale	AS SHOWN	project no:	GEOTLCOV25283AD-AE
original size	A4	figure no:	FIGURE 1
		rev:	A

coffey

PLOT DATE: 27/01/2016 12:15:35 PM DWG FILE: F:\GEOTECHNICS\1.PROJECTS\GEOTLCOV252\GEOTLCOV25283AD FASS DEVELOPMENT USYD\CAD\GEOTLCOV25283AD-AE.DWG



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

5 0 5 15 25

Scale (metres) 1:500

drawn	MV
approved	SK
date	27/01/16
scale	AS SHOWN
original size	A3

coffey

client:	UNIVERSITY OF SYDNEY C/O LEND LEASE BUILDING
project:	DETAILED SITE COMTAMINATION ASSESSMENT FASS ENABLING WORKS UNIVERSITY OF SYDNEY, NSW
title:	BOREHOLE LOCATION PLAN
project no:	GEOTLCOV25283AD-AE
figure no:	FIGURE 2
rev:	A

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Appendix A – Borehole Logs

coffey

Engineering Log - Borehole

Borehole ID.	**BH01**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
principal:	
project:	***FASS Enabling Works***
location:	***FASS Development, University of Sydney, Camperdown Campus***
date started:	***18 Jan 2016***
date completed:	***18 Jan 2016***
logged by:	***CL***
checked by:	***DS***

position: Not Specified | surface elevation: 29.50 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E					**FILL: Gravelly CLAY**: low plasticity, dark grey, grey, with concrete, shale, brick and timber fragments of gravel size.	<Wp			**FILL** PID: 5.8 ppm
			E	29	0.5			**FILL: Silty CLAY**: medium plasticity, red brown, brown, dark grey and dark brown, with construction rubble such as concrete, brick and shale of gravel size.				PID: 5.3 ppm
			E		1.0							PID: 5.2 ppm
			SPT 4, 7, 11 N*=18					**Silty CLAY**: high plasticity, red brown, orange brown, grey.		VSt / H		**RESIDUAL SOIL**
				28	1.5			**SHALE**: red brown, grey, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
					2.0							
				27	2.5							
			SPT 7, 15, 25 N*=40									
					3.0			Borehole BH01 terminated at 3.0 m Target stratum				
				26	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 24/01/2016 11:22

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH02**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client: **University of Sydney c/o Lend Lease Building**	date started: **18 Jan 2016**
principal:	date completed: **18 Jan 2016**
project: **FASS Enabling Works**	logged by: **CL**
location: **FASS Development, University of Sydney, Camperdown Campus**	checked by: **DS**

position: Not Specified | surface elevation: 29.40 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			E	29	0.5			**ASPHALT**: 0.05m.	D			**PAVEMENT**
								FILL: Gravelly SAND medium to coarse grained, dark brown, dark grey, fine to medium grained gravel.				**FILL**
			E									PID: 4 ppm
								FILL: CLAY: high plasticity, dark grey, grey, with trace of gravel.	>Wp			
												PID: 3.3 ppm
			E		1.0		CH	**Silty CLAY**: high plasticity, red brown.	<Wp	VSt / H		**RESIDUAL SOIL**
												PID: 4.1 ppm
			SPT 4, 7, 11 N*=18	28	1.5			**SHALE**: red brown, brown, pale grey, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
			D	27	2.5							
					3.0			Borehole BH02 terminated at 3.0 m Target stratum				
				26	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:04

