ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

UNIVERSITY OF TECHNOLOGY, SYDNEY

ON

STAGE 1 ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED BUILDING 02 BASEMENT EXTENSION

AT

UTS BROADWAY CAMPUS, THOMAS ST, ULTIMO NSW

JANUARY 2011 **REF: E24546Krpt**

Postal Address: PO Box 976, North Ryde BC NSW 1670
Tel: 02 9888 5000 • Fax: 9888 5004
EIS is a division of Jeffery and Katauskas Pty Ltd • ABN 17 003 550 801

EXECUTIVE SUMMARY

University Of Technology (UTS) commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake an Stage 1 environmental site assessment to assess the likelihood of contamination of the subsurface soils and groundwater for a proposed building B02 basement extension development at 638 Jones Street and 15 Broadway, Ultimo, NSW. The site is identified as Lot 2003 DP1053548 and part of Lot 2004 DP1053548.

The proposed development includes the extension of the existing basement to south-western corner of the alumni lawn within the UTS, Ultimo campus, Sydney. The development includes the excavation of an area approximately 70m by 33m down to a reduced level of -2.1m AHD (which relates to a maximum depth of the order of 17.4m below the existing surface levels).

The scope of work undertaken to achieve the objectives included: review of site history assessment previously undertaken by EIS in 2009; review of regional geology and groundwater conditions, including the location of registered groundwater bores in the vicinity of the site; design and implementation of a field sampling program; soil and groundwater sampling from accessible areas of the site as shown on Figure 2; laboratory analysis of selected soil and groundwater samples and preparation of a report presenting the results of the assessment together with recommendations on the suitability of the site for the proposed development.

Based on the site history assessment and site inspection the following potential contamination sources were identified:

- Potentially contaminated, imported fill material;
- Potential asbestos contamination associated with demolition of the former site buildings/sheds;
- Historical use of the site for commercial/industrial purposes; and
- Historical activities such as use of pesticides.

Soil samples were obtained from seven sampling locations for this investigation. This density is approximately 54% of the minimum sampling density recommended by the NSW EPA (now DECCW) for stage 2 Investigations. this sampling density was considered adequate for a stage 1 investigation.

The assessment included the installation of four groundwater monitoring wells in selected boreholes. The location of the groundwater monitoring wells is shown on Figure 2.

Summary of Soil Contamination:

All soil samples results were below the Site Assessment Criteria (SAC) and no asbestos was detected.

Waste Classification for Disposal of excavated soils:

Based on the results of the assessment, the fill material is classified as 'General Solid Waste (non-putrescible)' according to the criteria outlined in Waste Classification Guidelines 2009.

The natural silty clay and underlying shale/sandstone bedrock at the site is considered to be virgin excavated natural material (VENM). The material is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted.

Summary of Groundwater Contamination:

Four groundwater monitoring wells were installed during the investigation. The two shallow groundwater monitoring wells (MW201 and MW204A) remained effectively dry throughout the duration of investigation. The remaining two groundwater monitoring well (MW202 and MW204) encountered groundwater.

The groundwater sample obtained from MW202 encountered an elevated concentration of copper (2 μg/L) and the groundwater sample from MW204 encountered an elevated concentration of arsenic (29 μg/L) above the site assessment criteria. The results of the remaining analyses were below the site assessment criteria.

The arsenic and copper concentrations were considered to be the result of a regional groundwater conditions rather than a site specific issue due to the absence of significant elevations of these metals in the soil.

Suitability of the site for the Proposed Development:

Based on the scope of work undertaken for this assessment EIS consider that the site can be made suitable for the proposed development provided that the site is inspected by experienced environmental personnel during demolition and excavation works to assess any unexpected conditions or subsurface facilities that may be discovered between investigation locations. This should facilitate appropriate adjustment of the works programme and schedule in relation to the changed site conditions. EIS deem this precaution necessary due to the historical activities associated with the greater area.

The conclusions presented in this report have been made within the limitations of the scope of works undertaken for the investigation. The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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1 INTRODUCTION

University Of Technology Sydney (UTS) commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake an Stage 1 environmental site assessment to assess the likelihood of contamination of the subsurface soils and groundwater for a proposed building B02 basement extension development at 638 Jones Street and 15 Broadway, Ultimo, NSW.

The site is identified as Lot 2003 DP1053548 and Lot 2004 DP1053548 and at the time of this investigation was occupied by grassed, paved and landscaped areas with construction site amenities in the east section of the site. The site location is shown on Figure 1 and the investigation was confined to the proposed development area as shown on Figure 2.

The screening was undertaken generally in accordance with an J&K proposal (Ref: P33065SPcl1) of 4 November 2010 and EIS costs sheet2 emailed 9 November 2010. The investigation was commissioned by UTS in a Notice of Engagement Reference 02078/04B of 25 November 2010.

This report describes the investigation procedures and presents the results of the environmental site assessment, together with comments, discussion and recommendations.

A geotechnical investigation was undertaken in conjunction with the environmental site screening by J&K and the results are presented in a separate report (Ref. 24546SPrpt, dated 19 January, 2011).

1.1 Proposed Development Details

EIS understand that the proposed development includes the extension of the existing basement to the south west corner of the alumni lawn within the UTS, Ultimo campus, Sydney. The development includes excavation of an area approximately 70m by 33m to a reduced level of -2.1m AHD (which relates to a maximum depth of the order of 17.4m below the existing surface levels). This proposed excavation will extend; to the northern cut face of the existing Building 02 basement to the south; to within 3m of the Jones Street frontage to the west; to the modified basement access ramp to the east, and approximatley 24m from the Thomas Street frontage to the north.

The western portion of the basement will house a proposed Automated Storage and Retrieval System (ASRS), while in the eastern part of the basement there will be large

storage rooms as well as plant rooms and smaller storage and operational areas. In the proposed ASRS area, the basement will be extended deeper, to RL -5.0mAHD (about 20.2m depth); the eastern northern and western faces of this deeper excavation are coincident with the basement excavation above, while the southern face of this excavation will be set about 5m north of the northern face of the existing Building 02 basement excavation.

1.2 Previous Investigation Reports

J&K and EIS have previously undertaken geotechnical and environmental investigations for the wider UTS Broadway Precinct which include the subject site. The investigation reports and documents prepared by EIS and J&K are as follows:

- *Geotechnical Assessment for Concept Plan at University of Technology Sydney (UTS) Broadway*, Ref: 22549SPrptFinalRev1, dated 6 March 2009[1];
- *UTS Concept Plan Application: Environmental Assessment Comments on Draft Report*, *UTS Broadway Campus*, Ref: E22549Klet, dated 8 January 2009[2]; and
- *Report to University of Technology*, *Sydney on Stage 1 Environmental Site Assessment for Concept Plan – University of Technology Sydney (UTS) Broadway at UTS Broadway Precinct*, *13*, *15 & 83 Broadway; 235 & 638 Jones Street and 718 Harris Street*, *Ultimo*, *NSW*, Ref: E22549Krpt-Final4, dated May 2009[3].

The EIS 2009 report included a site history assessment for the wider UTS Broadway Precinct which included the subject site. Relevant information pertaining to the subject site has been included in this report. This report should be read in conjunction with the EIS 2009 report.

[1] *Geotechnical Assessment for Concept Plan at University of Technology Sydney (UTS) Broadway*, J&K, March 2009 (J&K 2009)

[2] *UTS Concept Plan Application: Environmental Assessment Comments on Draft Report*, *UTS Broadway Campus*, EIS, January 2009 (EIS Letter 2009)

[3] *Stage 1 Environmental Site Assessment for Concept Plan – University of Technology Sydney (UTS) Broadway at UTS Broadway Precinct*, *13*, *15 & 83 Broadway; 235 & 638 Jones Street and 718 Harris Street*, *Ultimo*, *NSW*, EIS, May 2009 (EIS 2009)

2 OBJECTIVES AND SCOPE OF WORK

2.1 Objectives

The primary objectives of the investigation were to:

- Assess the soil and groundwater contamination conditions at the site in relation to the proposed development;
- Undertake a waste classification assessment for off-site disposal of excavated soil associated with the proposed development works; and
- Prepare a report presenting the results of the investigation generally in accordance with the *NSW EPA (now DECCW) Guidelines for Consultants Reporting on Contaminated Sites (1997[4])* and *State Environmental Planning Policy No.55 – Remediation of Land (1998[5])*.

2.2 Scope of Work

The scope of work undertaken to achieve the objectives included:

1. Review of site history assessment previously undertaken by EIS in 2009;
2. Review of regional geology and groundwater conditions, including the location of registered groundwater bores in the vicinity of the site;
3. Design and implementation of a field sampling program;
4. Soil and groundwater sampling from accessible areas of the site as shown on Figure 2;
5. Laboratory analysis of selected soil and groundwater samples; and
6. Preparation of a report presenting the results of the assessment together with recommendations on the suitability of the site for the proposed development.

Field work for this investigation was undertaken on the following dates:

- Drilling, soil sampling and installation of the groundwater monitoring wells was undertaking on 6 – 10 December 2010, 13 – 15 December 2010, 17 December and 21 December 2010;
- The groundwater monitoring wells were developed on 14 December 2010; and
- Groundwater samples were obtained from the monitoring wells on 20 December 2010.

[4] *Guidelines for Consultants Reporting on Contaminated Sites*, NSW EPA (now DECCW), 1997 (Reporting Guidelines 1997)

[5] *State Environmental Planning Policy No. 55 – Remediation of Land*, NSW Government, 1998 (SEPP55)

3 SITE INFORMATION

3.1 Site Identification

The site identification details are summarised in the following table:

Site Owner:	University Of Technology
Site Address:	638 Jones Street, Ultimo, NSW & part of 15 Broadway, Ultimo, NSW
Lot & Deposited Plan:	Lot 2003 DP1053548 & part of Lot 2004 DP1053548
Local Government Authority:	City of Sydney
Current Zoning:	Residential - Business
Proposed Development Area:	Approximately 4,750m^2
AHD:	Approximately 14.9m
Geographical Location (MGA):	N:6249330 E:333590 (approximately)
Site Locality Plan:	Refer to Figure 1
Borehole Location Plan:	Refer to Figure 2

3.2 Site Description

The site is located in the north west section of the existing UTS facility, Ultimo. The site is accessed via Jones and Thomas Streets. The site is referred to as the Alumni lawn.

The site was bounded by Jones Street to the west and by Thomas Street to the north, beyond which were existing UTS buildings. The site was bound by the multi-purpose sports hall to the east and landscaped areas to the south, beyond which were more UTS buildings.

The site is located in an area of slightly undulating topography, near the broad crest of a hill. The local high point is approximately at the southern side of the site, with the land sloping generally to the north and north west at about 1° to 2°.

Jones Street was to the south-west of the site, with the ground levels being similar across this boundary. Thomas Street is to the north-west, and ground levels within the site are about 0.2m to 0.5m higher than the adjacent footpath, retained by a low height retaining wall.

At the time of the investigation, the majority of the site was covered with lawn, footpaths and planter beds. A car park access ramp linking Thomas Street to the

underground car park beneath UTS was located on a north west to south east axis through the middle of the site. The north east part of the site was occupied by a construction site compound (Lipman Constructions) for the new multi-purpose sports hall being constructed to the east of the site. A footpath running along the south east section of the site, adjacent to the construction compound, sloped down towards the north east at approximatley 2˚ to 3˚.

