ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

ST CATHERINE'S SCHOOL

ON

PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED ADDITIONS AND ALTERATIONS

AT

26 ALBION STREET, WAVERLEY, NSW

27 MAY 2014 **REF: E26904KBrpt**

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

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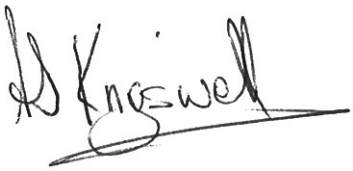
Report prepared by:

Vittal Boggaram
Associate Environmental Scientist

Report reviewed by:



Adrian Kingswell
Principal Environmental Scientist

EXECUTIVE SUMMARY

Sandrick Project Directions, on behalf of St Catherine's School ('the client'), commissioned Environmental Investigation Services (EIS) to undertake a preliminary Environmental Site Assessment (PESA) for the proposed alterations and additions to the existing school at 26 Albion Street, Waverley, NSW.

The site location is shown on the attached Figure 1 and the PESA was confined to the proposed development area as shown on the attached Figure 2 (referred to as 'the site' in this report).

The scope of work undertaken for the assessment included: review of background information; review of site information and site history documents; site inspection to identify Areas of Environmental Concern (AEC); preparation of a Preliminary Conceptual Site Model (PCSM); design and implementation of a field sampling and laboratory analysis program; and interpretation of the analytical results against the adopted Site Assessment Criteria (SAC).

The site history search indicated that the site has been used as a school since at least 1859. Alterations and additions were undertaken in 1980 to the senior classroom block and new buildings were constructed at the site in 1985. Some backfilling activity was undertaken during this period.

The following AEC were identified at the site:

- **Fill Material:** Fill material on site may have been historically imported from various sources and can contain elevated concentrations of contaminants;
- **Use of Pesticides for Landscaping:** Large sections of the site are covered by landscaping. The use of pesticides could have resulted in potential contamination. The use of Chlordane for termite proofing of buildings in 1985 could have resulted in point source contamination;
- **Electrical Sub-station (Potential Off-Site Source):** The site inspection identified the presence of an electrical sub-station located adjacent to the east site boundary with frontage onto Leichhardt Lane. The use of chemicals at the substation could have resulted in potential contamination migrating onto the subject site; and
- **Hazardous Building Materials:** The use of hazardous building material (e.g. asbestos) in the site buildings can result in potential contamination during demolition works.

Soil samples for this investigation were obtained from 10 evenly spaced sampling points as shown on the attached Figure 2. This density meets the minimum sampling density recommended by the EPA for the proposed development area.

Selected soil samples were analysed for a range of Potential Contaminants of Concern (PCC) identified in the PCSM (see **Section 6**). The laboratory results were assessed against the SAC adopted for the PESA (see **Section 7**).

All results were below the HIL-A and HSL-A criteria. The fill material is not considered to pose a risk to human receptors identified in the PCSM. A Fiber Cement Fragment (FCF) encountered in borehole BH303 was assessed to contain Synthetic Mineral Fibers (SMF) which is not considered to pose a risk to the receptors.

Two individual fill samples encountered zinc concentrations above the EILs adopted for the SAC. These elevations are not considered to pose an ecological risk due to the following:

- Zinc is naturally occurring metal which at low concentrations does not pose an ecological risk;
- The most conservative EILs were adopted as a screening tool for the assessment;
- Signs of vegetation stress was not visible during the site inspection; and

- The s149 certificates did not identify any ecological significant or threatened species at the site.

All of the pesticide results were below the SAC. These contaminants are not considered to pose a significant health or ecological risk to receptors identified in the PCSM.

A borehole BH305 was drilled down gradient from the sub-station. Elevated concentrations of contaminants were not encountered in the samples analysed from this borehole. The risk of widespread contamination from this off-site source is considered to be low.

The presence of hazardous building materials is considered to pose a relatively low risk to the human receptors identified in the PCSM provided that the demolition works of existing buildings are undertaken in accordance with the relevant codes and standards.

Due to the preliminary nature of the investigation the following data gaps remain:

- Inaccessible areas such as beneath buildings, swimming pool and areas of dense vegetation have not been investigated; and
- The groundwater at the site has not been investigated.

Based on the scope of works undertaken, EIS are of the opinion that the site is suitable for the proposed additions and alterations.

A hazardous building material (Hazmat) survey should be undertaken prior to the demolition of the site buildings.

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

Sandrick Project Directions, on behalf of St Catherine's School ('the client'), commissioned Environmental Investigation Services (EIS)[1] to undertake a preliminary Environmental Site Assessment (PESA) for the proposed alterations and additions to the existing school at 26 Albion Street, Waverley, NSW.

The site is identified as Lot 560 in DP 1138118. The site location is shown on the attached Figure 1 and the PESA was confined to the proposed development area as shown on the attached Figure 2. The proposed development area is referred to as 'the site' in this report.

The PESA was undertaken generally in accordance with an EIS proposal (Ref: EP7900KB-prop2) of 1 April 2014 and written acceptance from Sandrick Project Directions of 8 April 2014.

This report has been prepared to support the lodgement of a development application for the proposed development and ongoing use of the site as a school.

1.1 Proposed Development Details

EIS understand that the proposed development includes the demolition of a few existing buildings in the development area and construction of the following:

A basement level with proposed finished floor reduced level (RL) at RL74m to accommodate mechanical and aquatic plant and associated equipment. A new aquatic centre will be constructed directly above the basement level with a proposed pool deck at RL77.9m. A performing arts theatre is proposed immediately above the aquatic centre and an adjoining multi-purpose hall with a proposed finished floor level at RL85.9m. An option to construct a basement car parking level below a portion of the main pool area within the aquatic centre is also proposed. The car park would have a finished floor level at RL73.2m. Bulk excavation in this area is expected to extend to a maximum depth of approximately 8.8m.

The proposed foyer within the new aquatic centre (floor level at RL77.9m) will connect to the existing Dame Joan Sutherland Centre to the west (floor level at RL79.6m) via a stepped walkway. An extension to the north-western end of the aquatic centre (floor level at RL77.9m) will connect to the existing Jo Karaolis Sports Centre to the north-west with a stepped and ramped walkway extending up to the lower floor level of the sports centre (floor level at RL82.3m).

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

The new research centre will be constructed over the existing Jo Karaolis Sports Centre (current roof level at approximately RL91.7m) with a proposed finished floor level at RL91.9m. From the sports centre, the research centre will extend to the south-east over an 'undercroft' walkway access (finished floor level at RL85.9m) leading to the multipurpose hall, and extend east to the Leichhardt Lane frontage. The research centre will be supported by a combination of the existing sports centre footings and new footings.

1.2 Objectives

The objectives of the PESA are to:

- Assess the potential risk for widespread soil contamination at the site;
- Assess the potential risk to human health and the environment posed by the contaminants;
- Provide a preliminary waste classification for the off-site disposal of soil/bedrock excavated for the development; and
- Comment on the suitability of the site for the proposed development/landuse.

1.3 Scope of Work

The scope of work included:

- A review of background information made available to EIS;
- Preparation of site specific Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs);
- A review of site information and site history documents;
- A site inspection to identify areas of environmental concern (AEC);
- Preparation of a Preliminary Conceptual Site Model (PCSM) to outline the AEC, Potential Contaminants of Concern (PCC) and potential receptors;
- Design and implementation of a field sampling and laboratory analysis program;
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC); and
- Preparation of a report presenting the results of the assessment.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Amendment Act (2008[2])
State Environmental Planning Policy No.55 – Remediation of Land (1998[3])
Guidelines for Consultants Reporting on Contaminated Sites (2011[4])
Guidelines on the Duty to Report Contamination[5]
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006[6])
National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013[7])
NSW EPA Contaminated Sites Sampling Design Guidelines (1995[8])
NSW DECCW Waste Classification Guidelines - Part 1: Classifying Waste (2009[9])

[2] NSW Government Legislation, (2008), *Contaminated Land Management Amendment Act.* (referred to as CLM Amendment Act 2008)

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

[4] NSW Office of Environment and Heritage (OEH), (2011), *Guidelines for Consultants Reporting on Contaminated Sites.* (referred to as Reporting Guidelines 2011)

[5] NSW EPA, (Draft 2011), *Guidelines on the Duty to Report Contamination.* (referred to as Duty to Report Contamination 2011)

[6] NSW DEC, (2006), *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

[7] National Environment Protection Council (NEPC), (2013), *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).* (referred to as NEPM 2013)

[8] NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

[9] NSW DECCW, (2009), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2009)

2 BACKGROUND

2.1 Preliminary Contamination Screening (EIS, 2000[10])

A limited soil screening was undertaken by EIS for St Catherine's School in order to provide a waste classification (WC) in 2000. The WC was required for the disposal of material excavated for the proposed sports centre development.

The scope of work included drilling 5 boreholes in the development area using hand equipment. Selected soil samples from the boreholes were screened for limited contaminants in order to provide a WC.

The results of the screening were assessed against the former WC guidelines published by the EPA in 1999. The guideline has since been updated to the Waste Classification Guidelines 2009.

Based on the limited scope of work undertaken for the screening, the material to be excavated in the proposed development area was classed as 'Inert Waste'. This waste classification is no longer in use under the new guidelines.

2.2 JK Geotechnical Investigation (JK, 2013[11])

A geotechnical investigation was undertaken by JK Geotechnics for the proposed development in 2013. The investigation included drilling 5 boreholes (BH201 to BH205) at selected locations using hand held equipment. Copies of the borehole logs are attached in the appendices. A summary of the subsurface conditions encountered in the boreholes are summarised below:

- **Fill** - Sandy fill was encountered from the surface in all boreholes and extended to depths ranging from approximately 0.3m (BH205) to 1.1m (BH202). Based on the Dynamic Cone Penetration (DCP) test results, the fill was assessed to be poorly (occasionally moderately) compacted;

- **Natural Soil** - Natural sands were encountered beneath the fill in all the boreholes and extended to the top surface of the weathered sandstone bedrock. Based on the DCP test results, the natural sands were generally assessed to be loose (occasionally very loose or medium dense) on first contact and were consistently assessed to be at least medium dense below depths of approximately 2m (BH201), 2.6m (BH202), 2.2m (BH203), 1.6m (BH204) and 1.1m (BH205);

[10] EIS, (2000), *Environmental Soil Screening for Waste Disposal, St Catherine's School, 26 Albion Street, Waverley, NSW.* (Report Ref: E15537Flet, dated 28 November 2000) (referred to as EIS 2000 Report)

[11] JK, (2013), *Report to Sandrick on Geotechnical Investigation for Proposed Alterations and Additions at St Catherine's School, Albion Street, Waverley, NSW.* (Report Ref: 26904ZRrpt, dated 8 November 2013) (referred to as JK 2013 Report)

- **Bedrock** - Weathered sandstone bedrock was encountered in all the boreholes beneath the natural sands at depths of approximately 2.4m (BH204) and 5.2m (BH201). The bedrock surface steps down to the south from about RL87.7m (JK4) to RL74.1m (BH202) and was confirmed by site observations during construction of the Jo Karaolis Sports Centre. On first contact, the sandstone was assessed to be extremely weathered (occasionally distinctly weathered) and of extremely low to very low (occasionally very low to low) strength; and

- **Groundwater** - No discernible groundwater seepage was encountered during hand auger drilling, wash boring or core drilling of the boreholes. Standing water flush levels were recorded at depths of approximately 4.8m and 4.3m in BH201 and BH204, respectively. In BH204, the water flush level dropped to a depth of approximately 5.4m, 42 hours after borehole completion. This probably represents draining of the water flush through an open defect within the rock mass. Generally, full water flush returns were recorded which indicates a relatively impermeable rock mass. In BH201, 70% water flush returns were recorded and probably represent water loss through the upper sandy soil profile. Long term groundwater monitoring has not been carried out.

3 DATA QUALITY ASSESSMENT

3.1 Data Quality Objectives (DQOs)

The DQOs provide a systematic approach for undertaking the assessment and outlines the criteria against which the data can be assessed.

A methodology for establishing the DQOs is presented in the document *Data Quality Objectives Process for Hazardous Waste Site Investigations* (2000[12]). This methodology has been adopted in the NEPM 2013, AS4482.1-2005[13] and the Site Auditor Guidelines 2006. The main steps involved in preparing the DQOs are summarised in the table below:

Table 3-1: DQOs

Step	Input
State the Problem	The presence of contamination may pose a risk to human health and the environment. An investigation is required to assess the potential risk and to comment on the suitability of the site for the proposed development/landuse.
Identify the Decisions	The assessment aims to address the objectives outlined in **Section 1.2.**
Identify Inputs into the Decision	The following inputs will be used to address the decisions: • Review of background information (see **Section 2**). The laboratory data presented in the EIS 2000 report has not been included in this report for the following reasons: ➢ The data is over 14 years old and is not considered to be reliable; ➢ The laboratory analytical methods have changed during this time; and ➢ A meaningful assessment of the old values against the current NEPM 2013 guidelines cannot be made. • Review of site information including: regional geology; topography; acid sulfate soil (ASS) risk; hydrogeology; surface water flow; and review of major services (see **Section 4)**; • Review of site history information (see **Section 5);** • Undertake a site inspection to identify the AEC (see **Section 4**); • Prepare a PCSM (see **Section 6)**; • Design and implementation of a field sampling program (see **Section 8)**; • Design and implementation of a laboratory analysis program (see **Section 8**);

[12] US EPA, (2000), *Data Quality Objectives Process for Hazardous Waste Site Investigations.* (referred to as US EPA 2000)

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

Step	Input
	• Assessment of analytical data. The DQIs that will be used to assess the analytical data are outlined in **Section 3.2**; and • Compare the analytical results against the SAC outlined in **Section 7**.
Study Boundary	The investigation was confined to the proposed development area of the site as shown in Figure 2.
Develop a Decision Rule	The analytical results will be assessed against the SAC (see **Section 7).** The NEPM 2013 recommends using statistical analysis to assess the laboratory data for soil samples against the health based SAC. The data set should be assessed against the following criteria: • The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC; • The standard deviation (SD) of the results must be less than 50% of the SAC; and • No single value exceeds 250% of the relevant SAC. Statistical calculations are not required if all results are below the SAC. Statistical calculations are not undertaken on the following: • Health Screening Levels (HSLs) – elevated point source contamination associated with petroleum hydrocarbons can pose a vapour risk; and • Ecological Investigation Levels (EILs) – elevated EILs can pose a potential point source ecological risk.
Specific Limits on Decision Errors	Decision errors are false positive (i.e. stating the site is free of contamination when it is not) or false negative (i.e. stating that the site is contaminated when it is not). The more significant error is the false positive which may result in potential risks to human health and the environment. To account for this, the assessment has assumed that elevated concentrations of contaminants are present in the samples unless demonstrated otherwise.
Optimise the Design for Obtaining Data	The Site Auditor Guidelines 2006 recommend evaluating the data set as a whole to determine any limitations within the data set. The overall data set will be optimised by reviewing the data as the project proceeds. When necessary, adjustments will be made to the sampling or analytical program.