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH03**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
principal:	
project:	***FASS Enabling Works***
location:	***FASS Development, University of Sydney, Camperdown Campus***
date started:	***19 Jan 2016***
date completed:	***19 Jan 2016***
logged by:	***CL***
checked by:	***DS***

position: Not Specified | surface elevation: 29.00 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
DT				29				**CONCRETE**: 0.12m.				**PAVEMENT**
			E					**Gravelly Sandy CLAY**: low plasticity, dark brown, dark grey, fine to coarse grained sand, with sandstone and bricks of gravel size.	<Wp			**FILL** PID: 6.1 ppm
			E		0.5							PID: 5.3 ppm
			E	28	1.0		CH	**Silty CLAY**: high plasticity, red brown, pale grey, grey, with a trace of fine grained ironstone gravel.		VSt		**RESIDUAL SOIL**
AD/T		Not Encountered	SPT 4, 5, 8 N*=13		1.5			**SHALE**: pale grey, red brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
				27	2.0							
			SPT 8, 20, 16 N*=36		2.5							
				26	3.0			Borehole BH03 terminated at 3.0 m Target stratum				
					3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:04

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration (1 2 3): no resistance ranging to refusal

water: 10-Oct-12 water level on date shown; water inflow; water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH04**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
date started:	**18 Jan 2016**
principal:	
date completed:	**18 Jan 2016**
project:	***FASS Enabling Works***
logged by:	**CL**
location:	***FASS Development, University of Sydney, Camperdown Campus***
checked by:	**DS**

position: Not Specified | surface elevation: 29.60 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E					**ASPHALT**: 0.06m.				**PAVEMENT**
								FILL: Gravelly SAND medium to coarse grained, brown, dark brown, gravel sized brick and asphaltic concrete.	D			**FILL** 0.2m - DUP1 and TRIP1 taken PID: 5.3 ppm
			E		0.5		Cl	**Silty CLAY**: medium plasticity, pale grey, grey, mottled red brown.	<Wp	VSt / H		**RESIDUAL SOIL** PID: 3.4 ppm
			E	29				**SHALE**: red brown, brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK** PID: 2.1 ppm
			SPT 8, 12, 16 N*=28		1.0							
				28	1.5							
					2.0							
				27	2.5			Borehole BH04 terminated at 2.5 m Target stratum				
					3.0							
				26	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH05**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
date started:	**18 Jan 2016**
principal:	
date completed:	**18 Jan 2016**
project:	***FASS Enabling Works***
logged by:	**CL**
location:	***FASS Development, University of Sydney, Camperdown Campus***
checked by:	**DS**

position: Not Specified | surface elevation: 29.60 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E					**ASPHALT**				**PAVEMENT**
			E	29	0.5			**FILL: Gravelly SAND** medium to coarse grained, dark grey, dark brown, fine to coarse grained gravel.	D			**FILL** PID: 2.2 ppm PID: 1.9 ppm
			E					**SHALE**: orange brown, pale grey, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK** PID: 2.5 ppm
			SPT 9, 15, 20 N*=35	28	1.0 1.5							
				27	2.0 2.5			Borehole BH05 terminated at 2.0 m Target stratum				
				26	3.0 3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH06**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
principal:	
project:	***FASS Enabling Works***
location:	***FASS Development, University of Sydney, Camperdown Campus***
date started:	***19 Jan 2016***
date completed:	***19 Jan 2016***
logged by:	***CL***
checked by:	***DS***

position: Not Specified | surface elevation: 29.70 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
DT								**CONCRETE**: 0.12m.				**PAVEMENT**
			E					**FILL: Gravelly CLAY**: high plasticity, grey, brown, gravel sized sandstone and construction rubble.	<Wp			**FILL** PID: 6.4 ppm
			E		0.5		CH	**Silty CLAY**: high plasticity, pale grey, red brown, with a trace of fine grained gravel.		VSt		**RESIDUAL SOIL** PID: 6.3 ppm
				29								
			SPT 7, 10, 18 N*=28		1.0			**SHALE**: pale grey, red brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
AD/T		Not Encountered		28	1.5							
					2.0							
			SPT 11, 17, 10/80mm N*=R	27	2.5							
					3.0			Borehole BH06 terminated at 3.0 m Target stratum				
				26	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH07**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
principal:	
project:	***FASS Enabling Works***
location:	***FASS Development, University of Sydney, Camperdown Campus***
date started:	***19 Jan 2016***
date completed:	***19 Jan 2016***
logged by:	***CL***
checked by:	***DS***