The car-park access ramp in the centre of the site sloped up slightly to the south east (at an angle of about 1˚ to 2˚), before sloping down to the south east at about 15˚. The ramp appeared to provide vehicle access to the basements of Buildings 01 and 02 to the south east of the site. Located either side of the access ramp was a concrete crib retaining wall ranging from approximately 0m to 7m in height, with the highest section of the retaining was located in the south east section of the site. A footbridge, constructed over the deeper part of the driveway cut connected the east and west sections of the site.

Between the proposed basement extension and multi-purpose sports hall to the east was a second car-park access ramp off Thomas Street. This access ramp appeared to slope down to the south east at about 15˚ to the basement of Building 01. This access ramp was approximately 0.5m to 5.5m lower than the adjacent site area.

3.3 Regional Geology

The geological map of Sydney (1983[6]) indicates the site to be underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.4 Hydrogeology

NSW Office of Water (formerly Department of Water and Energy[7]) records were researched for the investigation and indicated that 10 registered groundwater bores lie within 1km of the site. The groundwater works summaries and a map indicating the location of the bores in relation to the site are attached in Appendix C. The details are summarised in the following table:

[6] *1:100,000 Geological Map of Sydney (Series 9130)*, Department of Mineral Resources (1983) [now Department of Primary Industries]

[7] http://www.waterinfo.nsw.gov.au/gw/ visited on January 2011

Ref No	Approx. distance from site(m)	Approx. direction from site	Depth (m)	Registered Purpose
GW109501	50	South	6.0	Monitoring Bore
GW109502	100	South	6.4	Monitoring Bore
GW109503	150	South	5.2	Monitoring Bore
GW109500	170	South-East	4.8	Monitoring Bore
GW071907	800	South-East	6.5	Test Bore
GW102476	720	East-south-east	4.0	Monitoring Bore
GW200690	800	East	6.0	Domestic
GW109238	880	East	7.5	Monitoring Bore
GW109240	900	East	7.5	Monitoring Bore
GW109239	930	East	7.45	Monitoring Bore

The stratigraphy of the site is expected to consist of residual clayey soils overlying relatively shallow bedrock. Based on these conditions groundwater is not considered to be a significant resource in the immediate vicinity of the site.

4 SUMMARY OF PREVIOUS INVESTIGATIONS

4.1 Reports By Others

The following environmental reports/letters have been sighted by EIS:

- Noel Arnold & Associates Report "Destructive Hazardous Material Survey Report Version 2 University of Technology Sydney for UTS Building 7 at 638 Jones Street, Ultimo NSW" (Ref: SU0004: 60644 dated October 2007);
- Noel Arnold & Associates Report "Preliminary Environmental Site Assessment with Soil Sampling Version 2 University of Technology Sydney for UTS Building 7 at 638 Jones Street, Ultimo NSW" (Ref: SU0004: 60712 dated December 2007); and
- Cardinal Project Services Letter "Letter to University of Technology, Sydney regarding Fill Materials at Former Building T Site, corner of Jones and Thomas Streets, Ultimo" dated 6 May 2008.

The Noel Arnold & Associates Report (2007) describes the Hazardous Building Assessment for Building 7 (EIS understand that Building 7 was formerly known as Building T when owned by TAFE NSW). The investigation found asbestos, synthetic mineral fibre, polychlorinated biphenyls (PCBs), lead paint and residual chemicals throughout Building 7.

The Noel Arnold & Associates Report (2008) describes the Preliminary Environmental Site Assessment with Soil Sampling undertaken by Noel Arnold & Associates in October and November 2007. The investigation involved drilling and sampling from eleven boreholes. The report concluded that the area investigated was suitable for the proposed development. In addition, the report recommended:

- Further sampling if any soil is found that is considered malodorous, displays staining or contains buried building materials; and
- All fill material imported onto the site has been validated in accordance with NSW DECC guidelines to guarantee it is not contaminated.

The Cardinal Project Services Letter describes the Virgin Excavated Natural Material (VENM) classifications for the material used to backfill the Former Building T Site to the current levels. The VENM was sourced from three different sites: 3-9 Gilles Street, Wollstonecraft; 1-3 Onslow Avenue, Elizabeth Bay; and 20-24 Alfred Street, Milsons Point. Two of the VENM classifications (Wollstonecraft and Elizabeth Bay) were prepared by Aargus, based on a visual assessment only. The Milsons Point VENM classification undertaken by Douglas Partners dated May 2007 included chemical testing of the fill and bedrock at the site.

4.2 Stage 1 Environmental Site Assessment (EIS 2009)

The Stage 1 environmental site assessment undertaken by EIS in 2009 consisted of a desktop study designed to assess the likelihood of contamination of the subsurface soils for the proposed Concept Plan. The Concept Plan included the following sites: 15 & 83 Broadway; 235 & 638 Jones Street; and 718 Harris Street, Ultimo, NSW (referred to as the Concept Plan Area – CPA).

The concept plan involves the construction, extension, refurbishment or demolition of certain buildings on the Broadway Precinct of the UTS City Campus to enable the University to provide an additional 84,750 m^2 of gross floor area of education, social and sporting facilities for use by existing and future students and the local community. The proposal will also enhance existing open space and improve pedestrian, bicycle and vehicular access into the Campus.

The scope of works for the Stage 1 assessment included an inspection of the CPA, review of historical CPA uses, including examination of regional aerial photographs and review of geology and groundwater conditions. Soil sampling was not undertaken for the Stage 1 assessment.

Historical information and inspection of the CPA and surrounding areas indicated a number of activities that could be expected to generate significant contamination. These include:

- Use of fill of unknown origin and composition to attain the CPA levels;
- Records that indicate the existence of a number of historical licences for USTs in the central and west sections of the CPA. Although some of these have been removed a number of decommissioned tanks may still be in place; and
- Potentially contaminating historical site uses including dry cleaners and newspaper production.

Based on the scope of works undertaken, the report recommended undertaking a Stage 2 environmental assessment. The report also recommended undertaking a Hazardous Building Material Survey of buildings prior to demolition or refurbishment.

5 SUMMARY OF SITE HISTORY ASSESSMENT

A detailed site history assessment of the CPA was undertaken by EIS for the Stage 1 2009 investigation. The assessment included the following:

- Review of historical aerial photographs;
- Review of historical land title records;
- Search of the NSW DECCW notices for the CPA under Section 58 of the *Contaminated Land Management Act* (1997[8])[9];
- Search of the NSW DECCW public register (POEO[10]) for licences, applications or notices for the CPA;
- Search of WorkCover databases for licenses to store dangerous goods including underground fuel storage tanks (USTs); and
- Review of City of Sydney Council historical development applications (DA) and building approvals (BA) records for the CPA.

The search of historical information for the wider CPA which included the subject site (Lot 2003 in DP1053548, and part of Lot 2004 in DP1053548) indicated the following:

- The historical land titles indicated the following potential land uses:
  - Mid 1970s to present, University (with commercial leases) (all lots);
  - Early 1980s to early 1990s, Different Companies (Lot 1 DP218673, Lot 1 in DP55460, and Lot 1 in DP89492);
  - Early 1970s to mid 1990s, Fairfax Group (Newspaper Company) (Lot 1 DP218673, Lot 1 in DP55460, and Lot 1 in DP89492);
  - Mid 1970s to mid 1920s, Different leases [Lollies maker (Lot 1 in DP 554602), shops (Lot 1 in DP 554602), hotel (Lot 1 in DP 554602), brewer (Lot 1 in DP 554602), wood making (Lot 1 in DP 554602), shipping providore (Lot 1 in DP 554602), butcher (Lot 1 in DP 554602), jeweller (Lot 1 in DP 554602), and a stove manufacture (Lot 1 in DP 554602)];
  - Early 1950s to mid 1960s, FC Lovelock (refrigeration whole sales) Lot 2004 in DP 1053548;
  - Early 1950s to early 1940s, Restaurateurs / confectioner manufacturer (Part of Lot 2004 in DP 1053548);
  - Late 1940s to mid 1950s, Dry Cleaners (Lot 1 DP218673, Lot 1 in DP55460, and Lot 1 in DP89492);
  - Early 1930s to late 1960s, Publicans (Part of Lot 2004 in DP 1053548);

[8] *Contaminated Land Management Act*, NSW Government Legislation, 1997 (CLM Act 1997)
[9] http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx visited on May 2009
[10] http://www.environment.nsw.gov.au/prpoeoapp/searchregister.aspx visited on May 2009

  - Late 1920s to mid 1930s, farm/dairy companies (Part of Lot 2004 in DP 1053548);
  - Mid to late 1920s to mid to late 1930s, steel manufacturer (Lot 1 in DP 218673);
  - Late 1920s to mid 1930s, Sewing Machine merchants (Lot 2004 in DP 1053548);
  - Mid 1920s to mid 1930s, Caldwells Wines Ltd (part of Lot 2004 DP 1053548);
  - Mid 1900s to late 1980s, Sydney Cold Stores Limited (Lot 11 in DP 835246); and
  - Early 1900s to late 1930s, Oil and coke man (Lot 1 DP 554602).
- The historical aerial photographs indicated that the wider CPA was occupied by a number of industrial/commercial building from pre 1930s to early 1960s with possibly residential building in the north-east of the site. After the early 1960s no residential buildings were apparent. By the late 1970s the CPA use appeared to be associated with the University;
- There were no recorded notices listed on the NSW DECC CLM register issued for the CPA;
- The WorkCover records indicate that USTs were present in the west and east sections of the CPA. WorkCover correspondence indicates that some of these USTs were removed and some have been abandoned. However, some of the correspondence is incomplete and there is a degree of uncertainty regarding the number and locations of tanks remaining within the CPA. The WorkCover data also records the presence of a number of above ground solvent stores/ cabinets in the CPA; and
- A letter from Cardinal Building Services includes VENM classifications for three sources of material used to backfill the area of former Building T (Subject site). Only fill material from one of the source site was subjected to chemical testing.

6 POTENTIAL CONTAMINATION SOURCES

6.1 Potential Site Specific Contamination

Potential contamination at the site would be anticipated to be associated with:

- Potentially contaminated, imported fill material;
- Potential asbestos contamination associated with demolition of the former site buildings/sheds;
- Historical use of the site for commercial/industrial purposes; and
- Historical activities such as use of pesticides.

6.1.1 Site Specific Soil Contaminants of Concern

The compounds identified as soil contaminants of concern at the site include:

- Heavy metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Total petroleum hydrocarbons (TPH);
- Volatile Organic Compounds (VOCs);
- Monocyclic aromatic hydrocarbon compounds: benzene, toluene, ethyl benzene and xylenes (BTEX);
- Polycyclic aromatic hydrocarbons (PAHs) including benzo(a)pyrene;
- Organochlorine pesticides (OCPs) including Aldrin, dieldrin, chlordane, DDT, DDD, DDE and heptachlor;
- Organophosphorous pesticides (OPPs);
- Polychlorinated Biphenyls (PCBs); and
- Asbestos.

6.1.2 Site Specific Groundwater Contaminants of Concern

The compounds identified as soil contaminants of concern at the site include:

- Heavy metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- TPH/BTEX;
- VOCs; and
- Oil and Grease.

6.2 Potential Receptors

The main potential contamination receptors are considered to include:

- Blackwattle Bay located approximately 1.23km to the north west of the site;
- Site visitors, workers and adjacent property owners, who may come into contact with contaminated soil and/or be exposed to contaminated dust arising from construction activity; and
- Future site occupants.

6.3 Contaminant Laydown and Transport Mechanisms

At this site, mobile contaminants would be expected to move down to the rock surface and migrate laterally down-slope from the source. The movement of contaminants would be expected to be associated with groundwater flow and seepage at the top of the bedrock.

7 ASSESSMENT CRITERIA DEVELOPMENT

7.1 Regulatory Background

In 1997 the NSW Government introduced the CLM Act. This Act has recently been amended by the *Contaminated Land Management Amendment Act* (2008[11]).