3.2 Data Quality Indicators (DQIs)

The DQIs required to address inputs into the decision include: precision, accuracy, representativeness, completeness and comparability. Reference should be made to the appendices for further information of the DQIs. The DQIs will be addressed as follows:

Table 3-2: DQIs

Indicator	Methods
Completeness	Data and documentation completeness will be achieved by: • Preparation of sampling and analysis plan; • Preparation of chain of custody (COC) records; • Review of the laboratory sample receipt information; • Use of National Association of Testing Authorities (NATA) registered laboratories for all analysis; • Visual, olfactory and PID screening of samples during the investigation; and • Laboratory analysis to target PCC. Any changes to the analytical schedule to be documented.
Comparability	Data comparability will be achieved by: • Maintaining consistency in sampling techniques; • Use of appropriate preservation, storage and transport methods; and • Use of consistent analysis techniques and reporting standards by the laboratories.
Representativeness	Data representativeness will be achieved by: • Appropriate coverage of sample locations across accessible areas of the site; and • Representative coverage of analysis for PCC. Any changes to the analytical schedule to be documented.
Precision	Precision will be achieved by: • Calculating the relative percentage difference (RPD) of duplicate samples; • The following acceptance criteria will be used to assess the RPD results: ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results < 5 times PQL, RPDs < 100% are acceptable; and • An explanation is provided if RPD results are outside the acceptance criteria.
Accuracy	Accuracy will be achieved by: • Use of trained and qualified field staff; • Appropriate industry standard sampling equipment and decontamination procedures; • Sampling and screening equipment will be factory calibrated on a regular basis. Calibration will be checked internally prior to use; • Sampling and equipment decontamination; • Collection and analysis of field Quality Assurance (QA) and Quality Control (QC) samples for PCC;

Indicator	Methods
	• The field QA/QC analysis adopted for this PESA is outlined in **Section 10;** • Acceptable concentrations in TS, TB and FR samples. Non-compliance to be documented in the report; • Appropriate sample preservation, handling, holding time and COC procedure; • Review of the primary laboratory QA/QC data including: RPDs, surrogate recovery, repeat analysis, blanks, laboratory control samples (LCS) and matrix spikes; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ RPDs: o results that are < 5 times the PQL, any RPD is acceptable; and o results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ LCS recovery and matrix spikes: o 70-130% recovery acceptable for metals and inorganics; o 60-140% recovery acceptable for organics; and o 10-140% recovery acceptable for VOCs; ➢ Surrogate spike recovery: o 60-140% recovery acceptable for general organics; and o 10-140% recovery acceptable for VOCs; ➢ Blanks: All less than PQL; and • Reporting to industry standards.

4 SITE INFORMATION AND PHYSICAL SETTING

4.1 Site Identification

Table 4-1: Site Identification Information

Site Owner:	Council of St Catherines Girls School Waverley
Site Address:	26 Albion Street, Waverley, NSW - 2024
Lot & Deposited Plan:	Lot 560 in DP1138118
Current Land Use:	School
Proposed Land Use:	School
Local Government Authority:	Waverley Council
Current Zoning:	Zone SP2 - Infrastructure
Area of Proposed Development (m^2):	3,500
RL (AHD in m) (approx.):	77 - 85
Geographical Location (MGA) (approx.):	N: 6247060 E: 338740
Site Location Plan:	Figure 1
Borehole Location Plan:	Figure 2

4.2 Site Location and Setting

The wider site is located in a predominantly residential area of Waverley and is bounded by Albion Street to the west, by Macpherson Street to the south, by Leichhardt Lane to the east and by existing residences to the north. Queens Park is located approximately 250m to the north-west of the wider site.

4.3 Topography

The wider site is located towards the crest of a hillside within an undulating regional topography which generally falls to the south and south-east towards the low lying Macpherson Street. The proposed development area is located to the south-east of the wider site with frontage onto Macpherson Street.

4.4 Site Inspection

A walkover inspection of the site and immediate surrounds was undertaken on 14 April 2014. The inspection was limited to accessible areas of the site and did not include an internal inspection of buildings. Selected site photographs obtained during the inspection are attached in the appendices.

At the time of the inspection, the north, central and south-west sections of the site were occupied by multi-level brick and concrete frame school buildings. Similar buildings extended to the north and west beyond the development area. A timber clad 'demountable' building supported on brick piers and electricity sub-station buildings were located on the east section of the site.

The south-east corner of the site was occupied by a concrete pool with rendered and concrete block amenities buildings. The north and south sections of the pool were in-ground and above-ground, respectively. The above-ground section of the pool appeared to be supported by concrete block footings. Limited access was available to the immediate north of the pool. The area appeared to indicate the presence of a sub-vertical sandstone bedrock face estimated to be approximately 0.5m to 1m high. The sandstone was assessed to be distinctly weathered and of at least low strength.

The surrounds to the school buildings comprised of concrete paved walkways and yard areas, occasional brick paved walkways, grass and synthetic grass surfaced areas. Landscaped areas over the south end of the subject site contained medium to large size trees. Two storm water pits (3.2m and 3.6m deep) connecting to on-site detention bladders were located over the east end of the central grassed area immediately to the south of the Jo Karaolis sports centre.

The surface levels over the subject site generally stepped or sloped down to the south. The steps in surface levels were supported by sandstone masonry retaining walls which ranged from approximately 0.6m to 4m high.

The east section of the south site boundary was lined by sandstone masonry and brick retaining walls (1.1m to 1.9m high) which supported a landscaped area immediately to the south of the above described pool. The adjacent section of the site boundary to the west was lined by the Dame Joan Sutherland building.

4.5 Surrounding Land Use

The immediate surrounds included the following landuses:

- North – Existing school buildings;
- South – Macpherson Street;
- East – Leichhardt Lane; and

- West – Existing school buildings.

4.6 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the assessment. Copies of relevant plans are attached in the appendices. A brief summary of relevant information is present below:

Table 4-2: Summary of Services

Service	Location	Contaminant Migratory Pathway
Sewer	The Sydney Water plan indicates that a sewer extends through the central section of the site from the east site boundary. A plan showing the service is attached in the appendices.	The backfill around the sewer could act as a potential migratory pathway for volatile and mobile contaminants.
Electrical	The plans indicate that an electrical substation was located adjacent to the east site boundary with frontage onto Leichhardt Lane. This was confirmed by the site inspection. Services from the sub-station extended away from the site towards the east.	The substation could have resulted in potential point source contamination adjacent to the site boundary.

4.7 Regional Geology

A review of the regional geological map of Sydney (1983[14]) indicates that the site is underlain by Quaternary age 'marine' sands with podsols overlying Hawkesbury Sandstone. In addition, an igneous dyke intrusion (trending approximately west-north-west to east-south-east) is indicated to be located close to the south site boundary. Hawkesbury Sandstone typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

4.8 Acid Sulfate Soil (ASS) Risk

The site is not located in an ASS risk area.

4.9 Hydrogeology

A review of groundwater bores registered with the NSW Office of Water[15] (NOW) was undertaken by EIS. The search was limited to registered bores located within

[14] Department of Mineral Resources, (1983), *1:100,000 Geological Map of Sydney (Series 9130).*

[15] http://www.waterinfo.nsw.gov.au/gw/, visited on 8 May 2014

approximately 1km of the site. The search indicated the existence of 1 registered bore GW110884 located to the south of the site. The bore is used as a test bore and was drilled to a depth of approximately 4.5m below ground level. Copies of the records are attached in the appendices.

The stratigraphy of the site is expected to consist of sandy soil overlying relatively shallow bedrock. Based on these conditions and the results of the groundwater bore search, groundwater is not considered to be a significant resource for abstraction purposes in the immediate vicinity of the site.

Reference should be made to **Section 9** for further information regarding the groundwater conditions encountered at the site during the investigation.

4.10 Surface Water Flows

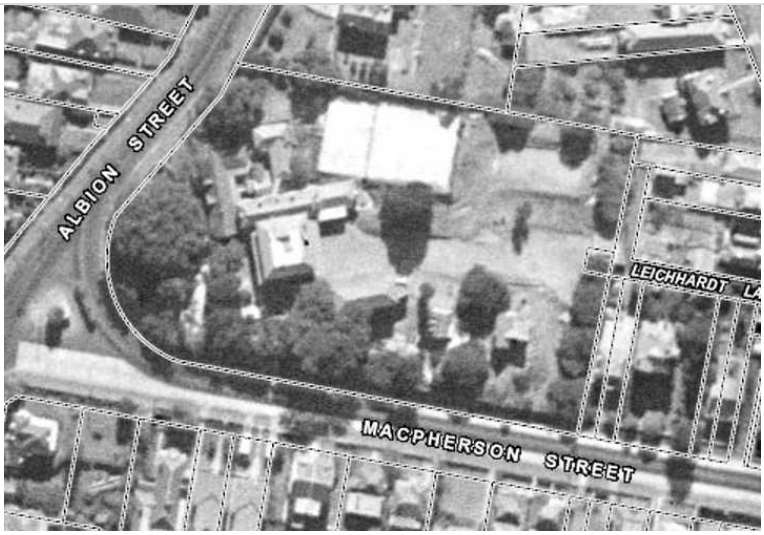
Based on the site and surrounding topography, surface water flows would be expected to enter the street stormwater system flowing toward the south and/or south-east towards Macpherson Street.

5 SITE HISTORY ASSESSMENT

5.1 Aerial Photographs

Historical aerial photographs of the site and immediate surrounds were reviewed for the assessment. The majority of the photographs were obtained from the NSW Department of Lands. A summary of the relevant information is presented in the following table:

Table 5-1: Summary of Historical Aerial Photos

Year	Details
1930	The photograph was of poor quality. The subject site formed part of the wider school and was relatively vacant. A small building was located in the south section of the site. A few trees were scattered across the site. The school buildings were located in the north and west sections of the site. The immediate surrounds were predominantly residential.
1943[16]	 The subject site was relatively vacant and generally appeared similar to the 1930 photograph. The site appeared undulating with a few steep slopes which appeared to fall to the south. The vacant areas appeared to be grassed. A small building was located in the south section of the site. A few trees were scattered across the site. The school buildings were located in the north and west sections of the site. The immediate surrounds appeared similar to the 1930 photograph.
1951	The site and immediate surrounds generally appeared similar to the 1943 photograph. A few additional buildings had been constructed in the north section of the wider school area.

[16] https://six.maps.nsw.gov.au/wps/portal/SIXViewer, visited on 13 May 2014

Year	Details
1961	The subject site appeared to be terraced with grass cover. A few medium sized trees were scattered across the subject site. The immediate surrounds appeared similar to the 1951 photograph.
1970	The site and immediate surrounds generally appeared similar to the 1961 photograph.
1978	An above ground swimming pool was located in the south section of the site. The remaining sections of the site appeared similar to the 1970 photograph.
1986	The site and immediate surrounds generally appeared similar to the 1978 photograph.
1994	The subject site and immediate surrounds appeared similar to the present layout.
2002	The subject site and immediate surrounds appeared similar to the present layout.
2005	The subject site and immediate surrounds appeared similar to the present layout.

5.2 Land Title Search

A review of historical land title information presented in the NBRS Heritage Assessment Report (December 2013[17]) was undertaken for this assessment. The heritage report was prepared for the master plan development of the wider site and included the subject site. Reference should be made to the NBRS report for further information.

A review of the heritage report indicates that the site was originally a school for the daughters of the Anglican clergy. The foundation stone for the original building was laid by Bishop Barker in 1857 and the school was opened in 1859. The school is the oldest independent girl's school in Australia. The buildings were refurbished and additional buildings were constructed in 1886 and during 1935 and 1936. Prior to the commencement of the school, the land was part of the wider Crown Land.

[17] NBRS + Partners, (2013), *Heritage Assessment, St Catherines School Waverley, Master Plan Subdivison, December 2013*.

5.3 Waverley Council Records

5.3.1 Council Information

A review of selected property files held by Council was undertaken by EIS on 22 April 2014. The files indicated the following activities which could have resulted in possible contamination:

- Alterations and additions were undertaken in 1980 to the senior classroom block. This included the demolition of various buildings which could have contained hazardous building materials like asbestos and lead in paint; and
- New building works and alterations to existing buildings were undertaken in 1985. This included sub-base filling and backfilling which could have imported potentially contaminated fill onto the site. The buildings were treated for termite proofing which included the use of the Organochlorine Pesticide (OP) compound Chlordane.

5.3.2 Section 149 Planning Certificate

The s149 (2 and 5) planning certificates were reviewed for the assessment. Copies of the certificates are attached in the appendices. A summary of the relevant information is presented below:

- The site is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM Act 1997;
- The site is not subject to a Site Audit Statement (SAS);
- The site is not located within an ASS risk area;
- The site is located in a heritage conservation area; and
- The site contains an item of environmental heritage.

5.4 WorkCover Records

WorkCover records were reviewed for the assessment. A copy of the WorkCover letter is attached in the appendices. The search did not indicate any licences to store dangerous goods including underground fuel storage tanks (USTs) or above ground storage tanks (ASTs) at the site.

5.5 NSW EPA Records

The NSW EPA records available online were reviewed for the assessment. A summary of the relevant information is provided in the following table:

Table 5-2: Summary of NSW EPA Online Records

Source	Details
CLM Act 1997[18]	There were no notices for the site under Section 58 of the Act.
NSW EPA List of Contaminated Sites[19]	The site is not listed on the NSW EPA register.
POEO Register[20]	There were no notices for the site on the POEO register.

5.6 Summary of Site History

A summary of the site history information is presented below:

- The aerial photographs and land title records indicate that the site has been used as a school since at least 1859;
- Council records indicate the site is located in a heritage conservation area and contains an item of environmental heritage;
- WorkCover records did not indicate any licences to store dangerous goods at the site; and
- NSW EPA records did not indicate any notices for the site.

5.7 Integrity of Site History Information

The majority of the site history information has been obtained from government organisations as outlined above. The veracity of the information from these sources is considered to be relatively high. A certain degree of information loss can be expected given the age of the development; gap between aerial photographs; and lack of detailed information prior to the 1900's.

[18] http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx, visited on 13 May 2014
[19] http://www.epa.nsw.gov.au/clm/publiclist.htm, visited on 13 May 2014
[20] http://www.epa.nsw.gov.au/prpoeoapp/, visited on 13 May 2014

6 PRELIMINARY CONCEPTUAL SITE MODEL (PCSM)

6.1 Areas of Environmental Concern (AEC) & Potential Contaminants of Concern (PCC)

The AEC identified in the table below are based on a review of the background information, site history information and site inspection. The AEC are sections of the site that have potentially been impacted by activities, site conditions and/or specific features that could present an environmental concern with regards to potential contamination.