position: Not Specified | surface elevation: 33.30 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
HA			E	33	0.5			**ASPHALT**: 0.03.	<Wp			**PAVEMENT**
								FILL: Gravelly CLAY: low plasticity, dark brown, dark grey, brick, ironstone, sandstone and glass fragments of gravel size.				**FILL** PID: 5.7 ppm odourous PID: 8.7 ppm
			E									PID: 6.9 ppm
			E		1.0		CH	**Silty CLAY**: high plasticity, red brown, pale grey.		St / VSt		**RESIDUAL SOIL**
AD/T		Not Encountered	SPT 4, 5, 8 N*=13	32	1.5							
				31	2.0			**SHALE**: pale grey, red brown, brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
			SPT 10, 18, 5/0mm HB N*=R		2.5							
				30	3.0			Borehole BH07 terminated at 2.8 m Target stratum				
					3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

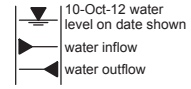
* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration

no resistance ranging to refusal

water



10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	***BH08***
sheet:	1 of 1
project no.	***GEOTLCOV25283AD***
client: ***University of Sydney c/o Lend Lease Building***	date started: ***18 Jan 2016***
principal:	date completed: ***18 Jan 2016***
project: ***FASS Enabling Works***	logged by: ***CL***
location: ***FASS Development, University of Sydney, Camperdown Campus***	checked by: ***DS***

position: Not Specified | surface elevation: 33.90 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T		Not Encountered	E					**ASPHALT**: 0.1m.				**PAVEMENT**
								FILL: CLAY: medium plasticity, dark brown, brown, with some fine to medium grained gravel and fine to coarse grained sand.	<Wp			**FILL** PID: 2.4 ppm
			E		0.5		CH	**Silty CLAY**: red brown, grey.		VSt / H		**RESIDUAL SOIL** PID: 1.1 ppm
			E SPT 12, 20, 5/10mm N*=R	33 32	1.0 1.5			**SHALE**: red brown, grey, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK**
				31 30	2.0 2.5 3.0 3.5			Borehole BH08 terminated at 2.0 m Target stratum				

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH09**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
date started:	**18 Jan 2016**
date completed:	**18 Jan 2016**
logged by:	**CL**
checked by:	**DS**

client: ***University of Sydney c/o Lend Lease Building***

principal:

project: ***FASS Enabling Works***

location: ***FASS Development, University of Sydney, Camperdown Campus***

position: Not Specified | surface elevation: 34.50 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E	34	0.0			**ASPHALT**: 0.06m.	D			**PAVEMENT**
			E					**FILL: Gravelly SAND** medium plasticity, orange brown, brown, dark brown, asphalt, brick and construction rubble of gravel size.				**FILL** PID: 2.9 ppm
			E									PID: 3.1 ppm
			SPT 5, 7, 8 N*=15	33	1.0		Cl	**Silty CLAY**: medium plasticity, orange brown, red brown, brown.	<Wp	VSt		PID: 2.6 ppm **RESIDUAL SOIL**
			E		2.0			**SHALE**: pale grey, orange brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK** PID: 3.2 ppm
			SPT 7, 17, 19 N*=36	32								
				31	3.0							
				30	4.0							
				29	5.0			Borehole BH09 terminated at 5.0 m Target depth				
				28	6.0							
				27	7.0							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	***BH10***
sheet:	1 of 1
project no.	***GEOTLCOV25283AD***
client:	***University of Sydney c/o Lend Lease Building***
date started:	***19 Jan 2016***
principal:	
date completed:	***19 Jan 2016***
project:	***FASS Enabling Works***
logged by:	***CL***
location:	***FASS Development, University of Sydney, Camperdown Campus***
checked by:	***DS***

position: Not Specified | surface elevation: 34.00 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
AD/T		Not Encountered	E	34				**ASPHALT**: 0.05m.	D			**PAVEMENT**
								FILL: Gravelly SAND medium to coarse grained, dark brown, dark grey, fine to medium grained gravel.				**FILL** PID: 5.9 ppm
			E		0.5		CH	**Silty CLAY**: high plasticity, red brown, pale grey.	<Wp	VSt		**RESIDUAL SOIL** PID: 5.5 ppm
			E	33	1.0			**SHALE**: pale grey, extremely weathered, estimated very low strength.				**EXTREAMLY WEATHERED BEDROCK** PID: 5.3 ppm
					1.5							
				32	2.0			Borehole BH10 terminated at 2.0 m Target depth				
					2.5							
				31	3.0							
					3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