The CLM Act 1997, associated regulations, SEPP55 and NSW DECCW (EPA) guidelines, were designed to provide uniform state-wide control of the management, investigation and remediation of contaminated land.

Prior to granting consent for any proposed rezoning or development, SEPP55 requires the consent authority to:

- Consider whether the land is contaminated;
- Consider whether the site is suitable, or if contaminated, can be made suitable by remediation, for the proposed land use; and
- Be satisfied that remediation works will be undertaken prior to use of the site for the proposed use.

Should the assessment indicate that the site poses a risk to human health or the environment, remediation of the site may be required prior to occupation of the proposed development. SEPP55 requires that the relevant local council be notified of all remediation works, whether or not development consent is required. Where development consent is not required, 30 days written notice of the proposed works must be provided to council. Details of validation of remediation work must also be submitted to Council within one month of completion of remediation works.

The consent authority may request that a site audit be undertaken during, or following the completion of the site assessment process. Under the terms of the CLM Act 1997 the NSW DECCW (EPA) Site Auditor Scheme was developed to provide a system of independent review for assessment reports. An accredited Contaminated Site Auditor is engaged to review reports prepared by suitably qualified consultants to ensure that the investigation has been undertaken in accordance with the guidelines and confirm that the sites are suitable for their intended use.

Section 59(2) of the CLM Act 1997 states that specific notation relating to contaminated land issues must be included on Section149 (s149) planning certificates prepared by Council where the land to which the certificate relates is:

[11] *Contaminated Land Management Amendment Act*, NSW Government Legislation, 2008 (CLM Amendment Act 2008)

- Within an investigation or remediation area;
- Subject to an investigation or remediation order by the DECCW (EPA);
- The subject of a voluntary investigation or remediation proposal; and/or
- The subject of a site audit statement.

Submission of contaminated site investigation and validation reports to council as part of rezoning or development application submissions may also result in notation of actual or potential site contamination on future s149 certificates prepared for the site.

Section 60 of the CLM Amendment Act 2008 sets out a positive duty on a land owner, or person whose activities have caused contamination, to notify the DECCW if they are or become aware that contamination exists on a site that generally poses *"an unacceptable risk to human health or the environment, given the site's current or approved use"*. This duty to report is based on trigger values, above which notification is required.

Off-site disposal of fill, contaminated material and excess soil/rock excavated as part of the proposed development works is regulated by the provisions of the *Protection of the Environment Operations Act* (1997[12]) and associated regulations and guidelines including the *NSW DECC (now DECCW) Waste Classification Guidelines - Part 1: Classifying Waste* (2009[13]). All materials should be classified in accordance with these guidelines prior to disposal.

Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.

7.2 Soil Contaminant Threshold Concentrations

The soil investigation levels adopted for this investigation are derived from the NSW DEC (now DECCW) document *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (2006[14]) and the National Environmental Protection Council document *National Environmental Protection (Assessment of Site Contamination) Measure* (1999[15]). The contaminant thresholds listed below are levels at which further investigation and

[12] *Protection of Environment Operations Act*, NSW Government, 1997 (POEO Act 1997)

[13] *Waste Classification Guidelines, Part 1: Classifying Waste*, NSW DECC, 2009 (Waste Classification Guidelines 2009)

[14] *Guidelines for the NSW Site Auditor Scheme, 2nd ed.*, NSW DEC, 2006 (Site Auditor Guidelines 2006)

[15] *National Environmental Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council (NEPC), 1999 (NEPM 1999)

evaluation is required to assess whether the site is considered suitable for the proposed urban land use.

To accommodate the range of human and ecological exposure settings, a number of generic settings are used on which the Health based Investigation Levels (HILs) can be based. Four categories of HILs are adopted for urban site assessments. Contaminant levels for a standard residential site with gardens and accessible soil (Column A) are based on protection of a young child resident at the site. The remaining categories (Columns D to F) present alternative exposure settings where there is reduced access to soil or reduced exposure time. These categories include residential land use with limited soil access, recreational and public open space and commercial/industrial use. Where the proposed land use will include more than one land use category (eg. mixed residential/commercial development) the exposure setting of the most "sensitive" land use is adopted for the site.

Threshold concentrations for petroleum hydrocarbon contaminants including total TPH and BTEX compounds have previously been established in the *NSW EPA (now DECCW) Contaminated Sites: Guidelines for Assessing Service Station Sites* (1994[16]) publication and this document is referenced in the Site Auditor Guidelines 2006. Heavy fraction petroleum hydrocarbon aliphatic/aromatic component threshold concentrations have also been introduced in NEPM 1999.

Soil samples for this investigation have been analysed for total recoverable hydrocarbons (TRH) rather than TPH. TRH analysis is undertaken without a preliminary silica gel clean-up of the sample. Consequently the TRH result may include other compounds such as phthalates, humic acids, fatty acids and sterols (if present). For comparative purposes in relation to the threshold concentrations, we have referred to TRH as TPH within this report.

7.2.1 Asbestos in Soil

NEPM 1999 does not provide numeric guidelines for the assessment of asbestos in soil. NSW DECCW (EPA) advice (2006) has indicated that consultants should use their 'professional judgement' regarding determination of appropriate investigation and remediation levels for asbestos in soils; however the NSW DECCW (EPA) have not published numerical guidelines for the assessment of asbestos in subsurface soils.

[16] *Guidelines for Assessing Service Station Sites*, NSW EPA, 1994 (Service Station Guidelines 1994)

The WorkCover publication *Working with Asbestos Guide* (2008[17]) states that, where buried asbestos is encountered, "A competent occupational hygienist should assess the site to determine:

- If asbestos material is bonded or friable
- The extent of asbestos contamination
- Safe work procedures for the remediation of the site"

"*Any asbestos cement products that have been subjected to weathering, or damaged by hail, fire or water blasting are considered to be friable asbestos and an asbestos removal contractor with a WorkCover license for friable asbestos removal is required for its removal*". Under the *NSW Occupational Health and Safety (OHS) Regulations 2001*[18] and WorkCover requirements all necessary disturbance works associated with friable asbestos containing materials must be conducted by a licensed AS-1 Asbestos Removal Contractor.

7.2.2 Site Assessment Criteria (SAC) for Soil Contaminants

The 'commercial/industrial' (Column F) exposure setting has been adopted for this assessment and the appropriate soil criteria are listed in the following table:

[17] *Working with Asbestos Guide*, NSW WorkCover, 2008 (WorkCover Working with Asbestos Guide 2008)
[18] *Occupational Health and Safety Regulation*, NSW Government, 2001 (NSW OH&S Regulation 2001)

Contaminant	SAC - HILs Column F (mg/kg)
Heavy Metals	
Arsenic (total)	500
Cadmium	100
Chromium (III)	60%
Copper	5000
Lead	1500
Mercury (inorganic)	75
Nickel	3000
Zinc	35000
Petroleum Hydrocarbons	
TPH (C_6-C_9)	65 [a]
TPH (C_{10}-C_{36})	1000 [a]
Benzene	1 [a]
Toluene	1.4 [a]
Ethylbenzene	3.1 [a]
Total Xylenes	14 [a]
PAHs	
Total PAHs	100
Benzo(a)pyrene	5
Pesticides (OCPs & OPPs)	
Aldrin + Dieldrin	50
Chlordane	250
DDT + DDD + DDE	1000
Heptachlor	50
Total OPPs	0.1[b]
Others	
PCBs (Total)	50
Asbestos	NDLR [c]
VOCs[d]	NDLR

Note:

[a] Service Station Guidelines 1994

[b] Due to the absence of locally endorsed guideline criteria, the laboratory practical quantitation limit (PQL) has been adopted.

[c] Not Detected at Limit of Reporting (NDLR)

[d] The site assessment criteria for VOCs in soil (apart from BTEX compounds) will be the limit of reporting (also known as the Practical Quantitation Limit).

7.2.3 Waste Classification Assessment Criteria

For the purpose of off-site disposal, the classification of soil into 'General Solid Waste (non-putrescible)', 'Restricted Solid Waste (non-putrescible)' and 'Hazardous Waste (non-putrescible)' categories is defined by chemical contaminant criteria outlined in the Waste Classification Guidelines 2009. The contaminant criteria are summarised in Table A-2.

7.3 Evaluation of Soil Analysis Data and Contaminant Threshold Concentrations

Assessment of the soil analytical data using the soil contaminant threshold concentrations has been undertaken in accordance with the methodology outlined in the NEPM 1999 Schedule 7(a).

The following criteria have been adopted for assessment of the analytical data:

- For a site to be considered suitable for the proposed land use each individual contaminant concentration should be less than the SAC; and
- Where the concentration of each contaminant is less than the SAC in all samples, the suitability of the site for the proposed use may be assessed based solely on individual analytical results.

Where contamination results exceed the SAC, a method of remediating the site is to physically and selectively remove the contamination hotspots from the site. This process should be continued until statistical analysis of the data meets the SAC. Validation of the remediated site is generally required to demonstrate that the site is suitable for the proposed land use.

7.4 Groundwater Contaminant Trigger Values

Groundwater resources in NSW are managed and regulated by environmental and planning legislation which including the POEO Act 1997, *Environmental Planning and Assessment Act* (1979[19]) and the *Water Management Act* (2000[20]).

In 2000, Australian and New Zealand Environment Conservation Council (ANZECC) released the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2000[21]) which superseded the previous guideline documents.

[19] *Environmental Planning and Assessment Act*, NSW Government, 1979 (EP&AA 1979)

[20] *Water Management Act*, NSW Government, 2000 (Water Act 2000)

[21] *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC, 2000 (ANZECC 2000)

The ANZECC 2000 guidelines include a complete framework for the development of appropriate guidelines for aquifer assessment. The above guidelines provide water quality parameters at the point of use including aquatic ecosystems (fresh and marine waters), drinking water, industrial and agricultural/irrigation uses.

The National Health and Medical Research Council (NHMRC) released the *Australian Drinking Water Guidelines* (2004[22]). These guidelines are predominantly used to assess drinking water quality and have been referenced in some cases.

The appropriate settings for current and potential uses of groundwater should be identified in establishing applicable groundwater trigger values:

- raw drinking water source;
- agricultural use – stock watering;
- agricultural and domestic use – irrigation;
- protection of aquatic ecosystems – freshwater; and
- protection of aquatic ecosystems – marine.

The presence of elevated contaminant concentrations in groundwater triggers further investigation of aquifer conditions to assess the source(s) of contamination and the lateral and vertical extent of the contamination.

Guidance on the remediation and management of contaminated groundwater is presented in the document *NSW DECCW (EPA) Guidelines for the Assessment and Management of Groundwater Contamination (2007[23])*.

There are no published Australian guideline concentrations for a number of volatile organic compounds. EIS have adopted the Practical Quantitation Limits (PQL) of the analytical technique as the site assessment criteria for these compounds. In the event that there are detectable concentrations for these compounds in any of the samples reference will be made to international guidelines for appropriate site assessment criteria.

[22] *Australian Drinking Water Guidelines*, National Health and Medical Research Council, 2004 (NHMRC 2004)

[23] *Guidelines for the Assessment and Management of Groundwater Contamination*, NSW DECCW, 2007 (Groundwater Contamination Guidelines 2007)

7.4.1 Petroleum Hydrocarbons in Groundwater

In the absence of locally endorsed guidelines for petroleum hydrocarbon compounds in water, the 'intervention value' concentration for mineral oil specified in the *Circular on Target Values and Intervention Values for Soil Remediation* (2000[24]) has been adopted.