Table 6-1: AEC and PCC

AEC	PCC
Fill Material: Fill material on site may have been historically imported from various sources and can contain elevated concentrations of contaminants.	HM, TPH, BTEX, PAHs, OCPs, OPPs, PCBs and asbestos
Use of Pesticides for Landscaping: Large sections of the site are covered by landscaping. The use of pesticides could have resulted in potential contamination. The use of Chlordane for termite proofing of buildings in 1985 could have resulted in point source contamination.	HM, OCPs and OPPs
Electrical Sub-station (Potential Off-Site Source): The site inspection identified the presence of an electrical sub-station located adjacent to the east site boundary with frontage onto Leichhardt Lane. The use of chemicals at the substation could have resulted in potential contamination migrating onto the subject site.	HM, TPH, BTEX, PAHs and PCBs
Hazardous Building Materials: The use of hazardous building material (e.g. asbestos) in the site buildings can result in potential contamination during demolition works.	Asbestos, lead and PCBs

Note:
HM – Heavy metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel & zinc
TPH – Total petroleum hydrocarbons including light, mid and heavy fractions
BTEX – Monocyclic aromatic hydrocarbons
VOCs - Volatile organic compounds includes BTEX compounds
PAHs - Polycyclic aromatic hydrocarbons
OCPs - Organochlorine pesticides
OPPs - Organophosphorus pesticides
PCBs - Polychlorinated Biphenyls

6.2 Contamination Fate and Transport

The fate and transport of PCC identified at the site is summarised in the following table:

Table 6-2: Fate and Transport of PCC

PCC	Fate and Transport
Non-volatile contaminants including: metals, heavy fraction PAHs, OCPs, OPPs, PCBs and asbestos	With the exception of asbestos, non-volatile contaminants are predominantly confined to the soil and groundwater medium. The mobility of these contaminants varies depending on: the nature and type of contaminant present (e.g. leachability, viscosity etc.); soil type/porosity; surface water infiltration; groundwater levels; and the rate of groundwater movement. ***Presence of Ash and Slag:*** Non-volatile contaminants associated with ash and slag waste (some heavy metals, heavy fraction PAHs, and sometimes heavy fraction TPHs) are bound within a relatively insoluble matrix. Slag and ash is usually formed as a by-product of combustion at high temperatures which 'locks in' the contaminants within the matrix. ***Presence of Asbestos:*** The potential transport of asbestos fibres is associated with the disturbance of asbestos contaminated soils and release of fibres into the atmosphere. This is likely to occur during excavation works. A number of studies have found that soils effectively filter out asbestos fibres and retain them within the soil matrix. The studies concluded that there is no significant migration of asbestos fibres, either through soil or groundwater. ***Site Conditions:*** Surface water has the potential to infiltrate into the subsurface at the subject site via garden beds, grassed areas, unlined water retention facilities etc. Surface water infiltration could increase the migration potential of certain contaminants.
Volatile contaminants including: TPH, BTEX, VOCs and light fraction PAHs	Volatile contaminants are usually more mobile when compared to the non-volatile compounds. The potential for migration of volatile contaminants such as light fraction PAHs and TPH is relatively high in sandy soil with a high water table. These contaminants break down rapidly as a result of microbial activity and availability of nutrients including nitrogen, oxygen etc. The mobile contaminants would be expected to move down to the rock surface or groundwater table and migrate down gradient from the source. The mobility would depend on a range of factors such as: soil

PCC	Fate and Transport
	type/porosity; surface water infiltration; groundwater levels; confining layers within the aquifer; solubility in groundwater etc.

6.3 Sensitive Receptors and Exposure Pathways

The potential receptors and exposure pathways identified at the site are presented in the following table:

Table 6-3: Potential Receptors and Exposure Pathways

Receptor	Pathway
Human Receptors: • Site occupants; • Site visitors; • Contractors and workers; • Future site occupants; and • Off-site occupants.	• Dermal contact, ingestion and inhalation; • Inhalation of airborne asbestos fibres; and • Abstraction and use of contaminated groundwater.
Environmental Receptors: • Landscaped areas located at the site.	• Exposure by direct contact with plants and animals; and • Extraction and use of contaminated water for landscaping.

7 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for this PESA is outlined in the table below. The SAC has been derived from NEPM 2013 and other guidelines as outlined in **Section 1.3**. Explanatory notes are included in the attached appendices.

The guideline values for individual contaminants outlined in Schedule B1 of the NEPM 2013 are reproduced in the appendices. The criterion for the individual contaminants analysed for this assessment are presented in the attached report tables.

Table 7-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs)	The HIL-A criteria for 'Residential with Accessible Soil' has been adopted for this PESA. These criteria are also considered to be the most suitable for primary schools.
Health Screening Levels (HSLs)	The HSL-A criteria for 'Residential with Accessible Soil' has been adopted for this PESA.
Ecological Assessment Criteria	A detailed assessment of ecological risk has not been undertaken for this PESA. A preliminary assessment of ecological risk, based on the limited information available at this stage, has been included in the report. The Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for 'Urban Residential and Public Open Space (URPOS)' have been adopted for the preliminary assessment. The ABC values for high traffic (25th percentiles) areas for old suburbs of NSW published in Olszowy et. al. (1995[21]) has been adopted for calculating the EILs for certain heavy metals.
Asbestos in Soil	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion for the Preliminary Site Investigation (PSI).
Waste Classification (WC) Criteria	The criteria outlined in the Waste Classification Guidelines 2009 have been adopted for this investigation.

[21] Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission.

8 INVESTIGATION PROCEDURE

8.1 Soil Sampling Plan

The NSW EPA Sampling Design Guidelines 1995 recommend a sampling density for a contamination assessment based on a systematic sampling pattern. Based on the size of the investigation area, the guidelines provide a minimum number of sampling points required for the investigation.

The guidelines recommend sampling from a minimum of 10 evenly spaced sampling points for the development areas of approximately 3,500m^2.

Samples for this investigation were obtained from 10 evenly spaced sampling points as shown on the attached Figure 2. This density meets the minimum sampling density recommended by the EPA.

The sampling locations were placed on a systematic plan with a grid spacing of approximately 30m between sampling location. A systematic plan was considered suitable to address potential contaminants associated with the fill material.

Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings.

8.2 Soil Sampling Methodology

Fieldwork for this investigation was undertaken on 14 April 2014. Sampling locations were set out using a tape measure. Locations were marked using spray paint. The sampling locations were cleared for underground services prior to drilling.

The majority of the sample locations were drilled using a four-wheel-drive (4wd) mounted hydraulically push tube rig. Soil samples were obtained from disposable polyethylene push tube samplers. In hard to access areas, the boreholes were drilled using hand equipment.

Soil samples were collected from the fill and natural profiles encountered during the investigation. Additional fill samples were obtained when relatively deep fill (>0.5m) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. All samples were recorded on the borehole logs attached in the appendices.

During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.

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. The samples were labelled with the job number, sampling location, sampling depth and date.

8.2.1 VOC Screening

A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for 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 for 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 attached in the appendices.

8.2.2 Decontamination and Sample Preservation

Details of the decontamination procedure adopted during sampling are presented in the appendices. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water.

Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS4482.1-2005 and AS4482.2-1999[22] as summarised in the following table:

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

Table 8-1: Soil Sample Preservation and Storage

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)	As above	Store at <4°, analysis within 14 days
PAHs, OCP, OPP & PCBs	As above	Store at <4°, analysis within 14 days
Asbestos	Sealed plastic bag	None

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. Field sampling protocols adopted for this assessment are summarised in the attached appendices.

8.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 8-2: Analytical Schedule

PCC	No. of Fill Soil Samples	No. of Natural Soil Samples	No. of Fibre Cement Fragments (FCF)
Heavy Metals	12	2	-
TPH	12	2	-
BTEX	12	2	-
PAHs	12	2	-
OCPs/OPPs	9	-	-
PCBs	9	-	-
Asbestos	9	-	2

8.4 Laboratory Analysis

The samples were analysed by the following laboratories:

Table 8-3: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples, intra-laboratory duplicates, trip blanks and trip spikes samples	Envirolab Services Pty Ltd, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	108268 and 108268-A
Inter-laboratory duplicates	Envirolab Services Pty Ltd (VIC), NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	3738
FCF	Pickford & Rhyder Consulting Pty Ltd, NATA Accreditation Number – 2515	78791-ID

Samples were analysed by the laboratories using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

9 INVESTIGATION RESULTS

9.1 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

Table 9-1: Summary of Subsurface Conditions

Profile	Description[1]
Fill	Fill material was encountered at the surface in all boreholes and extended to depths of approximately 0.2m to 1.8m. BH302, BH303, BH308 and BH310 were terminated in the fill at a maximum depth of approximately 0.5m to 1m. The fill typically comprised of: silty sand; silty gravelly sand; sandy silt; and silty clay. The fill contained inclusions of: ash; slag; trace of brick, tile and concrete fragments; quartz, igneous, sandstone and ironstone gravel; root fibres; clay nodules; domestic waste; and FCF. FCF was encountered in borehole BH303 at a depth of approximately 0.5m. The FCF was sampled for laboratory analysis.
Natural Soil	Silty sand natural soil was encountered below the fill in boreholes BH301, BH304, BH305 and BH306. The natural soil in these boreholes extended to depths of approximately 0.7m to 2.8m. The silty sand was fine to medium grained.
Bedrock	Sandstone bedrock was encountered below the natural soil and fill in boreholes BH301, BH307 and BH309. The sandstone was of fine to medium grained, extremely weathered and of extremely low strength on first contact.
Groundwater	Groundwater seepage was encountered in boreholes BH301 during drilling at depths of approximately 1.6m. The remaining boreholes were dry during drilling.

Note:
1 – Depths described in metres below ground level

9.1.1 VOC Screening

PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The majority of the PID readings were 0 ppm. Fill sample BH308 (0m-0.3m) encountered a PID value of 31.2ppm which indicates PID detectable VOCs.

9.2 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 9-2: Summary of Soil Laboratory Results

<table>
<tr><th>Analyte</th><th>Results Compared to SAC</th></tr>
<tr><td>Heavy Metals</td><td><u>HILs:</u>
All heavy metal results were below the HIL-A criteria.

<u>EILs:</u>
The majority of the heavy metal results were below the EIL-URPOS criteria. Elevated concentrations of individual metals were encountered above the EIL-URPOS in two fill samples as outlined below:

<table>
<tr><th>Analyte</th><th>Sample/Depth</th><th>Description</th><th>EIL</th><th>Concentration</th></tr>
<tr><td>Zinc</td><td>BH308 (0m-0.3m)</td><td>Fill</td><td>192</td><td>490</td></tr>
<tr><td>Zinc</td><td>BH310 (0m-0.4m)</td><td>Fill</td><td>192</td><td>250</td></tr>
</table>

<u>WC:</u>
The majority of the heavy metal results were less than the CT1 criteria. Three fill samples encountered lead concentrations above the CT1 but below the SCC1 criteria. TCLP leachates were prepared from the three samples and analysed for lead. The results were less than the TCLP1 criteria.</td></tr>
<tr><td>TPH</td><td><u>HSLs:</u>
All TPH results were below the HSL-A criteria.

<u>ESLs:</u>
All TPH results were below the ESL-URPOS criteria.

<u>WC:</u>
All TPH results were less than the relevant CT1 and SCC1 criteria.</td></tr>
<tr><td>BTEX</td><td><u>HSLs:</u>
All BTEX results were below the HSL-A criteria. Fill sample BH308 (0m-0.3m) encountered a Total Xylene value of 1mg/kg. This value was below the HSL-A criterion of 40mg/kg. The elevated PID value in this sample can be attributed to the presence of Xylenes in the sample.

<u>ESLs:</u>
All BTEX results were below the ESL-URPOS criteria.

<u>WC:</u>
All BTEX results were less than the relevant CT1 criteria.</td></tr>
</table>

Analyte	Results Compared to SAC
PAHs	**HILs:** All PAH results were below the HIL-A criteria. **HSLs:** All naphthalene results were below the HSL-A criteria. **ESLs:** All benzo(a)pyrene results were below the ESL-URPOS criteria, **EILs:** All naphthalene results were below the EIL-URPOS criteria. **WC:** The majority of the PAH results were less than the relevant CT1 and SCC1 criteria. An intra-laboratory duplicate sample Dup 1 (duplicate of primary sample BH308 (0m-0.3m)) encountered a B(a)P value of 0.83mg/kg which is above the CT1 but below the SCC1 criteria. TCLP leachates were prepared from the primary sample BH308 (0m-0.3m) sample and analysed for PAHs. The B(a)P result was less than the TCLP1 criteria.
OCPs & OPPs	**HILs:** All OCP and OPP results were below the HIL-A criteria. **EILs:** All DDT results were below the EIL-URPOS criteria. **WC:** All OCP and OPP results were less than the relevant SCC1 criteria.
PCBs	**HILs:** All PCB results were below the HIL-A criterion. **WC:** All PCB results were less than the SCC1 criterion.
Asbestos	**PSI:** Asbestos was not detected in the soil samples analysed for the investigation. FCF encountered in the fill in borehole BH303 at depth of 0.5m-0.7m was analysed for asbestos in material. The results indicate that the sample contained synthetic mineral fibres (SMF).

10 QA/QC ASSESSMENT

The QA/QC assessment includes a review of the DQIs established for the investigation (see **Section 3.2**). A summary of the field QA/QC samples are outlined below:

Table 10-1: Field QA/QC Samples

Field QA/QC	Frequency	Sample Details
Intra-laboratory duplicates	7% of Primary Samples	Soil Samples: Dup 1 is a soil duplicate of sample BH308 (0m-0.3m)
Inter-laboratory duplicates	7% of Primary Samples	Soil Samples: Dup 2 is a soil duplicate of sample BH309 (0m-0.4m)
TB	1 per batch	TB (sand blank) of 14 April 2014
TS	1 per batch of volatiles	Trip Spike (TS) (soil) is a BTEX spike of 14 April 2014

An assessment of the DQIs is summarised in the following table.

Table 10-2: Assessment of DQIs

Completeness

Data and documentation completeness was achieved through the following measures:

- A sampling and analysis plan was prepared for the investigation;
- COC records were prepared for each batch of samples sent to the labs (refer to appendices);
- Laboratory sample receipt information was reviewed for each batch (refer to appendices);
- NATA registered laboratories were used for all analysis;
- Visual observations and PID screening of samples was undertaken during the investigation as noted on the boreholes logs and COC documents (refer to appendices); and
- All soil samples were analysed for the PCC identified in **Section 6.1**, except for VOCs which were screened using a PID.

Comparability

Data comparability was achieved through the following measures:

- Similar sampling techniques were used during the investigation;
- Appropriate preservation, storage and transport methods were adopted for all samples; and
- Consistent analysis techniques and reporting standards were adopted by the laboratories.

Representativeness

Data representativeness was achieved through the following measures:

- The sampling plan was optimised to obtain adequate coverage of sample locations; and
- The assessment included a representative coverage of analysis for PCC.

Precision

Intra-laboratory RPD Results:

The intra-laboratory soil RPD results are presented in the attached report tables. The results indicated that field precision was acceptable.

The RPD values for a range of individual PAHs were outside the acceptance criteria. Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. Where applicable, the higher duplicate value has been adopted as a conservative measure (see attached report tables). As both the primary and duplicate sample results were less than the SAC, these exceedences are not considered to have had an adverse impact on the data set as a whole.

Inter-laboratory RPD Results:

The inter-laboratory soil RPD results are presented in the attached report tables. The results indicated that field precision was acceptable.

Accuracy

Accuracy was achieved through the following measures:

- Trained and qualified field staff were used for the investigation;
- Appropriate industry standard sampling equipment and decontamination procedures were adopted for the investigation as outlined in the attached appendices;
- Sampling and screening equipment are routinely factory calibrated. An in-house calibration check was undertaken prior to using onsite;
- Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation;
- The report was prepared generally in accordance with Reporting Guidelines 2011;
- Accuracy of field sampling was assessed as follows:
  - TS Results: The trip spike results are presented in the attached report tables. The BTEX results for the trip spikes ranged from 107% to 109% and indicated that field preservation methods were appropriate;
  - TB Results: The trip blank results are presented in the attached report tables and were all less than the PQLs.
- Review of laboratory QA/QC data indicated that the QA/QC results were within the acceptance criteria adopted by the individual laboratories.

11 WASTE CLASSIFICATION (WC)

11.1 Classification of Fill Soil for Off-Site Disposal

The waste classification for the fill material is summarised in the following table:

Table 11-1: Waste Classification of Fill

Extent	Classification	Disposal Option
Fill material	General Solid Waste (non-putrescible) (GSW)	A facility licensed by the NSW EPA to receive the waste stream. Alternatively, the fill material is considered to be suitable for re-use on the site provided it meet geotechnical and earthwork requirements.