* bit shown by suffix
e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH11**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
date started:	**19 Jan 2016**
date completed:	**19 Jan 2016**
logged by:	**CL**
checked by:	**DS**

client: ***University of Sydney c/o Lend Lease Building***

principal:

project: ***FASS Enabling Works***

location: ***FASS Development, University of Sydney, Camperdown Campus***

position: Not Specified | surface elevation: 26.80 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
DT								**CONCRETE**: 0.13m.				**PAVEMENT**
			E				CH	**FILL: Gravelly CLAY** medium plasticity, dark brown, dark grey, fine to medium grained gravel.	<Wp	St		**FILL**
								CLAY: high plasticity, dark brown, pale grey.				**RESIDUAL SOIL**
			E		0.5							PID: 5.7 ppm
				26						VSt / H		PID: 6.7 ppm
AD/T		Not Encountered	E		1.0							PID: 1.8 ppm
								SHALE: dark grey, red brown, brown, extremely weathered, estimated very low strength.				**EXTREAMLY WEATHERED BEDROCK**
			E	25	1.5							
					2.0			Borehole BH11 terminated at 2.0 m Target depth				
				24	2.5							
					3.0							
				23	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

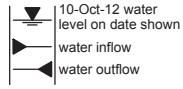
* bit shown by suffix, e.g. AD/T
- B blank bit
- T TC bit
- V V bit

support
- M mud
- C casing
- N nil

penetration

no resistance ranging to refusal

water


10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH12**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
date started:	**19 Jan 2016**
date completed:	**19 Jan 2016**
logged by:	**CL**
checked by:	**DS**

client: ***University of Sydney c/o Lend Lease Building***

principal:

project: ***FASS Enabling Works***

location: ***FASS Development, University of Sydney, Camperdown Campus***

position: Not Specified | surface elevation: 24.00 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E	24				**ASPHALT**: 0.02m.	D			**PAVEMENT**
			E					**FILL: Gravelly SAND** fine to coarse grained, brown, dark brown, gravel sized ballast and road base.				**FILL** PID: 7.1 ppm
			E									PID: 10.1 ppm
			E	23	1.0							PID: 9.2 ppm
							CH	**Silty CLAY**: high plasticity, red brown, pale grey, with visible minor rock structures.	<Wp	VSt / H		**RESIDUAL SOIL**
			E	22	2.0			**SHALE**: pale grey, red brown, extremely weathered, estimated very low strength.				**EXTREMELY WEATHERED BEDROCK** PID: 8.8 ppm
				21	3.0			becoming dark grey				
				20	4.0							
				19	5.0			Borehole BH12 terminated at 5.0 m Target depth				
				18	6.0							
				17	7.0							

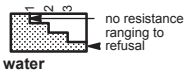
CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
- AD auger drilling*
- AS auger screwing*
- HA hand auger
- W washbore
- DT diatube
- HA hand auger