It is noted that these guidelines have not been endorsed by NSW DECCW (EPA) and are used only as a preliminary screening tool.

7.4.2 Site Assessment Criteria (SAC) for Groundwater Contaminants

The marine groundwater trigger values have been adopted along with other guideline values for this investigation as outlined in the table:

[24] *Circular on Target Values and Intervention Values for Soil Remediation*, Ministry of Housing, Spatial Planning and Environment, 2000 (Dutch Guidelines 2000)

Contaminant	Units	Marine Water Criteria [1]	Drinking Water Criteria [2]
Metals			
Arsenic	µg/L	2.3	7
Cadmium	µg/L	5.5	2
Chromium (III)	µg/L	10 [a]	50
Chromium (VI)	µg/L	4.4	-
Copper	µg/L	1.3	2000
Lead	µg/L	4.4	10
Mercury	µg/L	0.4	1
Nickel	µg/L	70	20
Zinc	µg/L	15	3000
Petroleum Hydrocarbons			
TPH C_{10}-C_{36}	µg/L	600 [d]	-
Benzene	µg/L	700	1
Toluene	µg/L	180 [a]	800
Ethylbenzene	µg/L	5 [a]	300
o-Xylene	µg/L	350 [a]	-
m + p Xylene	µg/L	30 [a]	-
Total Xylenes	µg/L	-	600
PAHs			
Naphthalene	µg/L	70	-
Anthracene	µg/L	0.4 [a]	-
Phenanthrene	µg/L	2 [a]	-
Fluoranthene	µg/L	1.4 [a]	-
Benzo(a)pyrene	µg/L	0.2 [a]	0.01
VOCs [e]			
Chloroform	µg/L	370	-
Others			
Oil and grease	mg/L	10 [b]	-
pH	-	7 - 8.5	6.5 - 8.5
EC	mg/L	-	-

Notes:

[1] 95% Trigger Values for Marine Water (ANZECC 2000)

[2] Australian Drinking Water Guidelines (NHMRC 2004)

[3] Due to the absence of locally endorsed criteria, the USEPA Region 9 PRGs for Tap water have been adopted

[a] Moderate or Low Reliability Trigger Values (ANZECC 2000)

[b] Concentration at which oil and grease typically become visible, Service Station Guidelines (1994)

[c] Aesthetic Trigger Values (ANZECC 2000)

[d] Due to the absence of locally endorsed criteria, the Dutch Guidelines 2000 have been adopted

[e] Site Assessment criteria only shown for VOCs detected.

8 ASSESSMENT PLAN

8.1 Soil Sampling Density

The EPA Sampling Design Guidelines 1995 for contaminated site investigations state that samples should be obtained from a minimum of thirteen evenly spaced sampling points for a site of this size (approximately 4,750m^2).

Samples were obtained from seven sampling locations for this investigation. This density is approximately 54% of the minimum sampling density for a stage 2 investigation, and was considered adequate for a preliminary screening.

The boreholes were drilled on a judgemental sampling plan with a spacing of up to 20m between sampling points. A judgemental sampling plan was considered most appropriate for this investigation as the location of deep imported potentially contaminated fill material were noted in certain sections of the site and was believed to be associated with the demolition of a previous building. A number of additional boreholes were drilled across the site as part of the geotechnical investigation.

8.2 Groundwater Sampling

The assessment included the installation of four groundwater monitoring wells in selected boreholes. The location of the groundwater monitoring wells is shown on Figure 2.

8.3 Data Quality Objectives (DQOs)

The DQOs for the assessment were developed with reference to the US EPA document *Data Quality Objectives Process for Hazardous Waste Site Investigations* (2000[25]). The document includes seven steps as follows:

1. State the problem
2. Identify the decision
3. Identify inputs into the decision
4. Study Boundaries
5. Develop a Decision Rule
6. Specify Limits on Decision Errors
7. Optimise the Design for Obtaining data

[25] *Data Quality Objectives Process for Hazardous Waste Site Investigations*, US EPA, *2000* (US EPA 2000)

Field investigations are undertaken generally in accordance with EIS sampling protocols outlined in Appendix D.

8.4 Data Quality Indicators (DQIs) and Quality Assurance

The validation, as part of the DQOs, involves the technical review of the data using defined QA Assessment Criteria. The success of the DQIs is based on assessment of the data set as a whole and not on individual acceptance or exceedance within the data set.

Review of QA criteria was based on laboratory data including surrogate recovery, repeat analysis, duplicates, matrix spikes and method blanks.

Field QA/QC included collection and analysis of the following for the contaminants of concern:

- approximately 14% of field soil samples as inter-laboratory duplicates;
- approximately 14% of field soil samples as intra-laboratory duplicates;
- field blank samples, rinsate samples of field equipment, and
- water trip spike sample.

Success of field DQIs is based on the following criteria:

- Relative percentage differences (RPDs) were calculated for the inter-laboratory and intra-laboratory duplicates. The RPD was calculated as the absolute value of the difference between the initial and repeat result divided by the average value, expressed as a percentage. The following acceptance criteria were used to assess the RPD results:
  - For results that were greater than 10 times the Practical Quantitation Limit (PQL) RPDs less than 50% were considered acceptable.
  - For results that were between 5 and 10 times PQL RPDs less than 75% were considered acceptable.
  - For results that were less than 5 times the PQL RPDs less than 100% were considered acceptable.
- Acceptable concentrations in blank samples.

9 INVESTIGATION PROCEDURE

9.1 Soil Sampling Methods

Subsurface investigation was undertaken using a track mounted hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler.

The SPT sampler was washed with phosphate free detergent and rinsed following each sampling event. The spiral flight augers were decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Details of the decontamination procedure adopted during sampling are presented in Appendix D.

Soil and rock samples were obtained at various depths, based on observations made during the field investigation. During sampling, soil at selected depths was split into initial and duplicate samples for QA/QC assessment.

All samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities.

During the investigation, soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS 4482.1-2005[26] and AS 4482.2-1999[27] as summarised in the following table:

Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4°, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals).
VOCs (TPH/BTEX)		Store at <4°, nil headspace, extract within 14 days, analysis within forty days
PAHs, OCP, OPP & PCBs		
Asbestos	Sealed plastic bag	None

[26] *Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil*, Standards Australia, 2005 (AS 2005)

[27] *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part2: Volatile Substances*, Standards Australia, 1999 (AS 1999)

The samples were labelled with the job number, sampling location, sampling depth and date. All samples were recorded on the borehole logs presented in Appendix A and on the laboratory chain of custody (COC) record presented in Appendix B.

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures. Detailed EIS field sampling protocols are included in Appendix D.

9.2 Photoionisation Detector (PID) Screening

A portable PID was used in this investigation to assist with selection of samples for laboratory hydrocarbon (TPH/BTEX) analysis.

The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source.

The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

PID screening of detectable volatile organic compounds (VOCs) was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. The PID headspace data is presented on the COC documents and borehole logs. PID calibration records are presented in Appendix E.

9.3 Groundwater Monitoring Well Installation

Four monitoring wells were installed in boreholes BH201, BH202, BH204A and BH204B as shown on Figure 2. The monitoring well construction details are documented on appropriate borehole logs presented in Appendix A.

The well construction details are summarised in the following table:

Borehole No.	Final Depth (m)	Surface R.L[3] (m)	Un-slotted PVC[1] Casing (m)	Machine Slotted PVC[1] Screen (m)	Sand Filter Pack (m)	Bentonite Seal (m)	Well Finishing Details[2]
BH201	4.0	14.38	0-0.3	0.3-4.0	0.3-4.0	0-0.3	Gatic cover
BH202	23.20	14.86	0-5.5	5.5-23.2	5.5-23.2	0-5.0	Gatic cover
BH204	20.85	15.22	0-5.0	5.0-20.85	5.0-20.85	0-5.0	Gatic cover
BH204A	4.05	15.23	0-0.3	0.3-4.05	0.3-4.05	0-0.3	Gatic cover

Notes:

[1] 50mm diameter Class 18 PVC has been used for the wells

[2] Concrete grout was used to seal the monitoring well

[3] RL: Reduced Level (AHD)

9.4 Monitoring Well Development

Drilling water was purged from the monitoring wells using a submersible electric pump. The pH, temperature, conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) were monitored during development using calibrated field instruments to assess the development of steady state conditions. Due to slow recharge steady state conditions were not achieved.

The monitoring well development sheets and the equipment calibration records are presented in Appendix E.

Water removed from the wells during purging was transported to EIS, where the water is stored in a holding drum prior to collection by licensed waste water contractors. When the drum is filled a sample is analysed to classify the water for disposal.

9.5 Groundwater Sampling

Groundwater samples were obtained from the monitoring wells using new disposable polyethylene bailers. Field measurements of pH, EC, DO and Eh were taken during sampling.

Due to the relatively slow infiltration of groundwater into the monitoring wells, steady state conditions were not achieved during sampling.

The sampling data sheets and the calibration documentation for the instruments are presented in Appendix D.

Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc.

The samples were preserved in accordance with water sampling requirements detailed in NEPM 1999 and placed in an insulated container with ice. During the investigation, groundwater samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998[28] as summarised in the following table:

[28] *Water Quality – Part 1: Sampling*, *Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples*, Standards Australia, 1998 (AS/NZS 5667.1:1998)

Analyte	Preservation	Storage Period
Heavy metals	45μm Filter, acidify with nitric acid to pH 1-2.	Store at <4°, analysis within 30 days
VOCs (TPH)	Zero headspace, teflon seal	Store at <4°, analysis within 7 days
VOCs (BTEX + Light TPH)	Zero headspace, Teflon seal, acidify with HCl to pH 1-2.	Store at <4°, analysis within 7 days
sVOCs (PAHs)	nil	Store at <4°, analysis within 7 days

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody procedures.

9.6 Laboratory Analysis

Laboratory analysis was undertaken by Envirolab Services Pty Ltd (NATA Accreditation No. 2901) with additional Quality Control Analysis undertaken by National Measurement Institute (NATA Accreditation No. 198).

9.6.1 Soil Samples

Soil samples were analysed using the following analytical methods detailed in Schedule B(3) of NEPM (1999[29]):

- Heavy metals – Nitric acid digestion. Analysis by ICP/AES.
- Low level mercury – cold vapour AAS.
- OC and OP pesticides and PCBs – Extracted with dichloromethane/acetone. Analysis by GC/ECD.
- PAHs – Soil extracted with dichloromethane/acetone. Analysis by GC/MS.
- TPH (volatile) – Soil extracted with methanol. Analysis by P&T GC/MS.
- TPH – Soil extracted with dichloromethane/acetone. Analysis by GC/FID.
- BTEX – Soil extracted with methanol. Analysis by P&T GC/MS.
- Asbestos – Polarizing light microscopy.
- VOCs – P&T. Analysis by GC/MS.

[29] *Guideline on Laboratory Analysis of Potentially Contaminated Soils*, Schedule B(3), NEMP, 1999 (Schedule B(3))

Toxicity characteristic leaching procedure (TCLP) leachates were prepared by rotating soil samples in a mild acid solution for 18 hours (NSW EPA WD-3 Method). Leachates were analysed using the analytical procedures outlined above.

9.6.2 Groundwater Samples

Groundwater samples were analysed using the following analytical methods endorsed by the NSW DECCW (EPA) (Schedule B(3) does not apply to water samples):

- Heavy metals – Direct injection. Analysis by ICP-AES.
- Low level mercury – Direct injection. Analysis by flow injection AAS.
- OC and OP pesticides and PCBs – GC/ECD.
- PAHs – Triple solvent (dichloromethane) extraction. Analysis by GC/MS.
- TPH (volatile) – P&T. Analysis by GC/MS.
- TPH – Solvent (dichloromethane) extraction. Analysis GC/FID.
- BTEX – Direct P&T. Analysis by GC/MS.
- Oil & Grease – Gravimetric. Hexane Extractable.
- VOCs – Direct purge and trap GC-MS.