The fill material must be disposed of to a NSW EPA licensed facility. It is the responsibility of the receiving facility to ensure that the material meets their EPA license conditions. EIS accepts no liability whatsoever for illegal or inappropriate disposal of excavated material.

11.2 Classification of Natural Soil and Bedrock for Off-Site Disposal

The waste classification for the natural material is summarised in the following table:

Table 11-2: Waste Classification of Natural Material

Extent	Classification	Disposal Option
Natural sandy soil and sandstone bedrock	Virgin excavated natural material (VENM)	VENM is considered suitable for re-use on the 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. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

Material classed as VENM must not be mixed with any fill material (including building rubble) as this will invalidate the VENM classification. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted.

12 TIER 1 RISK ASSESSMENT AND REVIEW OF PCSM

12.1 Fill Material

All of the fill results were below the HIL-A and HSL-A criteria. The fill material is not considered to pose a risk to human receptors identified in the PCSM. The FCF encountered in borehole BH303 encountered SMF which is not considered to pose a risk to the receptors.

Two individual fill samples encountered zinc concentrations above the EILs adopted for the SAC. These elevations are not considered to pose an ecological risk due to the following:

- Zinc is naturally occurring metal which at low concentrations does not pose an ecological risk;
- The most conservative EILs were adopted as a screening tool for the assessment;
- Signs of vegetation stress was not visible during the site inspection; and
- The s149 certificates did not identify any ecological significant or threatened species at the site.

12.2 Pesticides for Landscaping

All of the pesticide results were below the SAC. These contaminants are not considered to pose a significant health or ecological risk to receptors identified in the PCSM.

12.3 Electrical Sub-Station (Potential Off-Site Source):

A borehole BH305 was drilled down gradient from the sub-station. Elevated concentrations of contaminants were not encountered in the samples analysed from this borehole. The risk of widespread contamination from this off-site source is considered to be low.

12.4 Hazardous Building Materials

The presence of hazardous building materials is considered to pose a relatively low risk to the human receptors identified in the PCSM provided that the demolition works of existing buildings are undertaken in accordance with the relevant codes and standards.

12.5 Data Gaps

Due to the preliminary nature of the investigation the following data gaps remain:

- Inaccessible areas such as beneath buildings, swimming pool and areas of dense vegetation have not been investigated; and
- The groundwater at the site has not been investigated.

13 CONCLUSION

EIS consider that the report objectives (see **Sections 1.2** and **Section 3**) have been addressed. Based on the scope of works undertaken, EIS are of the opinion that the site is suitable for the proposed additions and alterations.

A hazardous building material (Hazmat) survey should be undertaken prior to the demolition of the site buildings.

13.1 Regulatory Requirement

The regulatory requirements applicable for the site are outlined in the following table:

Table 13-1: Regulatory Requirement

Guideline	Applicability
POEO Act 1997	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.
Work Health and Safety Code of Practice 2011[23]	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.
Dewatering Consent	In the event groundwater is intercepted during excavation works, dewatering may be required. Council, NSW Office of Water (NOW) and other relevant approvals (from discharge authorities like Sydney Water etc.) should be obtained prior to the commencement of dewatering.

[23] WorkCover NSW, (2011), *WHS Regulation: Code of Practice – How to Manage and Control Asbestos in the Workplace.*

14 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- 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;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- 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;
- The investigation 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 in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- 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;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and

- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

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

The 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 or landscaped areas 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 (e.g. 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 Report 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.

Assessment Limitations

Although information provided by a 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 Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an 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 Assessment Report

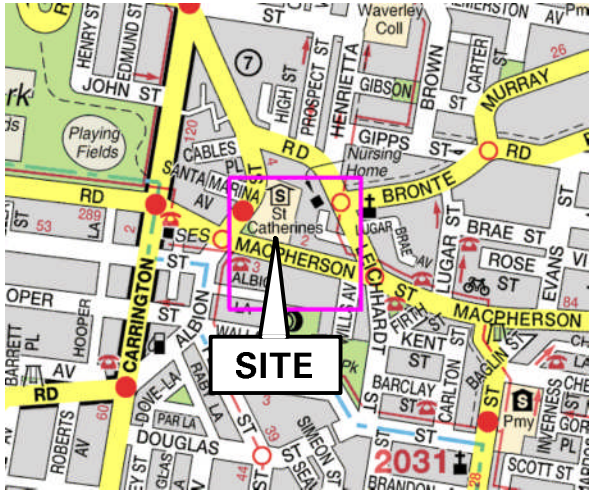
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, 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 rest 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.

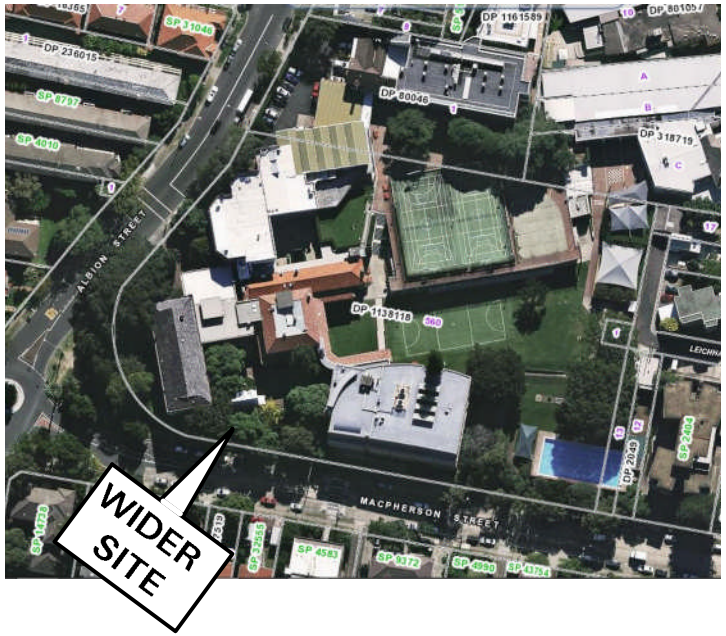
To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information 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.

REPORT FIGURES





N

NOTES:
Figure 1 has been recreated from UBD on disc (version 5.0) and NSW Department of Lands SIX Maps. Figure is not to scale.

UBD Map ref: 257G9

Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES

Project Number:	Title:
E26904KB	SITE LOCATION PLAN
Figure: 1	Address: 26 ALBION STREET, WAVERLEY, NSW

N

NOTES:
Figure 2 has been recreated from NSW Department of Lands SIX Maps.

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

LEGEND:

Approximate site boundary

BH301 (1.2) **Borehole location, number and depth of fill (m) (EIS 2014)**

Approximate Scale (m): 0 6 12 18 24 30

ENVIRONMENTAL INVESTIGATION SERVICES

Project Number:	Title:
E26904KB	BOREHOLE LOCATION PLAN
Figure: 2	Address: 26 ALBION STREET, WAVERLEY, NSW

REPORT TABLES

TABLE A

CHEMICAL CONTAMINANT CRITERIA FOR WASTE CLASSIFICATION

Waste Classification Guidelines Part 1: Classifying Waste DECC NSW July 2009

All data in mg/kg unless stated otherwise

CONTAMINANT	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE		
	CT1 (mg/kg)	TCLP1 (mg/L)	SCC1 (mg/kg)	CT2 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
Heavy Metals						
Arsenic	100	5	500	400	20	2,000
Beryllium	20	1	100	80	4	400
Cadmium	20	1	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	180	400	20	720
Monocyclic Aromatic Hydrocarbons						
Benzene	10	0.5	18	40	2	72
Toluene	288	14.4	518	1,152	57.6	2,073
Ethyl benzene	600	30	1,080	2,400	120	4,320
Total xylenes	1,000	50	1,800	4,000	200	7,200
Petroleum Hydrocarbons (TPH)						
Light Fraction TPH (C6-C9)	nsl	nsl	650	nsl	nsl	2,600
Mid to Heavy Fraction TPH (C10-C36)	nsl	nsl	10,000	nsl	nsl	40,000
Polycyclic Aromatic Hydrocarbons (PAHs)						
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23
Total PAHs	nsl	nsl	200	nsl	nsl	800
Others						
Polychlorinated biphenyls	nsl	nsl	<50	nsl	nsl	<50
Phenol (non-halogenated)	288	14.4	518	1,152	57.6	2,073
Scheduled chemicals	nsl	nsl	<50	nsl	nsl	<50

Explanation:

1). General Solid Waste (GSW):

- If SCC ≤ CT1 then TCLP not needed to classify the material as GSW
- If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as GSW

2). Restricted Solid Waste (RSW):

- If SCC ≤ CT2 then TCLP not needed to classify the material as RSW
- If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as RSW

3). Hazardous Waste (HW):

- If SCC > CT2 then TCLP not needed to classify the material as HW
- If TCLP > TCLP2 and/or SCC > SCC2 then treat as HW

Abbreviations:

SCC – Specific Contaminant Concentration

CT – Contaminant Threshold

TCLP – Toxicity Characteristics Leaching Procedure

nsl - No Set Limit

DECC - NSW Department of Environment and Climate Change (now OEH)

TABLE B
SOIL LABORATORY RESULTS COMPARED TO HILs
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI [2]	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P TEQ [3]	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0,1	0.1	100
Site Assessment Criteria (SAC) [1]			100	20	100	6000	300	40	400	7400	300	3	10	270	300	6	50	240	6	160	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH301	0-0.3	Fill - Silty Sand	LPQL	LPQL	3	8	36	LPQL	3	58	0.28	LPQL	LPQL	LPQL	LPQL	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH301	0.5-0.8	Fill - Silty Sand	LPQL	LPQL	2	8	49	0.1	1	98	0.16	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH301	1.5-1.7	Sandstone	LPQL	LPQL	1	LPQL	3	LPQL	LPQL	2	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH302	0.1-0.4	Fill - Silty Sand	LPQL	LPQL	8	7	6	LPQL	5	22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH303	0-0.3	Fill - Silty Sand	LPQL	LPQL	4	7	19	LPQL	2	43	0.27	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH303	0.5-0.7	Fill - Silty Sand	LPQL	LPQL	4	2	8	LPQL	1	18	3.62	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH304	0-0.3	Fill - Silty Sand	LPQL	LPQL	3	7	16	LPQL	9	35	0.25	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH304	2.5-2.8	Silty Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH305	0.2-0.5	Fill - Silty Sand	LPQL	LPQL	4	15	51	0.1	3	100	3.84	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH306	0-0.2	Fill - Silty Sand	LPQL	LPQL	2	11	110	LPQL	1	96	7.09	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH307	0-0.3	Fill - Silty Sand	LPQL	LPQL	4	8	26	LPQL	3	36	0.61	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH308	0-0.3	Fill - Silty Sand	LPQL	LPQL	7	39	190	0.2	4	490	6.4	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH309	0-0.4	Fill - Silty Sand	LPQL	LPQL	2	13	43	LPQL	LPQL	27	4.16	1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH310	0-0.4	Fill - Silty Sand	LPQL	LPQL	5	36	150	0.2	3	250	2.76	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
Total Number of Samples			14	14	14	14	14	14	14	14	14	14	9	9	9	9	9	9	9	9	9	9
Maximum Value			LPQL	LPQL	8	39	190	0.2	9	490	7.09	1	LPQL	LPQL	LPQL	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-A: 'Residential with garden/accessible soils; children's day care centers; preschools; and primary schools'

2 - The results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.

3 - B(a)P TEQ - Benzo(a)pyrene Toxicity Equivalence Quotient has been calculated based on 8 carcinogenic PAHs and their Toxic Equivalence Factors (TEFs) outlined in NEPM 2013

Concentration above the SAC **VALUE**

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
HILs: Health Investigation Levels
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure

TABLE C
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

				C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID [2]
PQL - Envirolab Services				25	50	0.2	0.5	1	3	1	
HSL Land Use Category [1]				RESIDENTIAL WITH ACCESSIBLE SOIL							
Sample Reference	**Sample Depth**	**Depth Category**	**Soil Category**								
BH301	0-0.3	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH301	0.5-0.8	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH301	1.5-1.7	1m to <2m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH302	0.1-0.4	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH303	0-0.3	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH303	0.5-0.7	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH304	0-0.3	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH304	2.5-2.8	2m to <4m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH305	0.2-0.5	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH306	0-0.2	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH307	0-0.3	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH308	0-0.3	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	1	LPQL	31.2
BH309	0-0.4	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH310	0-0.4	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
Total Number of Samples				14	14	14	14	14	14	14	14
Maximum Value				LPQL	LPQL	LPQL	LPQL	LPQL	1	LPQL	31.2

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013
2 - Field PID values obtained during the investigation

Concentration above the SAC VALUE
The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

Abbreviations:
UCL: Upper Level Confidence Limit on Mean Value
HSLs: Health Screening Levels
NA: Not Analysed
PQL: Practical Quantitation Limit
LPQL: Less than PQL
SAC: Site Assessment Criteria
NC: Not Calculated
NL: Not Limiting
NEPM: National Environmental Protection Measure

E26904KBrpt
May, 2014

SITE ASSESSMENT CRITERIA

				C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services				25	50	0.2	0.5	1	3	1
HSL Land Use Category [1]				RESIDENTIAL WITH ACCESSIBLE SOIL						
Sample Reference	**Sample Depth**	**Depth Category**	**Soil Category**							
BH301	0-0.3	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH301	0.5-0.8	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH301	1.5-1.7	1m to <2m	Sand	70	240	0.5	220	NL	60	NL
BH302	0.1-0.4	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH303	0-0.3	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH303	0.5-0.7	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH304	0-0.3	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH304	2.5-2.8	2m to <4m	Sand	110	440	0.5	310	NL	95	NL
BH305	0.2-0.5	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH306	0-0.2	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH307	0-0.3	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH308	0-0.3	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH309	0-0.4	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH310	0-0.4	0m to < 1m	Sand	45	110	0.5	160	55	40	3