* bit shown by suffix
- e.g. AD/T
- B blank bit
- T TC bit
- V V bit

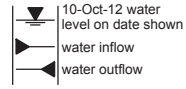
support
- M mud
- C casing
- N nil

penetration



no resistance ranging to refusal

water


10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH13**
sheet:	1 of 1
project no.	**GEOTLCOV25283AD**
client:	***University of Sydney c/o Lend Lease Building***
principal:	
project:	***FASS Enabling Works***
location:	***FASS Development, University of Sydney, Camperdown Campus***
date started:	***19 Jan 2016***
date completed:	***19 Jan 2016***
logged by:	***CL***
checked by:	***DS***

position: Not Specified | surface elevation: 25.40 m (AHD) | angle from horizontal: 90°

drill model: Commacchio 305, Track mounted | hole diameter : 100 mm

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T		Not Encountered	E	25	0.0			**ASPHALT**: 0.02m.	D			**PAVEMENT**
								FILL: Gravelly SAND medium to coarse grained, brown, dark brown, gravel sized shale, brick and plastic fragments.				**FILL**
												PID: 9.9 ppm
			E		0.5			with a trace of clay content				PID: 10.4 ppm
			E		1.0							PID: 7.1 ppm
				24			CH	**Silty CLAY**: high plasticity, pale grey, red brown.	<Wp	St / VSt		**RESIDUAL SOIL**
					1.5							
			E					**SHALE**: red brown, pale grey, extremely weathered, estimated very low strength.				**EXTREAMLY WEATHERED BEDROCK**
					2.0			Borehole BH13 terminated at 2.0 m Target depth				PID: 8.1 ppm
				23	2.5							
					3.0							
				22	3.5							

CDF_0_9_04BB.GLB Log COF BOREHOLE: NON CORED GEOTLCOV25283AD.GPJ <<DrawingFile>> 21/01/2016 17:05

method
AD auger drilling*
AS auger screwing*
HA hand auger
W washbore
DT diatube
HA hand auger

* bit shown by suffix
e.g. AD/T
B blank bit
T TC bit
V V bit

support
M mud
C casing
N nil

penetration
1 2 3
no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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Appendix B – Calibration Certificates

ThermoFisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Report – Solinst Model 122 Interface Meter

This Meter has been performance checked / calibrated* as follows:

Cleaned/Tested **Pass?** ☑ **Yes** ☐ **No**

☑ Probe

☑ Tape/Reel

☑ Performance Test & Battery Voltage Check (9.0 v) 8.0v minimum

Date: 15/01/2016 Checked by: [signature]

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
✓			Operations check OK
✓			Plastic Box / Bag
✓			Spare 9V Battery Qty 1
✓			Probe Cleaning Brush
X			Decon
✓			Instruction leaflet
✓			Tape Guide

Processors Signature/ Initials [signature]

Quote Reference	CS0040 16	Condition on return
Customer Ref		
Equipment ID	SOL122-43	
Equipment serial no.	250612	
Return Date	/ /	
Return Time		

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RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 7.00 / pH 4.00	7.00 pH	4.01 pH	N1770 / LJ1043	☑
Conductivity	12.88mS/cm	0.0 mS/cm	12.88 mS/cm	Nol 1598	☑
TDS	36 ppk	— ppk	— ppk	check only	☑
Dissolved Oxygen	Sodium Sulphite / Air	0.0 ppm in Sodium Sulphite	8.71 ppm Saturation in Air	102	☑
Check only		236			
Redox (ORP) *	Electrode operability test	~~240~~mV +/- 10%	234 mV	ND 1568 / ND 1569	☑

* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading.

☑ Battery Status 8.15 (min 7.2V)
☐ Electrical Safety Tag attached (AS/NZS 3760)

☑ Temperature 21.7 °C
☐ Electrodes Cleaned and checked

Tag No: 000396

Valid to: 12/04/2016

Date: 21/01/2016

Signed: Milenko

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	90FLMV Unit. Ops check/Battery status: 8.15
☑	☐	pH sensor with wetting cap, 5m
☑	☐	Conductivity/TDS/Temperature K=10 sensor, 5m
☑	☐	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
☑	☐	Redox (ORP) sensor with wetting cap, 5m
☑	☐	Power supply 240V to 12V DC 200mA
☑	☐	Instruction Manual
☑	☐	Quick Guide
☑	☐	Syringe with storage solution for pH and ORP sensors
☑	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)