10 RESULTS OF INVESTIGATION

10.1 Subsurface Conditions

Borehole locations are shown on Figure 2. For details of the subsurface soil profile reference should be made to the borehole logs in Appendix A. A summary of the subsurface conditions encountered in the boreholes is presented below:

Pavement

A 0.05m thick concrete slab pavement was encountered in BH207. Asphaltic concrete pavement was encountered in BH208 and BH210 at depths of 0.04m and 0.05m thick respectively.

Fill

Fill was encountered in all of the boreholes and ranged in depth from 0.45m in BH208 to 4.3m in BH201 and BH203. The fill generally consisted of silty clayey sand, silty sandy clay, silty gravelly sand and gravely sandy clay, with a trace of igneous, ironstone, shale and sandstone gravels, brick fragments and ash.

BH209 and BH210 encountered concrete at depths of 3.1m and 0.5m respectively. The thickness encountered in BH209 and BH210 was 0.2m and 0.1m respectively.

Natural Soils

Medium plasticity silty clay was encountered beneath the fill material in BH204 to BH208 and in BH210 and BH211. The natural silty clay ranged in depth from 1.5m in BH208 to 4.3m in BH205.

BH208 was terminated in the natural silty clay material at 1.5m

Bedrock

Shale bedrock with a trace of ironstone and gravel bands was encountered directly beneath the fill material in BH201 to BH203 and beneath the natural silty clay material in BH204, BH206, BH207, BH210 and BH211. The shale ranged in depth from 3.8m in BH211 to 5.3m in BH201.

Sandstone bedrock was encountered beneath the fill material in BH209, beneath the silty clay material in BH205 and beneath the shale in BH201 to BH204, BH206, BH207, BH210 and BH211.

BH201 to BH207 and BH209 to BH211 were terminated in the sandstone bedrock at depths ranging from 9.84m to 23.95m.

Groundwater

Groundwater monitoring wells were installed in boreholes BH201, BH202 and BH204. Standing Water Level (SWL) measured in the monitoring wells (from existing ground level) during the investigation is presented in the following table:

Monitoring Well	SWL (m) on 14/12/10	SWL (m) on 20/12/2010	Groundwater RL (m AHD)
MW201	Dry	Dry	14.38
MW202	5.19	5.32	14.86
MW204	5.71	7.56	15.23
MW204A	Dry	Dry	15.22

10.2 Laboratory Results

The laboratory reports are presented in Appendix B. The results have been assessed against the SAC adopted for this investigation.

10.2.1 Soil Samples

The soil laboratory results are presented in Table B to Table C inclusive. The results of the analyses are summarised below.

Heavy Metals

Seven fill and one natural soil samples were analysed for heavy metals. The results of the analyses were below the SAC.

Waste Classification:

The results for lead in the BH206 (0.5-0.65)m sample was above the CT1 criterion outlined in the Waste Classification Guidelines 2009. The remaining heavy metal results were less than the CT1 criteria.

A TCLP leachate was prepared from the BH206 (0.5-0.65)m sample and analysed for lead. The results were less than the TCLP1 criteria outlined in the Waste Classification Guidelines 2009.

Petroleum Hydrocarbons (TPH) and Monocyclic Aromatic Hydrocarbons (BTEX)

PID soil sample headspace readings for the BH211 (0-0.2)m sample was 0.5ppm. The remaining PID results were all zero ppm equivalent isobutylene. These results indicate a lack of PID detectable volatile organic contaminants.

Seven fill and one natural soil samples were analysed for TPH and BTEX compounds. The results of the analyses were below the SAC.

Waste Classification:

The results of all analyses were less than the relevant CT1 and SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Polycyclic Aromatic Hydrocarbons (PAHs)

Seven fill and one natural soil samples were analysed for a range of PAHs including Benzo(a)pyrene. The results of the analyses were than the SAC.

Waste Classification:

The results of all analyses were less than the relevant CT1 and SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Organochlorine (OCPs) and Organophosphorous (OPPs) Pesticides

Seven fill and one natural soil samples were analysed for a range of OCPs and OPPs. The results of the analyses were less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Polychlorinated Biphenyls (PCBs)

Seven fill and one natural soil samples were analysed for a range of PCBs. The results of the analyses were less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Asbestos

Seven fill soil samples, one natural soil samples were screened for the presence of asbestos fibres. The results of the analyses indicated that asbestos fibres were not encountered within the samples and no respirable fibres were detected.

Volatile Organic Compounds (VOCs)

Seven fill and one natural soil samples were analysed for VOCs. The results of the analyses were all less than the Practical Quantitation Limit.

Waste Classification:

The results of all analyses were less than the relevant CT1 and SCC1 outlined in the Waste Classification Guidelines 2009.

10.2.2 Groundwater Samples

Groundwater samples were obtained from MW202 and MW204. The groundwater laboratory results are presented in Table D. The results of the analysis are summarised below:

Heavy Metals

Two groundwater samples were analysed for heavy metals. The sample from MW202 contained a marginally elevated concentration of copper of 2μg/L and the sample from MW204 contained an elevated concentration of zinc of 29 μg/LThe site assessment criteria for copper and zinc are 1.3μg/L and 15μg/L respectively. The remaining heavy metal results were less than the site assessment criteria.

Volatile Organic Compounds (VOCs)

Two groundwater samples were analysed for a range of VOCs. The sample from MW202 encountered a slight detection of chloroform at a concentration of 1.7μg/L below the site assessment criterion. The remaining VOC results were all less than the practical quantitation limit.

Petroleum Hydrocarbons (TPH)

Two groundwater samples were analysed for TPH compounds. The sample from MW204 encountered a slight detection of TPH C10 – C36 at a concentration of 180 μg/L. The individual detection and the remaining results were below the site assessment criteria.

Monocyclic Aromatic Hydrocarbons (BTEX)

Two groundwater samples were analysed for BTEX compounds. The results of the analyses were less than the laboratory practical quantitation limit and below the site assessment criteria.

Oil & Grease

Two groundwater samples were analysed for oil and grease. The results of the analyses were less than the laboratory practical quantitation limit and below the site assessment criteria.

Sulphate, Chloride & Hardness

Two groundwater samples were analysed for sulphate, chloride and hardness. The sulphate concentrations in the samples from MW202 and MW204 were 360mg/L and 110mg/L respectively. The chloride concentrations in the samples from MW202 and MW204 were 47mg/L and 140mg/L respectively. The hardness concentrations in the samples from MW202 and MW204 were 389mg$CaCO_3$/L and 60 mg$CaCO_3$/L respectively.

pH and Conductivity

Two groundwater samples were analysed for pH and electrical conductivity (EC). The pH values for the samples from MW202 and MW204 were 7.2 and 6.1 respectively. The laboratory measured pH for MW204 was outside of the range of 7 to 8.5 specified in the SAC. The EC measurements for the samples from MW202 and MW204 were 1,400μS/cm and 920 μS/cm respectively.

Field Measurements

Field measurements recorded during sampling are as follows:

- pH ranged from 6.17 to 6.76;
- EC ranged from 630μS/cm to 792μS/cm;
- Eh ranged from 167.9mV to 185mV; and
- DO was 2.9ppm.

11 ASSESSMENT OF ANALYTICAL QA/QC

The DQOs and DQIs established for the investigation have been assessed in this section of the report. The assessment includes a review of the laboratory QA/QC procedure to assess whether the sample data is reliable.

The laboratory reports for this investigation have been checked and issued as final by:

- Envirolab Services Pty Ltd
  NATA Accreditation No. 2901
  Report numbers: 49438,49683,49983,50119, and 49683-A.
- National Measurement Institute
  NATA Accreditation No. 198
  Report number: RN833269.

The RPD results for the field QA/QC duplicate samples are summarised in Table E to Table H. An assessment of the DQIs adopted for this investigation is summarised in the following table. A brief explanation of the individual DQI is presented in Appendix D.

DQO	Number of Samples	DQI
Precision:		
Intra-laboratory duplicate Sample Reference: Dup D is a duplicate of soil sample BH211 (0-0.20)m Dup A1 is a duplicate of groundwater sample MW204	Soils: Fill - 7 Natural – 1 Dup - 1 Groundwater: 1	The results for the soil and groundwater intra-laboratory RPD values indicated that field precision was acceptable.
Inter-laboratory duplicate Dup B is a duplicate of soil sample BH203	Soil: 1	The inter-laboratory RPD values indicated that field precision was acceptable.
Field Blank FB1 – 6/12/2010 FB2 – 7/12/2010 FB3 – 8/12/2010 FB4 – 9/12/2010 FB5 – 10/12/2010 FB6 – 13/12/2010 FB7 – 17/12/2010	Sand: 7	Field blanks were found to be free of analyte concentrations above the PQLs.
Field Rinsate RS1 – 6/12/2010 RS2 – 7/12/2010 RS3 – 8/12/2010 RS4 – 9/12/2010 RS5 – 10/12/2010 RS6 – 13/12/2010 RS7 – 17/12/2010	Water: 7	Field rinsate RS2 was found to have a slight detection of toluene of 1.2 μg. The slight detection of toluene is not considered to have jeopardised the sampling procedure as all soil samples analysed were found to be less than the PQL for toluene. The remainder of the field rinsate samples were found to be free of analyte concentrations above the PQLs.
Trip Spike TS1 – 20/12/2010	Water: 1	Trip spike recovery values were within acceptable limits.
Accuracy:		
Surrogate Spikes	All organic analytes	Laboratory accuracy was good and that no outliers were reported.
Repeat analysis	Soil: 2	Laboratory accuracy was good with the exception of the RPD values for the PAH's the Envirolab report 49683, which was slightly outside of the acceptable limits. The laboratory report stated that the RPD values were accepted due to the non homogenous nature of the samples.
Matrix Spike	Soil: 2	Laboratory accuracy was good and that no outliers were reported.
Laboratory Control Sample (LCS)	Soil: 5	Laboratory accuracy was good and that no outliers were reported.
Representativeness:		

DQO	Number of Samples	DQI
Samples extracted and analysed within holding time	All Samples	All samples were extracted and analysed within the appropriate holding times outlined in the investigation procedure.
Analysis of Laboratory Blanks	All Analytes	All laboratory blanks were found to be free of analyte concentrations above the PQLs.
Comparability:		
EIS sampling protocols	All Samples	Sampling was undertaken in accordance with the EIS sampling protocols outlined in Appendix D
Standard laboratory analytical methods used	All Samples	All Samples
Samples obtained by qualified staff	All Samples	All Samples
Completeness:		
Documentation (including site notes, borehole logs and COC etc) was correctly maintained	All Samples	All Samples
Samples obtained were analysed for the contaminants of concern	All Samples	All Samples
Appropriate analytical methods used by the laboratory.	All Samples	All Samples

12 DISCUSSION

The environmental site assessment undertaken for the proposed building B02 extension development was designed to assess the suitability of the site for the proposed land use.

12.1 Summary of Soil Conditions

Soil samples obtained for the investigation were analysed for the potential contaminants of concern identified at the site.

Elevated concentrations of contaminants were not encountered in the soil samples analysed for the investigation. All results were below the site assessment criteria (SAC).

Based on the results, EIS are of the opinion that the potential for significant widespread soil contamination at the site is relatively low.

12.1.1 Asbestos in Soil

Asbestos was not detected above the reporting limit in the soil samples analysed for the investigation.