TABLE D
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES (2009)
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OCPs					TOTAL OPPs	Total PCBs	TPH					BTEX COMPOUNDS				ASBESTOS FIBRES
			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}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	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	0.2	0.5	1	3	100
General Solid Waste CT1 [1]			100	20	100	NSL	100	4	40	NSL	NSL	0.8	NSL	NSL	NSL	NSL		detect[2]	NSL	NSL		NSL		NSL	10	288	600	1000	-
General Solid Waste SCC1 [1]			500	100	1900	NSL	1500	50	1050	NSL	200	10	Scheduled Chemicals <50						50	650		NSL		10000	18	518	1080	1800	-
Restricted Solid Waste CT2 [1]			400	80	400	NSL	400	16	160	NSL	NSL	3.2	NSL	NSL	NSL	NSL		detect[2]	NSL	NSL		NSL		NSL	40	1152	2400	4000	-
Restricted Solid Waste SCC2 [1]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	Scheduled Chemicals <50						50	2600		NSL		40000	72	2073	4320	7200	-
Sample Reference	**Sample Depth**	**Sample Description**																											
BH301	0-0.3	Fill - Silty Sand	LPQL	LPQL	3	8	36	LPQL	3	58	0.28	0.08	0.2	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH301	0.5-0.8	Fill - Silty Sand	LPQL	LPQL	2	8	49	0.1	1	98	0.16	0.06	NA	NA	NA	NA		NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH301	1.5-1.7	Sandstone	LPQL	LPQL	1	LPQL	3	LPQL	LPQL	2	LPQL	LPQL	NA	NA	NA	NA		NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH302	0.1-0.4	Fill - Silty Sand	LPQL	LPQL	8	7	6	LPQL	5	22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH303	0-0.3	Fill - Silty Sand	LPQL	LPQL	4	7	19	LPQL	2	43	0.27	0.07	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH303	0.5-0.7	Fill - Silty Sand	LPQL	LPQL	4	2	8	LPQL	1	18	3.62	0.22	NA	NA	NA	NA		NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH304	0-0.3	Fill - Silty Sand	LPQL	LPQL	3	7	16	LPQL	9	35	0.25	0.05	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH304	2.5-2.8	Silty Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2	LPQL	LPQL	NA	NA	NA	NA		NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH305	0.2-0.5	Fill - Silty Sand	LPQL	LPQL	4	15	51	0.1	3	100	3.84	0.34	NA	NA	NA	NA		NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH306	0-0.2	Fill - Silty Sand	LPQL	LPQL	2	11	**110**	LPQL	1	96	7.09	0.59	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH307	0-0.3	Fill - Silty Sand	LPQL	LPQL	4	8	26	LPQL	3	36	0.61	0.11	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH308	0-0.3	Fill - Silty Sand	LPQL	LPQL	7	39	**190**	0.2	4	490	6.4	0.5	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1	Not Detected
BH309	0-0.4	Fill - Silty Sand	LPQL	LPQL	2	13	43	LPQL	LPQL	27	4.16	0.46	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH310	0-0.4	Fill - Silty Sand	LPQL	LPQL	5	36	**150**	0.2	3	250	2.76	0.26	LPQL	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
Total Number of samples			14	14	14	14	14	14	14	14	14	14	9	9	9	9		9	9	14	14	14	14	14	14	14	14	14	9
Maximum Value			LPQL	LPQL	8	39	190	0.2	9	490	7.09	0.59	0.2	LPQL	LPQL	LPQL		LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1	NC

EXPLANATION:
1 - NSW DECCW Waste Classification Guidelines (2009)
2 - Some Individual OPPs have CT1 & CT2 values. RefereNCe should be made to the Waste Classification Guidelines in the event of any detections

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OPP: Organophosphorus Pesticides
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
ALPQL: All values less than PQL
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
TPH: Total Petroleum Hydrocarbons
BTEX: Monocyclic Aromatic Hydrocarbons
OCP: Organochlorine Pesticides
CT: Contaminant Threshold
SCC: Specific Contaminant Concentration
HILs: Health Investigation Levels
NEPM: National Environmental Protection Measure

TABLE E
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			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 [1]			5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste [1]			20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste [1]			>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**							
BH306	0-0.2	Fill - Silty Sand	NA	NA	NA	0.1	NA	NA	NA
BH308	0-0.3	Fill - Silty Sand	NA	NA	NA	0.2	NA	NA	LPQL
BH310	0-0.4	Fill - Silty Sand	NA	NA	NA	0.09	NA	NA	NA
Total Number of samples			-	-	-	3	-	-	1
Maximum Value			-	-	-	0.2	-	-	LPQL

EXPLANATION:

1 - NSW DECCW Waste Classification Guidelines (2009)

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)pyrene
NC: Not Calculated
NA: Not Analysed
TCLP: Toxicity Characteristics Leaching Procedure

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TABLE F
LABORATORY RESULTS - FIBRE CEMENT FRAGMENTS

Sample Reference	Sample Depth	Sample Description	Results
BH303	0.5-0.7	Fibrous Aggregates	Synthetic Mineral Fibres

EXPLANATION:
Results by Pickford and Rhyder Consulting Pty Ltd Report Number 78791-ID

ABBREVIATIONS:
PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)pyrene
NC: Not Calculated
NA: Not Analysed

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TABLE G
SOIL LABORATORY RESULTS COMPARED TO EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category [1]			URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																		
						AGED HEAVY METALS-EILs						EILs		ESLs							
			pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services			-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC) [2]			-	-	-	NSL	13	28	NSL	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Soil Texture**																			
BH301	0-0.3	Coarse	NA	NA	NA	LPQL	3	8	36	3	58	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.08
BH301	0.5-0.8	Coarse	NA	NA	NA	LPQL	2	8	49	1	98	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.06
BH301	1.5-1.7	Coarse	NA	NA	NA	LPQL	1	LPQL	3	LPQL	2	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH302	0.1-0.4	Coarse	NA	NA	NA	LPQL	8	7	6	5	22	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH303	0-0.3	Coarse	NA	NA	NA	LPQL	4	7	19	2	43	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.07
BH303	0.5-0.7	Coarse	NA	NA	NA	LPQL	4	2	8	1	18	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.22
BH304	0-0.3	Coarse	NA	NA	NA	LPQL	3	7	16	9	35	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.05
BH304	2.5-2.8	Coarse	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	2	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH305	0.2-0.5	Coarse	NA	NA	NA	LPQL	4	15	51	3	100	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.34
BH306	0-0.2	Coarse	NA	NA	NA	LPQL	2	11	110	1	96	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.59
BH307	0-0.3	Coarse	NA	NA	NA	LPQL	4	8	26	3	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.11
BH308	0-0.3	Coarse	NA	NA	NA	LPQL	7	39	190	4	490	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1	0.5
BH309	0-0.4	Coarse	NA	NA	NA	LPQL	2	13	43	LPQL	27	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.46
BH310	0-0.4	Coarse	NA	NA	NA	LPQL	5	36	150	3	250	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.26
Total Number of Samples			0	0	0	14	14	14	14	14	14	14	9	14	14	14	14	14	14	14	14	14
Maximum Value			0	0	0	0	8	39	190	9	490	0	0	0	0	0	0	0	0	0	1	0.59

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013

2 - ABC Values for selected metals has been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with high traffic have been quoted)

Concentration above the SAC **VALUE**

The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

Abbreviations:

EILs: Ecological Investigation Levels
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
UCL: Upper Level Confidence Limit on Mean Value
ESLs: Ecological Screening Levels
NA: Not Analysed
LPQL: Less than PQL
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure
NC: Not Calculated
NSL: No Set Limit
ABC: Ambient Background Concentration

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EIL AND ESL ASSESSMENT CRITERIA

Land Use Category [1]			URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																		
						AGED HEAVY METALS-EILs						EILs		ESLs							
			pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	>C_{16}-C_{34} (F3)	>C_{34}-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services			-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC) [2]			-	-	-	NSL	13	28	NSL	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Soil Texture**																			
BH301	0-0.3	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH301	0.5-0.8	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	300	2800	50	85	70	105	0.7
BH301	1.5-1.7	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	300	2800	50	85	70	105	0.7
BH302	0.1-0.4	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH303	0-0.3	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH303	0.5-0.7	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	300	2800	50	85	70	105	0.7
BH304	0-0.3	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH304	2.5-2.8	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	300	2800	50	85	70	105	0.7
BH305	0.2-0.5	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	300	2800	50	85	70	105	0.7
BH306	0-0.2	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH307	0-0.3	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH308	0-0.3	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH309	0-0.4	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH310	0-0.4	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7

TABLE H
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH308 (0-0.3)	Arsenic	4	LPQL	LPQL	NC	NC
Dup Ref = Dup 1	Cadmium	0.4	LPQL	LPQL	NC	NC
	Chromium	1	7	6	6.5	15.4
Envirolab Report: 108268	Copper	1	39	36	37.5	8.0
	Lead	1	190	180	185	5.4
	Mercury	0.1	0.2	0.1	0.15	66.7
	Nickel	1	4	6	5	40.0
	Zinc	1	490	390	440	22.7
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	0.1	0.2	0.15	66.7
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	0.1	0.1	NC
	Phenanthrene	0.1	0.9	1.8	1.35	66.7
	Anthracene	0.1	0.2	0.4	0.3	66.7
	Fluoranthene	0.1	1.3	2.2	1.75	51.4
	Pyrene	0.1	1.1	2	1.55	58.1
	Benzo(a)anthracene	0.1	0.5	0.8	0.65	46.2
	Chrysene	0.1	0.4	0.8	0.6	66.7
	Benzo(b)&(k)fluorant	0.2	0.8	1.3	1.05	47.6
	Benzo(a)pyrene	0.05	0.5	0.83	0.665	49.6
	Indeno(123-cd)pyrene	0.1	0.3	0.5	0.4	50.0
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	0.3	0.4	0.35	28.6
	Benzo(a)pyrene TEQ	0.5	1	1	1	0.0
	Total PAHs	2.05	6.4	11	8.7	52.9
	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_{10} (F1)	25	LPQL	LPQL	NC	NC
	$>C_{10}$-C_{16} (F2)	50	LPQL	LPQL	NC	NC
	$>C_{16}$-C_{34} (F3)	100	LPQL	LPQL	NC	NC
	$>C_{34}$-C_{40} (F4)	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
	m + p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	1	LPQL	1	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 times 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
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TPH: Total Petroleum Hydrocarbons

TABLE I
SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	Envirolab VIC PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH309 (0-0.4)	Arsenic	4	4	LPQL	LPQL	NC	NC
Dup Ref = DUP 2	Cadmium	0.4	0.4	LPQL	LPQL	NC	NC
	Chromium	1	1	2	2	2	0.0
Envirolab Report: 108268	Copper	1	1	13	16	14.5	20.7
Envirolab VIC Report: 3738	Lead	1	1	43	51	47	17.0
	Mercury	0.1	0.1	LPQL	LPQL	NC	NC
	Nickel	1	1	LPQL	1	1	NC
	Zinc	1	1	27	36	31.5	28.6
	Naphthalene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	0.1	0.2	0.3	0.25	40.0
	Anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	0.1	0.7	1.1	0.9	44.4
	Pyrene	0.1	0.1	0.7	1.1	0.9	44.4
	Benzo(a)anthracene	0.1	0.1	0.3	0.5	0.4	50.0
	Chrysene	0.1	0.1	0.4	0.5	0.45	22.2
	Benzo(b)&(k)fluorant	0.2	0.2	0.8	1.3	1.05	47.6
	Benzo(a)pyrene	0.05	0.05	0.46	0.71	0.585	42.7
	Indeno(123-cd)pyrene	0.1	0.1	0.3	0.4	0.35	28.6
	Dibenzo(ah)anthracene	0.1	0.1	LPQL	0.1	0.1	NC
	Benzo(ghi)perylene	0.1	0.1	0.3	0.5	0.4	50.0
	Benzo(a)pyrene TEQ	0.5	0.5	1	1	1	0.0
	Total PAHs	2.05	2.05	4.2	6.7	5.45	45.9
	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_{10} (F1)	25	25	LPQL	LPQL	NC	NC
	>C_{10}-C_{16} (F2)	50	50	LPQL	LPQL	NC	NC
	>C_{16}-C_{34} (F3)	100	100	LPQL	LPQL	NC	NC
	>C_{34}-C_{40} (F4)	100	100	LPQL	LPQL	NC	NC
	Benzene	0.5	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	2	LPQL	LPQL	NC	NC
	o-xylene	1	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 times 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
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TPH: Total Petroleum Hydrocarbons

TABLE J
SUMMARY OF QA/QC - TRIP SPIKE AND TRIP BLANK RESULTS

ANALYSIS	Envirolab PQL		TB[s] 14/04/2014 108268	TS[s] 14/04/2014 108268
	mg/kg	µg/L	mg/kg	% Recovery
Benzene	1	1	LPQL	107%
Toluene	1	1	LPQL	108%
Ethylbenzene	1	1	LPQL	109%
m + p-xylene	2	2	LPQL	108%
o-xylene	1	1	LPQL	108%

EXPLANATION:

[W] Sample type (water)

[S] Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
TB: Trip Blank
TS: Trip Spike
RS: Rinsate Sample

E26904KBrpt
May, 2014

Appendix A: Borehole Logs and Explanatory Notes

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
301

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** EZIPROBE **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
						0			FILL: Silty sand, fine to medium grained, brown, light brown, trace of ash, fine to coarse grained quartz gravel, fine to medium grained igneous, sandstone, ironstone gravel.	M			GRASS COVER
						0.5			FILL: Silty sand, fine to medium grained, grey, traces of ash, fine to medium grained igneous and sandstone and gravel.	M			
									FILL: Silty gravelly sand, fine to course grained, grey and brown, fine to medium grained ironstone and sandstone gravel.	D			
						1		SM	SILTY SAND: fine to medium grained, orange brown.	D			
▶								-	SANDSTONE: fine to medium grained, orange brown, light grey.	XW	EL		
						1.5			as above with root fibres.				
						2			END OF BOREHOLE AT 2.0m				
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
302

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** EZIPROBE **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Silty sand, fine to medium grained, dark brown, light brown, trace of ash, slag, root fibres, fine to medium grained igneous, sandstone and quartz gravel.	M			GRASS COVER
						0.5			FILL: Silty clay, low plasticity, light grey, trace of fine to medium grained shale and igneous gravel.	MC≈PL			
									FILL: Silty sand, fine to medium grained, light grey, trace of brick fragments, fine to medium grained shale and sandstone gravel.	M			
						1			END OF BOREHOLE AT 1.0m				PROBE REFUSAL ON INFERRED SANDSTONE BEDROCK
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
303

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** EZIPROBE **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION						0			FILL: Silty sand, fine to medium grained, brown, trace of ash, brick fragments and fine to medium grained igneous gravel.				GRASS COVER
						0.5			as above with trace of fine to medium grained shale and quartz gravel and fibre cement fragments.				
									END OF BOREHOLE AT 0.7m				PROBE REFUSALON INFERRED SANDSTONE BEDROCK
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **304**

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** EZIPROBE **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION						0			FILL: Silty sand, fine to medium grained, light brown, trace of brick fragments, slag, root fibres, and fine to medium grained igneous gravel.	M			GRASS COVER
									FILL: Silty gravelly sand, fine to coarse grained igneous, light brown.	M			
						0.5			FILL: Silty sand, fine to coarse grained, light brown, trace of brick fragments, and fine to medium grained sandstone gravel.	M			
						1			FILL: Silty sand, dark brown, trace of root fibres, ash, and clay nodules.	M			
						1.5		CL	SILTY SAND: fine to medium grained, dark grey	M			
						2			as above but light grey.	M			
						2.5							
									END OF BOREHOLE AT 2.80m				
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
305

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION						0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres, and brick fragments.	M			
									FILL: Silty sand, fine to medium grained, trace of root fibres, domestic rubbish, and ash.	D			
						0.5		SC	SILTY SAND: fine to medium grained, light brown.	D			POSSIBLY FILL
						1							
									END OF BOREHOLE AT 1.3m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
306

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION	■		■			0			FILL: Silty sand, fine to medium grained, brown, trace of slag and concrete fragments.	M			GRASS COVER
								SP	SAND: fine to medium grained, light grey.	D			
						0.5							
									END OF BOREHOLE AT 0.7m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION	■	■				0			FILL: Sandy silt, fine to medium grained, light brown, trace of ash, root fibres, and fine to medium grained sandstone gravel.	D			GRASS COVER
						0.5							
	■	■				1							
						1.5							
	■	■				2		-	SANDSTONE: fine to medium grained, light grey.	XW			
									END OF BOREHOLE AT 2.0m				
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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DRY ON COMPLET -ION	■		■			0			FILL: Silty sand, fine to medium grained, light brown, trace of ash, brick and tile fragments, fine to medium grained sandstone, shale and ironstone gravel.	D			GRASS COVER
						0.5			END OF BOREHOLE AT 0.5m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

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309

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Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION	■		■			0			FILL: Silty sand, fine to medium grained, dark grey, trace of root fibres and brick fragments.	D			
						0.5		-	SANDSTONE: fine to medium grained, light grey.	XW			
	■		■			1			END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
310

Environmental logs are not to be used for geotechnical purposes

Client: ST CATHERINE'S SCHOOL

Project: PROPOSED ADDITIONS AND ALTERATIONS

Location: 26 ALBION STREET, WAVERLEY, NSW

Job No. E26904KB **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 14/4/14 **Datum:**

Logged/Checked by: J.D.C./G.F.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET -ION						0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres, ash, and fine to medium grained sandstone gravel.	M			
						0.5			FILL: Silty sand, fine to medium grained, grey, trace of root fibres, slag, and fine to medium grained sandstone gravel.	D			
									END OF BORHOLE AT 0.6m				HAND AUGER REFUSAL ON INFERRED SANDSTONE BEDROCK
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

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

The test results are reported in the following form:

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

  N = 13
  4, 6, 7

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

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.