Date: 21/01/2016

Signed: Milenko

TFS Reference	CS0040 16	Return Date:	/ /
Customer Reference		Return Time:	
Equipment ID	90FLMV SF	Condition on return:	
Equipment Serial No.	S1815		

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Appendix C – Groundwater Field Data Sheets

coffey environments

Well Gauging Form

PROJECT NAME: 4570

PROJECT NUMBER: GEOTECHNICAL 25283AR

FIELD PERSONNEL: AR SK

DATE: 22/1/16

PROJECT MANAGER:

FIELD EQUIPMENT:

Equipment Used: 11 meter. IP Serial Number: SOL-122-43

REFER TO SOPs WHEN GAUGING WELLS:

SOP - Monitoring Well Gauging and SOP – Decontamination of Sampling Equipment

Time of Day	Well ID	Well Diameter	Total Well Depth note 1	Depth to PSH (NAPL) [A]	Depth to Groundwater [B]	PSH Thickness [B-A]	Height of Well Stick-Up	COMMENTS (note 2) ODOUR, COLOUR, SHEEN, NAPL (and its colour), REMEDIATION SYSTEM, etc
		mm	m	mBTOC	mBTOC	mm	m	
830	BH2	50	2.96	–	2.64	–	CATIC	No odour., No sheen.
850	BH12	50	4.895	–	1.421	–	CATIC	// //
855	BH4	50	4.530	–	3.575	–	CATIC	// //

Notes: 1 Indicate in 'Comments' column if measured Total Well Depth differs from log. 2 Do not attempt to sniff the monitoring well to detect any odours, only note any apparent odour when the well cap is opened

coffey environments

Groundwater Sampling Form (A) - General

PROJECT NAME: USYD

PROJECT NUMBER: GEOTLCOV25283AD

FIELD PERSONNEL: AK

DATE: 22/01/2016

PROJECT MANAGER: SK.

WELL ID: B172

METER ID: 90FLMVSF

TOTAL WELL DEPTH: 2.96

SCREEN INTERVAL: —

EQUIPMENT USED: BAILER ☑ WATERRA ☐ OTHER _____

WELL DIAMETER: 50mm

WELL STICK-UP: CATIC.

WELL GAUGING AND PURGE VOLUME CALCULATIONS

(TOTAL WELL DEPTH) – (DEPTH TO WATER) = (WATER COLUMN)

2.96 m - 2.64 ≈ 0.5 m

Use water column calculation together with the procedures in 'SOP- Groundwater Sampling - Bailers' to determine the correct volume to be purged from the well (enter this value in the field to the right)

LITRES PER 1 WELL VOLUME

x3'6 _____ L

WELL HEADSPACE PID READING

PID READING

PPM: —

TIME OF DAY	CYCLE/ PUMP RATE (ml/min)	VOLUME (L)	DEPTH TO WATER (m)	DISSOLVED OXYGEN (mg/l)		ELECTRICAL CONDUCTIVITY (mS or µS/cm)		pH (pH units)		REDOX POTENTIAL (mV)		TEMPERATURE (°C)		CLARITY – tick one					COMMENTS
				READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE*	READING	CHANGE	Clear	Slightly Cloudy	Cloudy	Very Cloudy	Turbid	ODOUR, COLOUR, SEDIMENTS, PSH COLLECTED, etc
830	NA	0.5				Purged	0.5L	dry.							✓				brown, no odour, no sheen.
						not enough		volume				for							
						parameters		Sampled	upon										
							refill.												
STABILISATION CRITERIA (3 readings within following ranges)				± 10%		± 3%		± 0.1 unit		± 10mV		± 0.2°C							

DUPLICATE COLLECTED: Y ☐ N ☒ DUPLICATE ID: _____

TRIPLICATE COLLECTED: Y ☐ N ☑ TRIPLICATE ID: _____

WERE METALS FIELD FILTERED? Y ☒ N ☒ UNFILTERED SAMPLES MUST NOT BE PUT INTO A PRESERVED CONTAINER (IE. 'METALS' BOTTLE)