12.2 Summary of Groundwater Conditions

Groundwater monitoring wells were installed in boreholes BH201, BH202, BH204 and BH204A. Standing Water Level (SWL) measured in the monitoring wells (from existing ground level) during the investigation is presented in the following table:

Monitoring Well	SWL (m) on 14/12/10	SWL (m) on 20/12/2010	Groundwater RL (m AHD)
MW201	Dry	Dry	-
MW202	5.19	5.32	9.3 - 9.8
MW204	5.71	7.56	- 0.4
MW204A	Dry	Dry	-

12.2.1 Groundwater Contamination

Two of groundwater samples were analysed for the potential contaminants of concern identified at the site.

Elevated concentrations of copper and arsenic were encountered in the samples as outlined in the following table:

Summary of Elevated Heavy Metal Groundwater Results (µg/L)		
Contaminant	Copper	arsenic
SAC		
MW202	2	-
MW204	-	29

The results of the remaining analyses were below the SAC.

The copper and arsenic concentrations in the groundwater were considered to be the result of regional groundwater conditions rather than a site specific issue for the following reasons:

- Significant concentrations of copper and arsenic in the fill material or natural soil which would represent a potential groundwater contamination source, were not identified during the current investigation;
- Elevated concentrations of copper, arsenic, lead and zinc are commonly encountered in groundwater in urban environments and are associated with factors such as surface water infiltration and leaking water infra-structure; and
- Elevations may be associated with regional groundwater conditions in the immediate vicinity of the site.

As a result of uncontrolled filling at the beginning of the twentieth century the groundwater beneath the Sydney CBD area is considered to be a "highly disturbed system". Imposition of a regulatory framework that attempts to impose the same level of protection as for a pristine ecosystem to the Sydney CBD groundwater is considered to be impractical. The general philosophy outlined in the ANZECC 2000 promotes this approach. However, care should be taken to minimise further degradation of the groundwater quality.

Traces of chloroform are commonly encountered in town water supplies. The chloroform is formed as a result of a reaction between traces of organic material and chlorine (used to disinfect water). The presence of chloroform in MW202 suggests the presence of some leaking water infrastructure in the area.

12.2.2 Dewatering During Development

In the event groundwater is intercepted during excavation works, dewatering will be required. Council approval will be required prior to disposal of groundwater into the stormwater system.

MW204 contained a marginal detection of mid to heavy fraction (C_{15}-C_{28}) hydrocarbons. Although this concentration was below the site assessment criterion it may not be acceptable for disposal to stormwater. The detection may be an anomaly resulting from the installation of the monitoring well. The groundwater from the well should be re-sampled and analysed in order to obtain further information. In the event that the groundwater quality is not considered to be acceptable for disposal to stormwater some treatment may be required.

Prior to any de-watering the pH should be measured to assess whether it complies with any conditions by Council for disposal to stormwater. If the pH is outside of acceptable limits some treatment may be necessary prior to disposal

12.3 Waste Classification

12.3.1 Classification of Fill Soils

Based on the results of the assessment, the fill material is classified as 'General Solid Waste (non-putrescible)' according to the criteria outlined in Waste Classification Guidelines 2009.

12.3.2 Classification of Natural Soil and Bedrock

The natural silty clay and underlying shale/sandstone bedrock at the site is considered to be virgin excavated natural material (VENM). The material is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted.

VENM must not be mixed with any fill material (including building rubble) as this will invalidate the VENM classification.

In the event the natural soils require disposal to a NSW DECCW (EPA) licensed landfill, the material can be disposed as 'General Solid Waste (non-putrescible)'.

12.4 Conclusion

Based on the scope of work undertaken for this assessment EIS consider that the site can be made suitable for the proposed development provided that the site is inspected by experienced environmental personnel during demolition and excavation works to assess any unexpected conditions or subsurface facilities that may be discovered between investigation locations. This should facilitate appropriate adjustment of the works programme and schedule in relation to the changed site conditions.

13 LIMITATIONS

The boreholes drilled for the investigation have enabled an assessment to be made of the existence of significant, large quantities of contaminated soils. The conclusions based on this investigation are that, while major contamination of the site is not apparent, problems may be encountered with smaller scale features between boreholes. EIS adopts no responsibility whatsoever for any problems such as underground storage tanks, buried items or contaminated material that may be encountered between sampling locations at the site. The proposed construction activities at the site should be planned on this basis, and any unexpected problem areas that are encountered between boreholes should be immediately inspected by experienced environmental personnel. This should ensure that such problems are dealt with in an appropriate manner, with minimal disruption to the project timetable and budget.

The conclusions developed in this report are based on site conditions which existed at the time of the site assessment and the scope of work outlined previously in this report. They are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, and visual observations of the site and vicinity, together with the interpretation of available historical information and documents reviewed as described in this report.

The investigation for this assessment and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined previously in this report.

Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated.

EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination.

Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes.

Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken

with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work.

EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site.

EIS have not and will not make any determination regarding finances associated with the site.

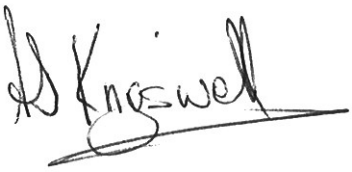
Changes in the proposed or current site use may result in remediation or further investigation being required at the site.

During construction at the site, soil, fill and any unsuspected materials that are encountered should be monitored by qualified environmental and geotechnical engineers to confirm assumptions made on the basis of the limited investigation data, and possible changes in site level and other conditions since the investigation. Soil materials considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa.

Should you require any further information regarding the above, please do not hesitate to contact us.

Yours faithfully
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Mitch Delaney
Environmental Scientist



Adrian Kingswell
Senior Associate

ABBREVIATIONS

AAS	Atomic Absorption Spectrometry
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)pyrene
BH	Borehole
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
DECCW	Department of Environment, Climate Change and Water (formerly DECC, DEC and EPA)
DNR	NSW Department of Natural Resources (now split between DWE and DECCW)
DWE	NSW Department of Water and Energy
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA NSW	Environment Protection Authority, New South Wales (now part of DECCW)
GC-ECD	Gas Chromatograph-Electron Capture Detector
GC-FID	Gas Chromatograph-Flame Ionisation Detector
GC-MS	Gas Chromatograph-Mass Spectrometer
HIL	Health Based Investigation Level
HM	Heavy Metals
ICP-AES	Inductively Couple Plasma – Atomic Emission Spectra
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
OCPs	Organochlorine Pesticides
OHS (OH&S)	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PPIL	Provisional Phyto-toxicity Investigation Levels
PQL	Practical Quantitation Limit
P&T	Purge & Trap
RAP	Remedial Action Plan
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SEPP	State Environmental Planning Policy
sPOCAS	suspension Peroxide Oxidation Combined Acidity and Sulfate
SPT	Standard Penetration Test
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TP	Test Pit
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

IMPORTANT INFORMATION ABOUT THE SITE ASSESSMENT REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

An Environmental Assessment Report is Based on a Unique Set of Project Specific Factors:

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- the proposed land use is altered;
- the defined subject site is increased or sub-divided;
- the proposed development details including size, configuration, location, orientation of the structures are modified;
- the proposed development levels are altered, eg addition of basement levels; or
- ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (eg. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Assessment is Based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Environmental Site Assessment Limitations

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Environmental Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an environmental assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Environmental Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but

significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problems, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the test of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

TABLE A - 2
CHEMICAL CONTAMINANT CRITERIA FOR WASTE CLASSIFICATION
Waste Classification Guidelines. Part 1: Classifying Waste DECC (now DECCW) NSW July 2009

GENERAL SOLID WASTE	RESTRICTED SOLID WASTE	HAZARDOUS WASTE
IF SCC ≤ CT1, TCLP NOT NEEDED TO CLASSIFY AS GENERAL SOLID WASTE	IF SCC ≤ CT2, TCLP NOT NEEDED TO CLASSIFY AS RESTRICTED SOLID WASTE	IF SCC > CT2, TCLP NOT NEEDED TO CLASSIFY AS HAZARDOUS WASTE
IF TCLP ≤ TCLP1 AND SCC ≤ SCC1 TREAT AS GENERAL SOLID WASTE	IF TCLP ≤ TCLP2 AND SCC ≤ SCC2 TREAT AS RESTRICTED SOLID WASTE	IF TCLP > TCLP2 AND/OR SCC > SCC2 TREAT AS HAZARDOUS WASTE

	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE		
CONTAMINANT	CT1 (mg/kg)	TCLP1 (mg/L)	SCC1 (mg/kg)	CT2 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
Arsenic	100	5	500	400	20	2,000
Beryllium	20	1.0	100	80	4	400
Cadmium	20	1.0	100	80	4	400
Chromium VI	100	5	1,900	400	20	7,600
Cyanide (total)	320	16	5,900	1280	64	23,600
Cyanide (Amenable)	70	3.5	300	280	14	1,200
Fluoride	3,000	150	10,000	12,000	600	40,000
Lead	100	5	1,500	400	20	6,000
Mercury	4	0.2	50	16	0.8	200
Molybdenum	100	5	1,000	400	20	4,000
Nickel	40	2	1,050	160	8	4,200
Selenium	20	1	50	80	4	200
Silver	100	5.0	180	400	20	720
Benzene	10	0.5	18	40	2	72
Toluene	288	14.4	518	1,152	57.6	2,073
Ethylbenzene	600	30	1,080	2,400	120	4,320
Total xylenes	1,000	50	1,800	4,000	200	7,200
Total petroleum hydrocarbons (C6-C9)	-	-	650	-	-	2,600
Total petroleum hydrocarbons (C10-C36) (C10-C14, C15-C28, C29-C36)	-	-	10,000	-	-	40,000
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23
Polycyclic aromatic hydrocarbons (Total)	-	-	200	-	-	800
Polychlorinated biphenyls	-	-	<50	-	-	<50
Phenol (nonhalogenated)	288	14.4	518	1,152	57.6	2,073
Scheduled chemicals	-	-	<50	-	-	<50

NOTE:
SCC – Specific Contaminant Concentration
CT – Contaminant Threshold
TCLP – Toxicity Characteristics Leaching Procedure

EIS

TABLE B
SUMMARY OF LABORATORY RESULTS
SOIL ASSESSMENT
All data in mg/kg unless stated otherwise

ANALYTE			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES				OP PESTICIDES	PCBs	PETROLEUM HYDROCARBONS								VOCs	PID VALUES	ASBESTOS FIBRES
																			Petroleum Hydrocarbons					Benzene	Toluene	Ethyl benzene	Total Xylenes		
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor			C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	C_{10} - C_{36}						
PQL - Envirolab Services			4	0.5	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.5	0.5	1	3	1		100
Site Assessment Criteria ^			500 *	100 *	60% *	5000 *	1500 *	75 *	3000 *	35000 *	100 *	5 *	50 *	250 *	1000 *	50 *	0.1 ^^	50 *	65 #	nsl	nsl	nsl	1000 #	1 #	1.4 #	3.1 #	14 #	PQL**		100^^
General Solid Waste CT1*			100	20	100	nsl	100	4	40	nsl	nsl	0.8	nsl					nsl	nsl	nsl			nsl	10	288	600	1000	nsl	-	-
General Solid Waste SCC1*			500	100	1900	nsl	1500	50	1050	nsl	200	10	50					50	650	nsl			10000	18	518	1080	1800	nsl	-	-
Restricted Solid Waste CT2*			400	80	400	nsl	400	16	160	nsl	nsl	3.2	nsl					nsl	nsl	nsl			nsl	40	1152	2400	4000	nsl	-	-
Restricted Solid Waste SCC2*			2000	400	7600	nsl	6000	200	4200	nsl	800	23	50					50	2600	nsl			40000	72	2073	4320	7200	nsl	-	-
Sample Reference	**Sample Depth**	**Sample Description**																												
BH201	3.0-3.45	Fill	5	LPQL	8	28	23	LPQL	10	40	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH202	3.0-3.45	Fill	LPQL	LPQL	9	10	30	LPQL	7	39	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH203	1.5-1.95	Fill	9	LPQL	4	29	22	LPQL	LPQL	27	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH203	4.5-4.8	Shale	LPQL	LPQL	1	19	15	LPQL	LPQL	6	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH204	0.5-0.95	Fill	11	LPQL	4	31	14	LPQL	LPQL	7	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH205	0.5-0.95	Fill	5	LPQL	6	13	22	LPQL	2	10	LPQL	LPQL	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH206	0.5-0.65	Fill	5	LPQL	10	25	130	0.1	6	140	3	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	No asbestos found at reporting limit
BH211	0-0.2	Fill	5	LPQL	7	16	29	LPQL	18	27	0.17	0.07	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.5	No asbestos found at reporting limit
Total Number of samples			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0
Maximum Value			11	0	10	31	130	0.1	18	140	3	0.3	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	nc

EXPLANATION:

^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:

* National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
Health Investigation Levels (HIL) - Column F, Commercial/Industrial

\# NSW DECC (EPA) Guidelines for Assessing Service Station Sites (1994)

^^ In the absence of Australian guidelines, the laboratory PQL has been adopted as the site assessment criteria

* NSW DECCW (EPA) Waste Classification Guidelines (2009)

** For this screening the site assessment criteria for VOCs in soil (apart from BTEX compunds) will be the PQL of the analytical technique.