Static Cone Penetrometer Testing and Interpretation: Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

  The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

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

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than “straight line” variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

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

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

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

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

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

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

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site.

GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

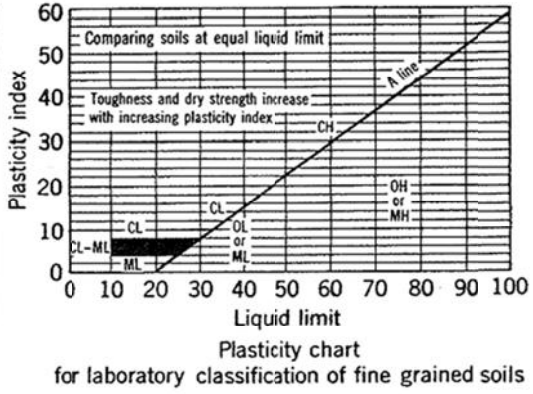
OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)				Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 Atterberg limits above "A" line, with *PI* greater than 7 Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below "A" line or *PI* less than 5 Atterberg limits below "A" line with *PI* greater than 7 Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
		Gravels with fines (appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
			Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	*SW*	Well graded sands, gravelly sands, little or no fines		
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size (The 75 μm sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than 380 μm Sieve Size						
		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			
	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)
		Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity	
	Silts and clays liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays	
		Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity	
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils	



Plasticity chart
for laboratory classification of fine grained soils

Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	C	Extent of borehole collapse shortly after drilling.
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos screening.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength.
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test).
Moisture Condition (Cohesive Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
(Cohesionless Soils)	D	DRY – Runs freely through fingers.
	M	MOIST – Does not run freely but no free water visible on soil surface.
	W	WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – Unconfined compressive strength less than 25kPa
	S	SOFT – Unconfined compressive strength 25-50kPa
	F	FIRM – Unconfined compressive strength 50-100kPa
	St	STIFF – Unconfined compressive strength 100-200kPa
	VSt	VERY STIFF – Unconfined compressive strength 200-400kPa
	H	HARD – Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)**
	VL	Very Loose: <15 / 0-4
	L	Loose: 15-35 / 4-10
	MD	Medium Dense: 35-65 / 10-30
	D	Dense: 65-85 / 30-50
	VD	Very Dense: >85 / >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten carbide wing bit.
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

LOG SYMBOLS continued

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL		Easily remoulded by hand to a material with soil properties.
----------	----------	0.03	
Very Low:	VL		May be crumbled in the hand. Sandstone is "sugary" and friable.
----------	----------	0.1	
Low:	L		A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
----------	----------	0.3	
Medium Strength:	M		A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
----------	----------	1	
High:	H		A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
----------	----------	3	
Very High:	VH		A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
----------	----------	10	
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

Appendix B: Laboratory Reports and Chain of Custody Documents

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

CERTIFICATE OF ANALYSIS 108268

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	**E26904KB, Waverley**
No. of samples:	33 Soils, 1 Material
Date samples received / completed instructions received	15/04/14 / 15/04/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	24/04/14 / 24/04/14
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	108268-1	108268-2	108268-4	108268-5	108268-8
Your Reference	----------	BH301	BH301	BH301	BH302	BH303
Depth	----------	0-0.3	0.5-0.8	1.5-1.7	0.1-0.4	0-0.3
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	20/04/2014	20/04/2014	20/04/2014	20/04/2014	20/04/2014
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	83	96	76	75

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	108268-10	108268-11	108268-15	108268-17	108268-19
Your Reference	----------	BH303	BH304	BH304	BH305	BH306
Depth	----------	0.5-0.7	0-0.3	2.5-2.8	0.2-0.5	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil/Material	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	20/04/2014	20/04/2014	20/04/2014	20/04/2014	20/04/2014
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	79	83	84	80

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	20/04/2014	20/04/2014	20/04/2014	20/04/2014	20/04/2014
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	81	85	83	82

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	108268-32	108268-33
Your Reference	----------	TB	TS
Depth	----------	-	-
Date Sampled		14/04/2014	14/04/2014
Type of sample		Soil	Soil
Date extracted	-	16/04/2014	16/04/2014
Date analysed	-	20/04/2014	20/04/2014
Benzene	mg/kg	<0.2	107%
Toluene	mg/kg	<0.5	108%
Ethylbenzene	mg/kg	<1	109%
m+p-xylene	mg/kg	<2	108%
o-Xylene	mg/kg	<1	108%
Surrogate aaa-Trifluorotoluene	%	87	99

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	108268-1	108268-2	108268-4	108268-5	108268-8
Your Reference	----------	BH301	BH301	BH301	BH302	BH303
Depth	----------	0-0.3	0.5-0.8	1.5-1.7	0.1-0.4	0-0.3
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	87	91	93	86	90

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	108268-10	108268-11	108268-15	108268-17	108268-19
Your Reference	----------	BH303	BH304	BH304	BH305	BH306
Depth	----------	0.5-0.7	0-0.3	2.5-2.8	0.2-0.5	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil/Material	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	89	87	88	92	86

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	91	86	90	87	90

PAHs in Soil						
Our Reference:	UNITS	108268-1	108268-2	108268-4	108268-5	108268-8
Your Reference	----------	BH301	BH301	BH301	BH302	BH303
Depth	----------	0-0.3	0.5-0.8	1.5-1.7	0.1-0.4	0-0.3
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Pyrene	mg/kg	0.1	0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	0.06	<0.05	<0.05	0.07
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	mg/kg	0.35	0.16	NIL (+)VE	NIL (+)VE	0.30
Surrogate p-Terphenyl-d14	%	92	92	94	89	94

PAHs in Soil						
Our Reference:	UNITS	108268-10	108268-11	108268-15	108268-17	108268-19
Your Reference	----------	BH303	BH304	BH304	BH305	BH306
Depth	----------	0.5-0.7	0-0.3	2.5-2.8	0.2-0.5	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil/Material	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Phenanthrene	mg/kg	0.8	<0.1	<0.1	0.4	1.0
Anthracene	mg/kg	0.2	<0.1	<0.1	0.1	0.2
Fluoranthene	mg/kg	0.7	0.1	<0.1	0.7	1.2
Pyrene	mg/kg	0.6	0.1	<0.1	0.7	1.2
Benzo(a)anthracene	mg/kg	0.2	<0.1	<0.1	0.3	0.6
Chrysene	mg/kg	0.2	<0.1	<0.1	0.3	0.5
Benzo(b+k)fluoranthene	mg/kg	0.3	<0.2	<0.2	0.6	0.9
Benzo(a)pyrene	mg/kg	0.22	0.05	<0.05	0.34	0.59
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	0.2	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	0.2	0.3
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	<0.5	<0.5	<0.5	1.0
Total +ve PAH's	mg/kg	3.9	0.28	NIL (+)VE	4.0	7.2
Surrogate p-Terphenyl-d14	%	91	94	90	94	90

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	108268-21 BH307 0-0.3 14/04/2014 Soil	108268-24 BH308 0-0.3 14/04/2014 Soil	108268-26 BH309 0-0.4 14/04/2014 Soil	108268-28 BH310 0-0.4 14/04/2014 Soil	108268-30 DUP1 - 14/04/2014 Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	<0.1	<0.1	0.2
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Phenanthrene	mg/kg	<0.1	0.9	0.2	0.3	1.8
Anthracene	mg/kg	<0.1	0.2	<0.1	<0.1	0.4
Fluoranthene	mg/kg	0.2	1.3	0.7	0.5	2.2
Pyrene	mg/kg	0.2	1.1	0.7	0.5	2.0
Benzo(a)anthracene	mg/kg	<0.1	0.5	0.3	0.2	0.8
Chrysene	mg/kg	0.1	0.4	0.4	0.2	0.8
Benzo(b+k)fluoranthene	mg/kg	<0.2	0.8	0.8	0.4	1.3
Benzo(a)pyrene	mg/kg	0.11	0.50	0.46	0.26	0.83
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.3	0.3	0.2	0.5
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.3	0.3	0.2	0.4
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	1.0	1.0	<0.5	1.0
Total +ve PAH's	mg/kg	0.58	6.4	4.2	2.8	11
Surrogate p-Terphenyl-d14	%	95	90	96	92	93

Organochlorine Pesticides in soil						
Our Reference:	UNITS	108268-1	108268-5	108268-8	108268-11	108268-19
Your Reference	----------	BH301	BH302	BH303	BH304	BH306
Depth	----------	0-0.3	0.1-0.4	0-0.3	0-0.3	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	93	97	94	92

Organochlorine Pesticides in soil						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	91	98	93	94

Organophosphorus Pesticides						
Our Reference:	UNITS	108268-1	108268-5	108268-8	108268-11	108268-19
Your Reference	----------	BH301	BH302	BH303	BH304	BH306
Depth	----------	0-0.3	0.1-0.4	0-0.3	0-0.3	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	93	97	94	92

Organophosphorus Pesticides						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	91	98	93	94

PCBs in Soil						
Our Reference:	UNITS	108268-1	108268-5	108268-8	108268-11	108268-19
Your Reference	----------	BH301	BH302	BH303	BH304	BH306
Depth	----------	0-0.3	0.1-0.4	0-0.3	0-0.3	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	93	97	94	92

PCBs in Soil						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	18/04/2014	18/04/2014	18/04/2014	18/04/2014	18/04/2014
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	92	91	98	93	94

Acid Extractable metals in soil						
Our Reference:	UNITS	108268-1	108268-2	108268-4	108268-5	108268-8
Your Reference	----------	BH301	BH301	BH301	BH302	BH303
Depth	----------	0-0.3	0.5-0.8	1.5-1.7	0.1-0.4	0-0.3
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	3	2	1	8	4
Copper	mg/kg	8	8	<1	7	7
Lead	mg/kg	36	49	3	6	19
Mercury	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	1	<1	5	2
Zinc	mg/kg	58	98	2	22	43

Acid Extractable metals in soil						
Our Reference:	UNITS	108268-10	108268-11	108268-15	108268-17	108268-19
Your Reference	----------	BH303	BH304	BH304	BH305	BH306
Depth	----------	0.5-0.7	0-0.3	2.5-2.8	0.2-0.5	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil/Material	Soil	Soil	Soil	Soil
Date digested	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	3	<1	4	2
Copper	mg/kg	2	7	<1	15	11
Lead	mg/kg	8	16	<1	51	110
Mercury	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Nickel	mg/kg	1	9	<1	3	1
Zinc	mg/kg	18	35	2	100	96

Acid Extractable metals in soil						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	7	2	5	6
Copper	mg/kg	8	39	13	36	36
Lead	mg/kg	26	190	43	150	180
Mercury	mg/kg	<0.1	0.2	<0.1	0.2	0.1
Nickel	mg/kg	3	4	<1	3	6
Zinc	mg/kg	36	490	27	250	390

Moisture						
Our Reference:	UNITS	108268-1	108268-2	108268-4	108268-5	108268-8
Your Reference	----------	BH301	BH301	BH301	BH302	BH303
Depth	----------	0-0.3	0.5-0.8	1.5-1.7	0.1-0.4	0-0.3
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Moisture	%	9.4	9.6	15	9.4	15

Moisture						
Our Reference:	UNITS	108268-10	108268-11	108268-15	108268-17	108268-19
Your Reference	----------	BH303	BH304	BH304	BH305	BH306
Depth	----------	0.5-0.7	0-0.3	2.5-2.8	0.2-0.5	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil/Material	Soil	Soil	Soil	Soil
Date prepared	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Moisture	%	8.9	13	4.1	10	13

Moisture						
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28	108268-30
Your Reference	----------	BH307	BH308	BH309	BH310	DUP1
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4	-
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	16/04/2014	16/04/2014	16/04/2014	16/04/2014	16/04/2014
Date analysed	-	17/04/2014	17/04/2014	17/04/2014	17/04/2014	17/04/2014
Moisture	%	15	17	9.4	13	18

Asbestos ID - soils						
Our Reference:	UNITS	108268-1	108268-5	108268-8	108268-11	108268-19
Your Reference	----------	BH301	BH302	BH303	BH304	BH306
Depth	----------	0-0.3	0.1-0.4	0-0.3	0-0.3	0-0.2
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	23/04/2014	23/04/2014	23/04/2014	23/04/2014	23/04/2014
Sample mass tested	g	Approx 40g	Approx 40g	Approx 40g	Approx 40g	Approx 40g
Sample Description	-	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils					
Our Reference:	UNITS	108268-21	108268-24	108268-26	108268-28
Your Reference	----------	BH307	BH308	BH309	BH310
Depth	----------	0-0.3	0-0.3	0-0.4	0-0.4
Date Sampled		14/04/2014	14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	23/04/2014	23/04/2014	23/04/2014	23/04/2014
Sample mass tested	g	Approx 40g	Approx 40g	Approx 40g	Approx 40g
Sample Description	-	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil	Grey-brown coarse-grained soil	Brown coarse-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - materials		
Our Reference:	UNITS	108268-10
Your Reference	----------	BH303
Depth	----------	0.5-0.7
Date Sampled		14/04/2014
Type of sample		Soil/Material
Date analysed	-	23/04/2014
Mass / Dimension of Sample	-	40x28x12mm
Sample Description	-	Grey vitreous fibrous cement material
Asbestos ID in materials	-	No asbestos detected Synthetic mineral fibre detected

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			20/04/2014	108268-2	20/04/2014 || 20/04/2014	LCS-2	20/04/2014
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	108268-2	<25 || <25	LCS-2	84%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	108268-2	<25 || <25	LCS-2	84%
Benzene	mg/kg	0.2	Org-016	<0.2	108268-2	<0.2 || <0.2	LCS-2	83%
Toluene	mg/kg	0.5	Org-016	<0.5	108268-2	<0.5 || <0.5	LCS-2	82%
Ethylbenzene	mg/kg	1	Org-016	<1	108268-2	<1 || <1	LCS-2	86%
m+p-xylene	mg/kg	2	Org-016	<2	108268-2	<2 || <2	LCS-2	84%
o-Xylene	mg/kg	1	Org-016	<1	108268-2	<1 || <1	LCS-2	83%
naphthalene	mg/kg	1	Org-014	<1	108268-2	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	86	108268-2	83 || 83 || RPD: 0	LCS-2	84%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	108268-2	<50 || <50	LCS-2	85%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	108268-2	<100 || <100	LCS-2	104%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	108268-2	<100 || <100	LCS-2	115%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	108268-2	<50 || <50	LCS-2	85%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	108268-2	<100 || <100	LCS-2	104%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	108268-2	<100 || <100	LCS-2	115%
Surrogate o-Terphenyl	%		Org-003	90	108268-2	91 || 91 || RPD: 0	LCS-2	82%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	LCS-2	105%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	LCS-2	122%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	LCS-2	118%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || 0.1	LCS-2	115%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	0.1 || 0.1 || RPD: 0	LCS-2	121%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	LCS-2	111%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	108268-2	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	108268-2	0.06 || <0.05	LCS-2	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	108268-2	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	92	108268-2	92 || 103 || RPD: 11	LCS-2	95%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-21	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			18/04/2014	108268-21	18/04/2014 || 18/04/2014	LCS-2	18/04/2014
HCB	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	107%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	68%
Heptachlor	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	90%
delta-BHC	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	95%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	118%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	93%
Dieldrin	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	91%
Endrin	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	89%
pp-DDD	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	96%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	LCS-2	76%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	96	108268-21	95 || 93 || RPD: 2	LCS-2	91%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-21	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			18/04/2014	108268-21	18/04/2014 || 18/04/2014	LCS-2	18/04/2014
Diazinon	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	LCS-2	96%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	LCS-2	86%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	108268-21	<0.1 || <0.1	LCS-2	86%
Surrogate TCMX	%		Org-008	96	108268-21	95 || 93 || RPD: 2	LCS-2	96%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	108268-21	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			18/04/2014	108268-21	18/04/2014 || 18/04/2014	LCS-2	18/04/2014
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	LCS-2	113%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	108268-21	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	96	108268-21	92 || 93 || RPD: 1	LCS-2	105%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			16/04/2014	108268-2	16/04/2014 || 16/04/2014	LCS-2	16/04/2014
Date analysed	-			17/04/2014	108268-2	17/04/2014 || 17/04/2014	LCS-2	17/04/2014
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	108268-2	<4 || <4	LCS-2	93%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	108268-2	<0.4 || <0.4	LCS-2	101%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	108268-2	2 || 2 || RPD: 0	LCS-2	98%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	108268-2	8 || 8 || RPD: 0	LCS-2	98%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	108268-2	49 || 55 || RPD: 12	LCS-2	99%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	108268-2	0.1 || 0.1 || RPD: 0	LCS-2	111%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	108268-2	1 || 1 || RPD: 0	LCS-2	98%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	108268-2	98 || 100 || RPD: 2	LCS-2	99%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Asbestos ID - materials	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date analysed	-			[NT]	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
Date analysed	-	108268-21	20/04/2014 || 20/04/2014	108268-5	20/04/2014
TRHC$_6$ - C$_9$	mg/kg	108268-21	<25 || <25	108268-5	76%
TRHC$_6$ - C$_{10}$	mg/kg	108268-21	<25 || <25	108268-5	76%
Benzene	mg/kg	108268-21	<0.2 || <0.2	108268-5	76%
Toluene	mg/kg	108268-21	<0.5 || <0.5	108268-5	74%
Ethylbenzene	mg/kg	108268-21	<1 || <1	108268-5	76%
m+p-xylene	mg/kg	108268-21	<2 || <2	108268-5	76%
o-Xylene	mg/kg	108268-21	<1 || <1	108268-5	75%
naphthalene	mg/kg	108268-21	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	108268-21	82 || 83 || RPD: 1	108268-5	76%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
Date analysed	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
TRHC$_{10}$ - C$_{14}$	mg/kg	108268-21	<50 || <50	108268-5	78%
TRHC$_{15}$ - C$_{28}$	mg/kg	108268-21	<100 || <100	108268-5	88%
TRHC$_{29}$ - C$_{36}$	mg/kg	108268-21	<100 || <100	108268-5	89%
TRH>C$_{10}$-C$_{16}$	mg/kg	108268-21	<50 || <50	108268-5	78%
TRH>C$_{16}$-C$_{34}$	mg/kg	108268-21	<100 || <100	108268-5	88%
TRH>C$_{34}$-C$_{40}$	mg/kg	108268-21	<100 || <100	108268-5	89%
Surrogate o-Terphenyl	%	108268-21	91 || 89 || RPD: 2	108268-5	80%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
Date analysed	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
Naphthalene	mg/kg	108268-21	<0.1 || <0.1	108268-5	114%
Acenaphthylene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	108268-21	<0.1 || <0.1	108268-5	120%
Phenanthrene	mg/kg	108268-21	<0.1 || <0.1	108268-5	116%
Anthracene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	108268-21	0.2 || 0.1 || RPD: 67	108268-5	115%
Pyrene	mg/kg	108268-21	0.2 || 0.1 || RPD: 67	108268-5	119%
Benzo(a)anthracene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	108268-21	0.1 || <0.1	108268-5	108%
Benzo(b+k)fluoranthene	mg/kg	108268-21	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	108268-21	0.11 || 0.1 || RPD: 10	108268-5	115%
Indeno(1,2,3-c,d)pyrene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	108268-21	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	108268-21	95 || 94 || RPD: 1	108268-5	92%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	108268-5	16/04/2014
Date analysed	-	[NT]	[NT]	108268-5	18/04/2014
HCB	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	[NT]	[NT]	108268-5	107%
gamma-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	[NT]	[NT]	108268-5	64%
Heptachlor	mg/kg	[NT]	[NT]	108268-5	88%
delta-BHC	mg/kg	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	[NT]	[NT]	108268-5	92%
Heptachlor Epoxide	mg/kg	[NT]	[NT]	108268-5	112%
gamma-Chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	[NT]	[NT]	108268-5	91%
Dieldrin	mg/kg	[NT]	[NT]	108268-5	88%
Endrin	mg/kg	[NT]	[NT]	108268-5	86%
pp-DDD	mg/kg	[NT]	[NT]	108268-5	90%
Endosulfan II	mg/kg	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	[NT]	[NT]	108268-5	77%
Methoxychlor	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%	[NT]	[NT]	108268-5	88%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	108268-5	16/04/2014
Date analysed	-	[NT]	[NT]	108268-5	18/04/2014
Diazinon	mg/kg	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	[NT]	[NT]	108268-5	94%
Fenitrothion	mg/kg	[NT]	[NT]	108268-5	78%
Bromophos-ethyl	mg/kg	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	[NT]	[NT]	108268-5	83%
Surrogate TCMX	%	[NT]	[NT]	108268-5	94%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	108268-5	16/04/2014
Date analysed	-	[NT]	[NT]	108268-5	18/04/2014
Arochlor 1016	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	[NT]	[NT]	108268-5	105%
Arochlor 1260	mg/kg	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%	[NT]	[NT]	108268-5	103%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	108268-21	16/04/2014 || 16/04/2014	108268-5	16/04/2014
Date analysed	-	108268-21	17/04/2014 || 17/04/2014	108268-5	17/04/2014
Arsenic	mg/kg	108268-21	<4 || <4	108268-5	92%
Cadmium	mg/kg	108268-21	<0.4 || <0.4	108268-5	94%
Chromium	mg/kg	108268-21	4 || 3 || RPD: 29	108268-5	91%
Copper	mg/kg	108268-21	8 || 5 || RPD: 46	108268-5	100%
Lead	mg/kg	108268-21	26 || 26 || RPD: 0	108268-5	93%
Mercury	mg/kg	108268-21	<0.1 || <0.1	108268-5	113%
Nickel	mg/kg	108268-21	3 || 2 || RPD: 40	108268-5	91%
Zinc	mg/kg	108268-21	36 || 28 || RPD: 25	108268-5	94%

QUALITY CONTROL Asbestos ID - materials	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date analysed	-	[NT]	[NT]	[NR]	[NR]

Report Comments:

Asbestos ID was analysed by Approved Identifier: Paul Ching
Asbestos ID was authorised by Approved Signatory: Paul Ching

INS: Insufficient sample for this test
NA: Test not required
<: Less than

PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than

NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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

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

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Vittal Boggaram

Sample log in details:

Your reference:	**E26904KB, Waverley**
Envirolab Reference:	**108268**
Date received:	15/04/14
Date results expected to be reported:	**24/04/14**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	33 soils
Turnaround time requested:	Standard
Temperature on receipt (°C)	15.2
Cooling Method:	Ice Pack
Sampling Date Provided:	YES

Comments:

If there is sufficient sample after testing, samples will be held for the following time frames from date of receipt of samples:
Water samples - 1 month
Soil and other solid samples - 2 months
Samples collected in canisters - 1 week. Canisters will then be cleaned.
All other samples are not retained after analysis
If you require samples to be retained for longer periods then retention fees will apply as per our pricelist.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E26904KB Date Results Required: STANDARD Sheet 1, 2	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Vittal Boggaram

Project: Proposed Development
Location: Waverley, NSW
Sampler: JDC

Tests Required

Sample Preservation: In esky on ice

	Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 3	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	
1	14/4/14		BH301	0-0.3	Glass jar + Asb Bag	0	Soil		X										
2				0.5-0.8	Glass jar + Asb Bag					X									
3				0.8-1	Glass jar + Asb Bag														
4				1.5-1.7	Glass jar + Asb Bag					X									
5			BH302	0.1-0.4	Glass jar + Asb Bag				X										
6				0.6-0.7	Glass jar + Asb Bag														
7				0.7-1	Glass jar + Asb Bag														
8			BH303	0-0.3	Glass jar + Asb Bag				X										
9				0.3-0.5	Glass jar + Asb Bag														
10				0.5-0.7	Glass jar + Asb Bag					X						X			
11			BH304	0-0.3	Glass jar + Asb Bag				X										
12				0.3-0.5	Glass jar + Asb Bag														
13				0.5-0.8	Glass jar + Asb Bag														
14				1.1-1.4	Glass jar + Asb Bag														
15				2.5-2.8	Glass jar + Asb Bag					X									
16			BH305	0-0.2	Glass jar + Asb Bag														
17				0.2-0.5	Glass jar + Asb Bag					X									
18				0.6-1	Glass jar + Asb Bag														
19			BH306	0-0.2	Glass jar + Asb Bag				X										
20				0.5-0.7	Glass jar + Asb Bag														
21			BH307	0-0.3	Glass jar + Asb Bag				X										
22				0.7-1	Glass jar + Asb Bag														
23				1.8-2	Glass jar + Asb Bag	0													
24			BH308	0-0.3	Glass jar + Asb Bag	3.2			X										
25	↓		↓	0.3-0.5	Glass jar + Asb Bag	0	↓												

ENVIROLAB

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

Job No: 108268
Date Received: 15/4/14
Time Received: 1420
Received by: TA
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:
Vittal B S	15/4/14	14.20	

L08268

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E26904KB Date Results Required: STANDARD Sheet 2/2	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Vittal Boggaram

Project: Proposed Development
Location: Waverley, NSW
Sampler: JDC

Sample Preservation: In esky on ice

Tests Required

	Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 3	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	
26	14/4/14		BH309	0-0.4	Glass jar + Asb Bag	0	Soil		X										
27	↓		↓	0.8-1	Glass jar + Asb Bag	0	↓												
28			BH310	0-0.4	Glass jar + Asb Bag	0			X										
29			↓	0.4-0.6	Glass jar + Asb Bag	0													
30			DUP1	—	Glass jar + ~~Asb Bag~~	—		X											
			DUP2	—	Glass jar + ~~Asb Bag~~	—		X		Please send to Envirolab VIC									
31	↓		DUP3	—	Glass jar + ~~Asb Bag~~	—	↓												
32	↓		TB	—	Glass jar + ~~Asb Bag~~	—	↓						X						
33	↓		TS	—	Glass jar + ~~Asb Bag~~	—	↓						X						
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
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					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														
					Glass jar + Asb Bag														

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:	
Vittal B.S	15/4/14			

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

CERTIFICATE OF ANALYSIS 108268-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	**E26904KB, Waverley**
No. of samples:	Additional testing on 3 soils
Date samples received / completed instructions received	15/04/14 / 07/05/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	14/05/14 / 12/05/14
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

PAHs in TCLP (USEPA 1311)		
Our Reference:	UNITS	108268-A-24
Your Reference	----------	BH308
Depth	----------	0-0.3
Date Sampled		14/04/2014
Type of sample		Soil
Date extracted	-	12/05/2014
Date analysed	-	12/05/2014
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	102

Metals in TCLP USEPA1311				
Our Reference:	UNITS	108268-A-19	108268-A-24	108268-A-28
Your Reference	----------	BH306	BH308	BH310
Depth	----------	0-0.2	0-0.3	0-0.4
Date Sampled		14/04/2014	14/04/2014	14/04/2014
Type of sample		Soil	Soil	Soil
Date extracted	-	08/05/2014	08/05/2014	08/05/2014
Date analysed	-	08/05/2014	08/05/2014	08/05/2014
pH of soil for fluid# determ.	pH units	7.7	9.6	9.1
pH of soil for fluid # determ. (acid)	pH units	1.5	1.6	1.6
Extraction fluid used	-	1	1	1
pH of final Leachate	pH units	4.9	5.2	5.0
Lead in TCLP	mg/L	0.1	0.2	0.09

Method ID	Methodology Summary
Org-012 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311 and in house method INORG-004.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/05/2014	[NT]	[NT]	LCS-W1	12/05/2014
Date analysed	-			12/05/2014	[NT]	[NT]	LCS-W1	12/05/2014
Naphthalene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	110%
Acenaphthylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	99%
Phenanthrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	108%
Anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	102%
Pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	105%
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	100%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	Org-012 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	107%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	83	[NT]	[NT]	LCS-W1	123%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			08/05/2014	108268-A-19	08/05/2014 || 08/05/2014	LCS-1	08/05/2014
Date analysed	-			08/05/2014	108268-A-19	08/05/2014 || 08/05/2014	LCS-1	08/05/2014
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	108268-A-19	0.1 || 0.1 || RPD: 0	LCS-1	96%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	108268-A-24	08/05/2014
Date analysed	-	[NT]	[NT]	108268-A-24	08/05/2014
Lead in TCLP	mg/L	[NT]	[NT]	108268-A-24	95%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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

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

Aileen Hie

From: Vittal Boggaram [vboggaram@jkgroup.net.au]
Sent: Wednesday, 7 May 2014 12:50 PM
To: Aileen Hie
Subject: FW: Additional TCLP Testing for registration '108268 - E26904KB, Waverley'

Importance: High

108268A
std TAT
due 14/5/14.

Hi Aileen,

Can you please schedule the following additional testing on a standard turnaround. Thanks.