Concentration above the Site Assessment Criteria **VALUE**

ABBREVIATIONS:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)Pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OP: Organophosphorus Pesticides
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls

UCL: Upper Level Confidence Limit on Mean Value
na: Not Analysed
nc: Not Calculated
nsl: No Set Limit

TABLE C
SUMMARY OF LABORATORY RESULTS
TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
All data in mg/L unless stated otherwise

ANALYTE		Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	B(a)P
PQL - Envirolab Services		0.05	0.01	0.01	0.03	0.0005	0.02	0.001
TCLP1 - General Solid Waste *		5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste *		20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste *		>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	**Sample Depth**							
BH206	0.5-0.65	na	na	na	0.8	na	na	na
Total Number of samples		0	0	0	1	0	0	0
Maximum Value		0	0	0	0.8	0	0	0

EXPLANATION:

* NSW DECCW (EPA) Waste Classification Guidelines (2009)

Concentration above the General Solid Waste value — **VALUE**
Concentration above the Restricted Solid Waste value — **VALUE**

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)Pyrene
nc: Not Calculated
na: Not Analysed

TABLE D
GROUNDWATER MONITORING ANALYSIS
All results in µg/L unless stated otherwise.

ANALYTE	PQL Envirolab Services	SAC ANZECC 2000 Marine Waters [1]	SAC Drinking Water [2]	SAMPLES MW202	SAMPLES MW204
Field Measurements *					
Dissolved oxygen (ppm)	-	nsl	nsl	2.9	2.9
Redox potential (mV)	-	nsl	nsl	185	167.9
pH	-	7 - 8.5 [++]	6.5 - 8.5 ^	**6.76**	**6.17**
Conductivity (µS/cm)	-	nsl	nsl	630	792
Temperature C°	-	nsl	nsl	19.4	21.3
Inorganic Compounds and Parameters					
Oil and Grease (mg/L)	5	10 [#]	nsl	LPQL	LPQL
pH	0.1	7 - 8.5 [++]	6.5 - 8.5 ^	7.2	**6.1**
Electrical Conductivity (mS/cm)	0.001	nsl	nsl	1400	920
Hardness (mgCaCo3/L)	1	nsl	200 ^	389	60
Chloride (mg/L)	1	nsl	nsl	47	140
Sulphate (mg/L)	1	nsl	nsl	360	110
Heavy Metals					
Arsenic (As III)	1	2.3 [t]	7	LPQL	1
Cadmium	0.1	5.5	2	LPQL	LPQL
Chromium	1	10 [t]	50	LPQL	LPQL
Copper	1	1.3	2000	**2**	1
Lead	1	4.4	10	LPQL	LPQL
Mercury	0.5	0.4	1	LPQL	LPQL
Nickel	1	70	20	4	9
Zinc	1	15	3000^	11	**29**
Petroleum Hydrocarbons					
Hydrocarbons C6-C9	10	nsl	nsl	LPQL	LPQL
Hydrocarbons C10-C14	50	nsl	nsl	LPQL	LPQL
Hydrocarbons C15-C28	100	nsl	nsl	LPQL	180
Hydrocarbons C29-C36	100	nsl	nsl	LPQL	LPQL
Total Hydrocarbons C10-C36	-	600 **	nsl	LPQL	LPQL
Volatile Organic Contaminants (VOCs) [##]					
Benzene	1	700	1	LPQL	LPQL
Toluene	1	180[t]	800	LPQL	LPQL
Ethylbenzene	1	5[t]	300	LPQL	LPQL
m+p-xylene	2	275[t]	nsl	LPQL	LPQL
o-xylene	1	350[t]	nsl	LPQL	LPQL
Chloroform	1	370	nsl	1.7	LPQL

EXPLANATION:

[1] ANZECC Australian Water Quality Guidelines for Marine Waters, 2000 - Trigger Values for protection of 95% of species

[2] NHMRC Australian Drinking Water Guidelines (2004)

* Field Measurements Undertaken on 20 December 2010

[+] ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters, 2000 - Level for NSW Lowland Rivers.

[++] ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters, 2000 - Level for South-East Australian Estuaries

^ In the absence of a health guideline the aesthetic guideline concentration has been quoted

** In the absence of locally endorsed guidelines, the Dutch intervention levels specified in *'Circular on target values and intervention values for soil remediation'* (*Ministry of Housing and the Environment 2000*) have been quoted

[t] In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been used.

[#] NSW EPA (DECCW) Guidelines for Assessing Service Station Sites (1994)

^^ In the absence of Australian guidelines, the laboratory practical quantitation limit has been used as a preliminary screening level

[##] Site assessment criteria only shown for BTEX and chloroform. Apart from chloroform, concentrations of all VOCs were less than the Practical Quantation Limit.

Concentration above the SAC — **VALUE**
Concentration above Drinking Water Guidelines — **VALUE**

ABBREVIATIONS:

nsl: No Set Limit
LPQL: Less than Practical Quantitation Limit
(-) : Not Applicable

TABLE E
SOIL INTRA-LABORATORY DUPLICATE RESULTS
QA/QC - RELATIVE PERCENTAGE DIFFERENCES
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Intra-laboratory	Arsenic	4	5	<4	4.5	22
Soil	Cadmium	0.5	LPQL	LPQL	NC	NC
sample ID = BH211 (0-0.2)	Chromium	1	7	6	6.5	15
Dup ID = DUPD	Copper	1	16	19	17.5	17
	Lead	1	29	28	28.5	4
Envirolab Report: 50119	Mercury	0.1	LPQL	LPQL	NC	NC
	Nickel	1	18	14	16	25
	Zinc	1	27	29	28	7
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	0.1	0.1	0.1	0
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b)&(k)fluorant	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	0.07	0.06	0.065	15
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	Total PAHs	1.55	0.17	0.16	0.165	6
	Total OCPs	0.1	LPQL	LPQL	NC	NC
	Total OPPs	0.1	LPQL	LPQL	NC	NC
	Total PCBs	0.1	LPQL	LPQL	NC	NC
	C_6-C_9 TPH	25	LPQL	LPQL	NC	NC
	C_{10}-C_{14} TPH	50	LPQL	LPQL	NC	NC
	C_{15}-C_{28} TPH	100	LPQL	LPQL	NC	NC
	C_{29}-C_{36} TPH	100	LPQL	LPQL	NC	NC
	Benzene	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	Total Xylenes	1	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

- Results > 10 times PQL = RPD value < 50% are acceptable
- Results between 5 & 10 time PQL = RPD value < 75% are acceptable
- Results < 5 times PQL = RPD value < 100% are acceptable

RPD Results Above the Acceptance Criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NC: Not Calculated

TABLE F
SOIL INTER-LABORATORY DUPLICATE RESULTS
QA/QC - RELATIVE PERCENTAGE DIFFERENCES
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	NMI PQL	INITIAL	REPEAT	MEAN	RPD %
Intra-laboratory	Arsenic	4	0.5	<4	3.4	2.7	52
Soil	Cadmium	0.5	0.5	LPQL	LPQL	NC	NC
sample ID = BH 203 (4.5-4.8)	Chromium	1	0.5	1	1.9	1.45	62
Dup ID = DUP B	Copper	1	0.5	19	18	18.5	5
	Lead	1	0.5	15	14	14.5	7
Envirolab Report: 49683	Mercury	0.1	0.2	LPQL	LPQL	NC	NC
and	Nickel	1	0.5	<1	1	0.75	67
NMI Report: RN833269	Zinc	1	0.5	6	7.6	6.8	24
	Naphthalene	0.1	0.5	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	0.5	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	0.5	LPQL	LPQL	NC	NC
	Fluorene	0.1	0.5	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	0.5	LPQL	LPQL	NC	NC
	Anthracene	0.1	0.5	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	0.5	LPQL	LPQL	NC	NC
	Pyrene	0.1	0.5	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	0.5	LPQL	LPQL	NC	NC
	Chrysene	0.1	0.5	LPQL	LPQL	NC	NC
	Benzo(b)&(k)fluorant	0.2	1	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	0.5	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	0.5	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	0.5	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	0.5	LPQL	LPQL	NC	NC
	Total PAHs	1.55	8	LPQL	LPQL	NC	NC
	Total OCPs	0.1	0.1	LPQL	LPQL	NC	NC
	Total OPPs	0.1	0.1	LPQL	LPQL	NC	NC
	Total PCBs	0.1	0.1	LPQL	LPQL	NC	NC
	C_6-C_9 TPH	25	25	LPQL	LPQL	NC	NC
	C_{10}-C_{14} TPH	50	50	LPQL	LPQL	NC	NC
	C_{15}-C_{28} TPH	100	100	LPQL	LPQL	NC	NC
	C_{29}-C_{36} TPH	100	100	LPQL	LPQL	NC	NC
	Benzene	0.5	1	LPQL	LPQL	NC	NC
	Toluene	0.5	1	LPQL	LPQL	NC	NC
	Ethylbenzene	1	1	LPQL	LPQL	NC	NC
	Total Xylenes	1	2	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

- Results > 10 times PQL = RPD value < 50% are acceptable
- Results between 5 & 10 time PQL = RPD value < 75% are acceptable
- Results < 5 times PQL = RPD value < 100% are acceptable

RPD Results Above the Acceptance Criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated

TABLE G
GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS
QA/QC - RELATIVE PERCENTAGE DIFFERENCES
All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Intra-laboratory Water sample ID = MW294 Dup ID = Dup A1 Envirolab Report: 49983	Arsenic	1	1	1	1	0
	Cadmium	0.1	LPQL	LPQL	NC	NC
	Chromium	1	LPQL	LPQL	NC	NC
	Copper	1	1	<1	0.75	67
	Lead	1	LPQL	LPQL	NC	NC
	Mercury	0.5	LPQL	LPQL	NC	NC
	Nickel	1	9	9	9	0
	Zinc	1	29	28	28.5	4
	C_6-C_9 TPH	10	LPQL	LPQL	NC	NC
	C_{10}-C_{14} TPH	50	LPQL	LPQL	NC	NC
	C_{15}-C_{28} TPH	100	180	<100	115	113
	C_{29}-C_{36} TPH	100	LPQL	LPQL	NC	NC
	Benzene	1	LPQL	LPQL	NC	NC
	Toluene	1	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	Total Xylenes	1	LPQL	LPQL	NC	NC

EXPLANATION:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

- Results > 10 times PQL = RPD value < 50% are acceptable
- Results between 5 & 10 time PQL = RPD value < 75% are acceptable
- Results < 5 times PQL = RPD value < 100% are acceptable

RPD Results Above the Acceptance Criteria **VALUE**

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NC: Not Calculated

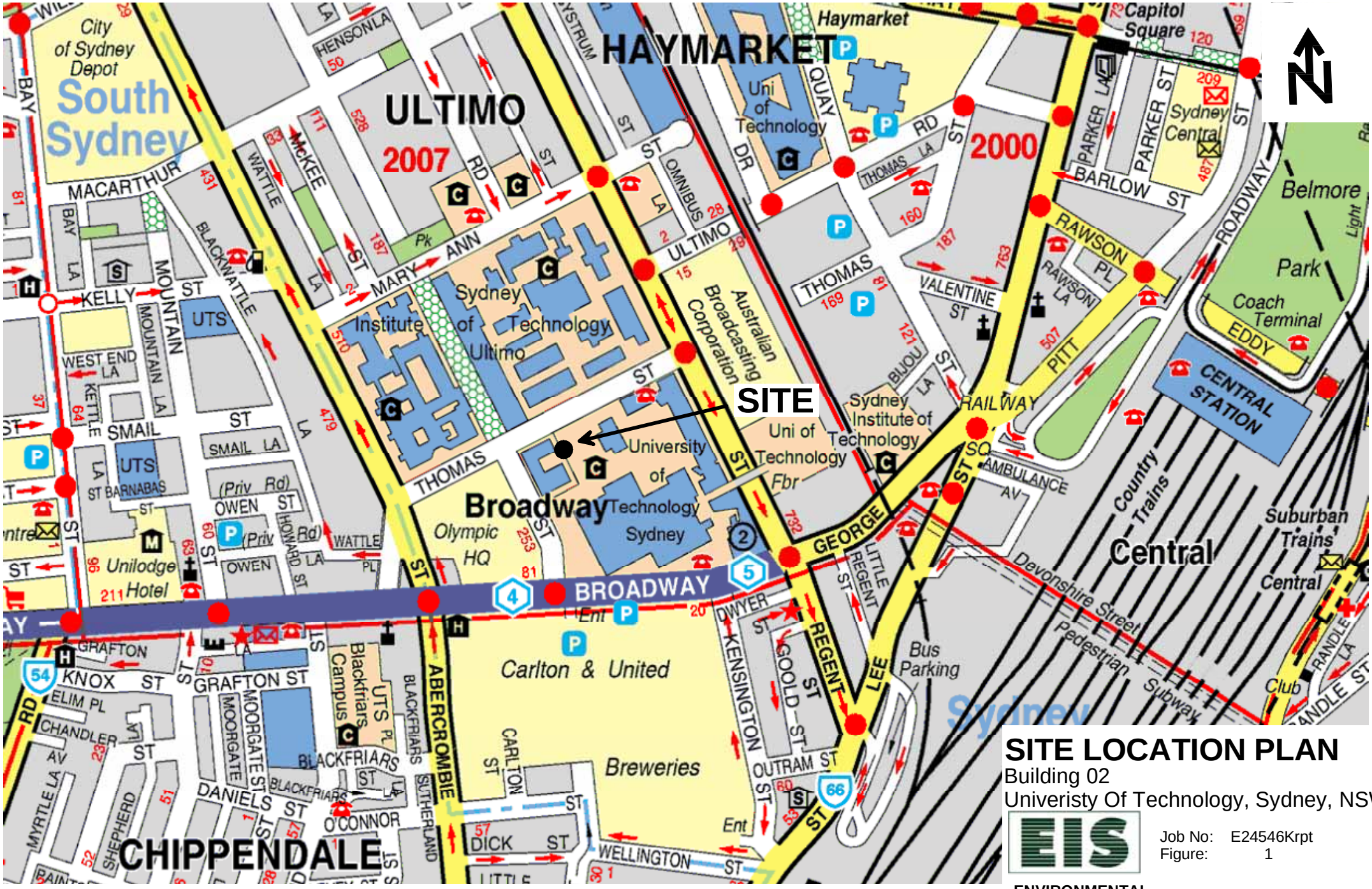
TABLE H
LABORATORY RESULTS
QA/QC - TRIP SPIKE, TRIP BLANK AND RINSATE

ANALYSIS	Envirolab PQL		FB1[s] 6/12/2010 49438 mg/kg	RS1[w] 6/12/2010 49438 µg/L	FB2[s] 7/12/2010 49438 mg/kg	RS2[w] 7/12/2010 49438 µg/L	FB3[s] 8/12/2010 49438 mg/kg	RS3[w] 8/12/2010 49438 µg/L	FB4[s] 9/12/2010 49683 mg/kg	RS4[w] 9/12/2010 49683 µg/L	FB5[s] 10/12/2010 49683 mg/kg	RS5[w] 10/12/2010 49683 µg/L	FB6[s] 13/12/2010 49683 mg/kg	RS6[w] 13/12/2010 49683 µg/L	FB7[s] 17/12/2010 50119 mg/kg	RS7[w] 17/12/2010 50119 µg/L	Trip spike 1[s] 20/12/2010 49983 % Recovery
	mg/kg	µg/L															
Benzene	1	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	100
Toluene	1	1	LPQL	LPQL	LPQL	1.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	95
Ethylbenzene	1	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	106
Total Xylenes	1	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	106

EXPLANATION:
[W] Sample type (water)
[S] Sample type (sand)
BTEX concentrations in trip spikes are presented as % recovery

Results Above the PQLs VALUE

ABBREVIATIONS:
PQL: Practical Quantitation Limit
LPQL: Less than PQL
(-) : Not Applicable / Not Analysed
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls



SITE LOCATION PLAN

Building 02
Univeristy Of Technology, Sydney, NSW

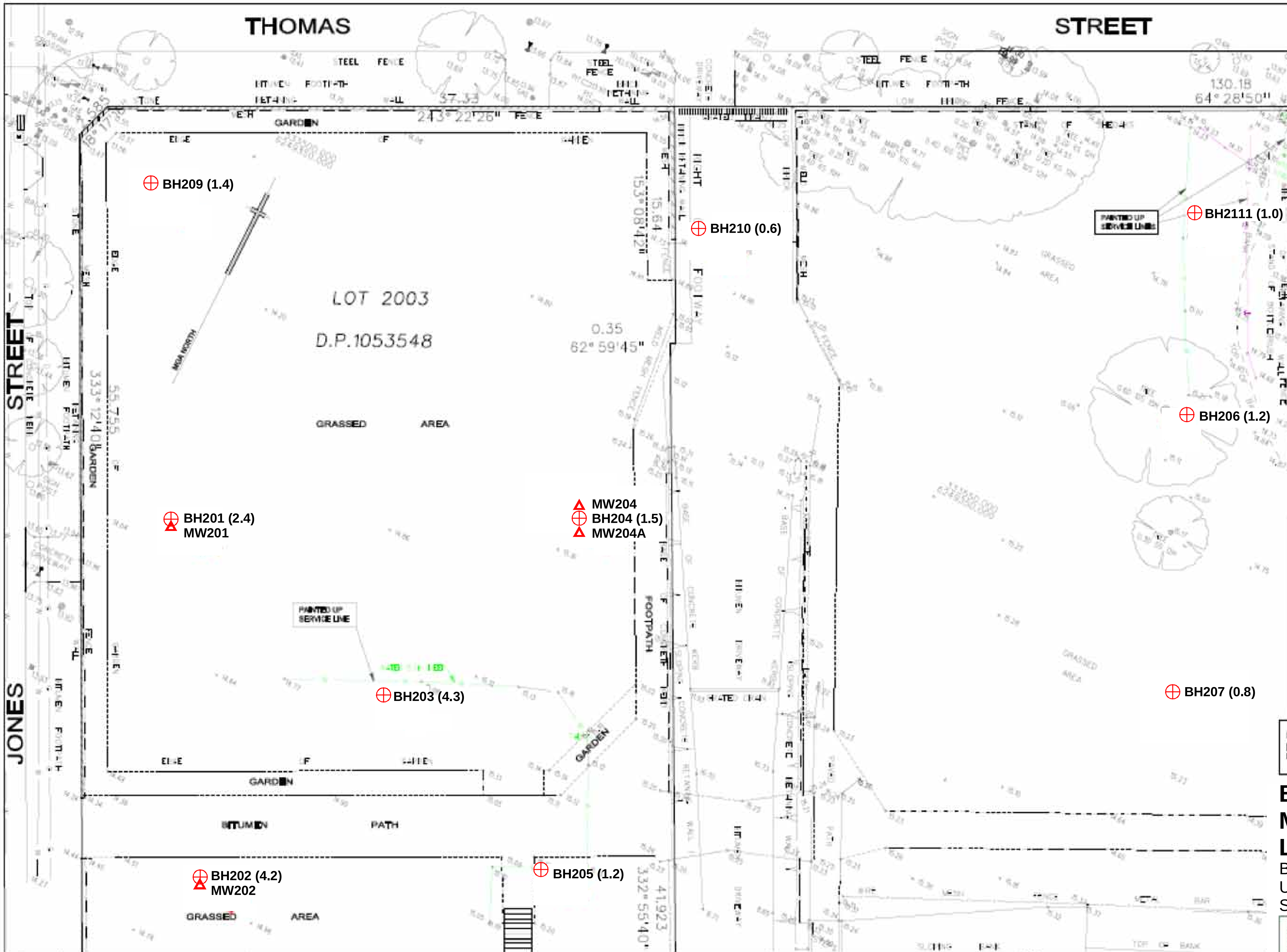
EIS

Job No: E24546Krpt
Figure: 1

ENVIRONMENTAL INVESTIGATION SERVICES

Recreated from UBD on disc (version 5.0)
Map Ref: 3 B15 (not to scale)

Note: Reference should be made to the text for a full understanding of this plan



BOREHOLE INFORMATION

EASTING	NORTHING	R.L.	B.H. #
333506.93	6249326.25	14.38	B.H.201
333516.85	6249305.75	14.86	B.H.202
333524.05	6249322.10	15.08	B.H.203
333530.15	6249338.20	15.22	B.H.204A
333530.15	6249338.55	15.23	B.H.204B
333538.25	6249316.60	15.14	B.H.205
333562.57	6249361.80	15.27	B.H.206
333589.80	6249345.30	15.33	B.H.207
333585.30	6249377.20	12.88	B.H.208
333498.55	6249348.10	13.83	B.H.209
333528.70	6249368.40	14.59	B.H.210
333557.15	6249373.85	14.77	B.H.211

NOTE:
DETAIL AND LEVELS SHOWN HEREON FROM PREVIOUSLY SURVEYED INFORMATION

BOREHOLE & MONITORING WELL LOCATION PLAN

Building 02
University Of Technology
Sydney, NSW

Job No: E24546Krpt
Figure: 2

ENVIRONMENTAL INVESTIGATION SERVICES

LEGEND:

BH1 (2.0) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)

MW201 MONITORING WELL LOCATION AND NUMBER

RYGATE & COMPANY PTY. LIMITED

CLIENT: JEFFERY & KATAUSKAS

ULTIMO

SYDNEY