Sample	Lab Ref No.	Depth	Date Sampled	Additional Tests
BH306	19	0-0.2	14/04/2014	TCLP Lead
BH308	24	0-0.3	14/04/2014	TCLP Lead + TCLP PAHs
BH310	28	0-0.4	14/04/2014	TCLP Lead

Regards,

Vittal Boggaram
Associate

Environmental Investigation Services
CONSULTING ENVIRONMENTAL ENGINEERS AND SCIENTISTS

Tel: 02 9888 5000
Fax: 02 9888 5001
vboggaram@jkgroup.net.au
www.jkgeotechnics.com.au

PO Box 976
North Ryde BC NSW 1670

115 Wicks Road
Macquarie Park NSW 2113

-----Original Message-----
From: Results [mailto:Results@envirolab.com.au]
Sent: Thursday, 24 April 2014 5:28 PM
To: Vittal Boggaram (vboggaram@jkgroup.net.au)
Subject: Results for registration '108268 - E26904KB, Waverley'

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC
an excel file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
Jacinta Hurst on jhurst@envirolabservices.com.au or David Springer on dspringer@envirolabservices.com.au
or
Tania Notaras on tnotaras@envirolabservices.com.au

Regards

ENVIROLAB SERVICES
A division of Envirolab Group
ENVIROLAB GROUP

Envirolab Services Pty Ltd - Melbourne
ABN 37 112 535 645 - 02
1 Dalmore Drive, Scoresby VIC 3179 Australia
Ph +613 9763 2500 Fax +613 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 3738

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	**E26904KB - Waverley, NSW**
No. of samples:	1 soil
Date samples received / completed instructions received	16/04/2014 / 16/04/2014

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	24/04/14 / 24/04/14
Date of Preliminary Report:	Not Issued

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Results Approved By:

Analisa Mathrick
Laboratory Supervisor

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/4/14
Date analysed	-	17/4/14
vTRH C_6 - C_9	mg/kg	<25
vTPH C_6 - C_{10}	mg/kg	<25
TRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	108

TRH Soil C10-C40 NEPM		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/4/14
Date analysed	-	17/4/14
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
Total TRH (C10-C36)	mg/kg	<250
TRH >C_{10}-C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16}-C_{34}	mg/kg	<100
TRH >C_{34}-C_{40}	mg/kg	<100
Total TRH (>C10-C40)	mg/kg	<250
Surrogate o-Terphenyl	%	96

PAHs in Soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/04/2014
Date analysed	-	18/04/2014
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	0.3
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	1.1
Pyrene	mg/kg	1.1
Benzo(a)anthracene	mg/kg	0.5
Chrysene	mg/kg	0.5
Benzo(b, j & k)fluoranthene	mg/kg	1.3
Benzo(a)pyrene	mg/kg	0.71
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4
Dibenzo(a,h)anthracene	mg/kg	0.1
Benzo(g,h,i)perylene	mg/kg	0.5
Total +ve PAH's	mg/kg	6.7
Benzo(a)pyrene TEQ	mg/kg	1
Surrogate p-Terphenyl-d_{14}	%	96

OCP in Soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/04/2014
Date analysed	-	18/04/2014
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Surrogate TCMX	%	98

OP in Soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/04/2014
Date analysed	-	18/04/2014
Azinphos-methyl	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorovos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	98

PCBs in Soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date extracted	-	16/04/2014
Date analysed	-	18/04/2014
Arochlor 1016	mg/kg	<0.1
Arochlor 1221	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Total Positive PCB	mg/kg	<2.0
Surrogate TCLMX	%	98

Acid Extractable metals in soil		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date digested	-	17/4/14
Date analysed	-	17/4/14
Arsenic	mg/kg	<4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	2
Copper	mg/kg	16
Lead	mg/kg	51
Mercury	mg/kg	<0.1
Nickel	mg/kg	1
Zinc	mg/kg	36

Moisture		
Our Reference:	UNITS	3738-1
Your Reference	----------	DUP2
Date Sampled	----------	14/04/2014
Type of sample		Soil
Date prepared	-	16/04/2014
Date analysed	-	22/04/2014
Moisture	%	9.6

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater 2013.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-015	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/4/14	[NT]	[NT]	LCS-1	16/4/14
Date analysed	-			17/4/14	[NT]	[NT]	LCS-1	17/4/14
vTRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	81%
vTPH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-1	72%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-1	97%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-1	98%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	88%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-1	95%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-1	94%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	115	[NT]	[NT]	LCS-1	115%

QUALITY CONTROL TRH Soil C10-C40 NEPM	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/4/14	[NT]	[NT]	LCS-1	16/4/14
Date analysed	-			17/4/14	[NT]	[NT]	LCS-1	17/4/14
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	105%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	109%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	104%
TRH >C_{10}-C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-1	101%
TRH >C_{16}-C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	100%
TRH >C_{34}-C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-1	104%
Surrogate o-Terphenyl	%		Org-003	104	[NT]	[NT]	LCS-1	103%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	[NT]	[NT]	LCS-1	16/04/2014
Date analysed	-			18/04/2014	[NT]	[NT]	LCS-1	18/04/2014
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	100%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	122%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	100%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	101%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	105%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	77%
Benzo(b, j & k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-1	81%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	106	[NT]	[NT]	LCS-1	96%
QUALITY CONTROL OCP in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	[NT]	[NT]	LCS-1	16/04/2014
Date analysed	-			18/04/2014	[NT]	[NT]	LCS-1	18/04/2014
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	102%
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	109%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	104%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	105%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	98%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	102%
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	100%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	100%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	84%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	97%
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-1	78%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	108	[NT]	[NT]	LCS-1	96%

QUALITY CONTROL OP in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	[NT]	[NT]	LCS-1	16/04/2014
Date analysed	-			18/04/2014	[NT]	[NT]	LCS-1	18/04/2014
Azinphos-methyl	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	LCS-1	102%
Chlorpyriphos-methyl	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	LCS-1	96%
Diazinon	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorovos	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	LCS-1	88%
Fenitrothion	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	LCS-1	70%
Malathion	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Parathion	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-015	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-015	104	[NT]	[NT]	LCS-1	94%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			16/04/2014	[NT]	[NT]	LCS-1	16/04/2014
Date analysed	-			18/04/2014	[NT]	[NT]	LCS-1	18/04/2014
Arochlor 1016	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-1	101%
Arochlor 1260	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Total Positive PCB	mg/kg	2	Org-006	[NT]	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-015	108	[NT]	[NT]	LCS-1	96%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			17/4/14	[NT]	[NT]	LCS-1	17/4/14
Date analysed	-			17/4/14	[NT]	[NT]	LCS-1	17/4/14
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-1	101%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-1	102%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	104%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	101%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	103%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-1	107%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	102%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	104%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batched of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

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

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

A division of Envirolab Group

Envirolab Services Pty Ltd - Melbourne
ABN 37 112 535 645 - 02
1 Dalmore Drive, Scoresby VIC 3179 Australia
Ph +613 9763 2500 Fax +613 9763 2633
melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Vittal Boggaram

Sample log in details:

Your reference:	**E26904KB - Waverley, NSW**
Envirolab Reference:	**3738**
Date received:	16/04/2014
Date results expected to be reported:	**24/04/14**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	1 soil
Turnaround time requested:	Standard
Temperature on receipt	11.3C
Cooling Method:	Ice Pack
Sampling Date Provided:	YES

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples. Other samples such as filters, tubes and air toxics cans may be used entirely during testing.

Contact details:

Please direct any queries to Analisa Mathrick on amathrick@envirolab.com.au or
Suk Lee on slee@envirolab.com.au
ph: 03 9763 2500 fax: 03 9763 2633

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E26904KB Date Results Required: STANDARD Sheet 2, 2	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Vittal Boggaram

Project: Proposed Development
Location: Waverley, NSW
Sampler: JDC

Sample Preservation: In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 3	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs
14/4/14		BH309	0-0.4	Glass jar + Asb Bag	0	Soil		X									
↓		↓	0.8-1	Glass jar + Asb Bag	0	↓											
↓		BH310	0-0.4	Glass jar + Asb Bag	0	↓		X									
↓		↓	0.4-0.6	Glass jar + Asb Bag	0	↓											
↓		DUP1	—	Glass jar + ~~Asb Bag~~	—	↓	X										
↓		DUP2	—	Glass jar + ~~Asb Bag~~	—	↓	X	Please send to Envirolab VIC									
↓		DUP3	—	Glass jar + ~~Asb Bag~~	—	↓											
↓		TB	—	Glass jar + ~~Asb Bag~~	—	↓						X					
↓		TS	—	Glass jar + ~~Asb Bag~~	—	↓						X					
				Glass jar + Asb Bag													
				Glass jar + Asb Bag													
				Glass jar + Asb Bag													
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				Glass jar + Asb Bag													

ENVIROLAB
Envirolab Services
16 Dalmore Drive
Caribbean Park
Scoresby VIC 3179
Ph: (03) 9763 2500
Job No: 3738
Date Received: 16/4/14
Time Received: 12:00
Received by: TS
Temp: Cool/Ambient 11.3°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:
Vittal B.S	15/4/14		TA

Send by Pratistha (EIS Sydney) 15/4/14 15:10

PICKFORD & RHYDER CONSULTING PTY LTD
ABN 17 105 546 076
Occupational Hygiene Measurements and Solutions.

PO Box 1422 Lane Cove 1595
Rear - 244 Burns Bay Road
Lane Cove NSW Australia
Phone: (02) 9418 9151
Fax: (02) 9418 9150

15 April 2014

Mr Vittal Boggaram
Environmental Investigations Services
PO Box 976
NORTH RYDE BC NSW 1670
Email: vboggaram@jkgroup.net.au

CERTIFICATE OF ANALYSIS – ASBESTOS IDENTIFICATION

YOUR REFERENCE/JOB No: E26904KB
TYPE OF SAMPLES: Bulk sample – as received from EIS
SITE LOCATION: Proposed Development, Waverley
DATE SAMPLED: 14 April 2014 **DATE RECEIVED:** 15 April 2014
OUR REFERENCE: 78791-ID

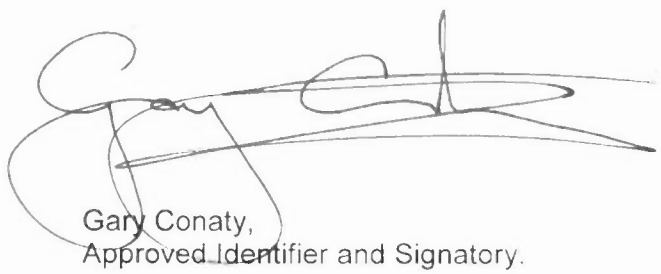
TEST METHOD: Bulk materials examined by Stereomicroscopy and Polarized Light Microscopy (with Dispersion Staining) in accordance with AS 4964-2004: - 'Method for the qualitative identification of asbestos in bulk samples' as outlined in Laboratory Method ID/1.

Sample/ Borehole No.	*Lab No.*	*Sample Information*	*Analysis Result*	*Description*
BH303	78791	0.5-0.7 metres depth	no asbestos detected	The sample was grey/green fibrous rock-type aggregates of approximate weight 13 g, in which synthetic mineral fibres were detected. No asbestos fibres were detected or found in the sample.

All sampling and site work has been undertaken by the client - the analytical procedures and results reported on this Certificate have been conducted by Pickford & Rhyder Consulting.

Sampling is not covered by the scope of accreditation.

Analysed and reported by:



Gary Conaty,
Approved Identifier and Signatory.

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025. This document shall not be reproduced except in full.

Accreditation number 2515

78791

TO:
Pickford & Rhyder Consulting Pty Ltd
244 Burns Bay Road, Lane Cove, NSW – 2066

Phone: (02) 9418 9151
Fax: (02) 9418 9150

Attention: Gary / Lisa

Date Results Required: Standard

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E26904KB Sheet 1/1

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Vittal Boggaram

Project: Proposed Development
Location: Waverley, NSW
Sampler: JDC

Tests Required

Sample Preservation:
In esky on ice

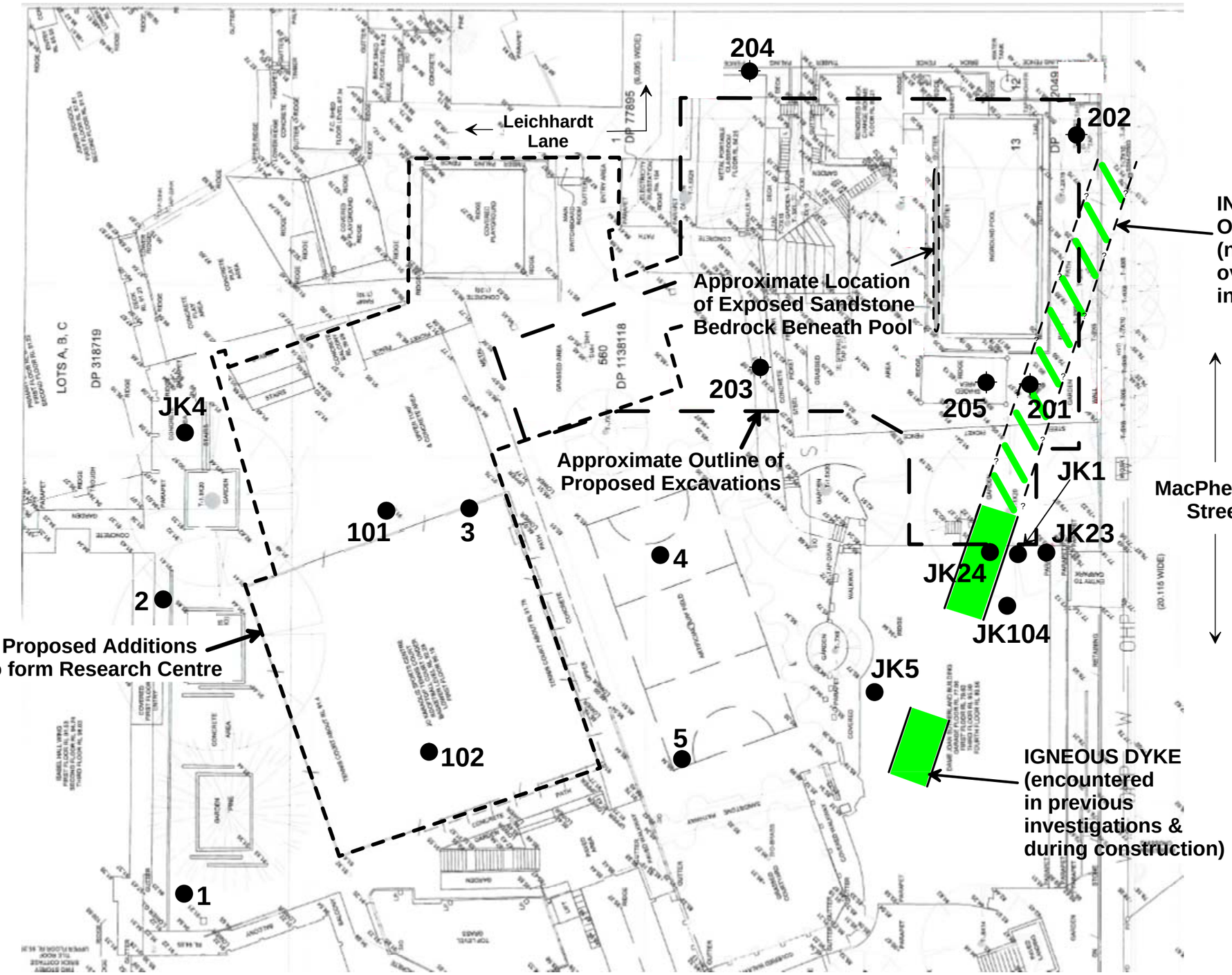
Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Depth (m)	Sample Container	PID (ppm/ Odour)	Sample Description	Asbestos									Comments/Detection Limits Required
14/4/14	10:00	—	BH302	0.5-0.7	Plastic Bag		Material	X									
					Plastic Bag												
					Plastic Bag												
					Plastic Bag												
					Plastic Bag												
					Plastic Bag												

Relinquished By:	Date: 14/4/14 Time: 2:30	Received By:
Vittal B-S		
Relinquished By:	Date: Time:	Received By:

Remarks:

Appendix C: Site Information and Site History Documents

Appendix C1: JK Borehole Logs of 2013



LEGEND

- BOREHOLE
- BOREHOLE AND DCP TEST

201 etc	Boreholes and DCP tests from current investigation
1, 101, JK1 etc	Boreholes from previous investigations

Scale (m): 0 25

JK Geotechnics
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Title: **INVESTIGATION LOCATION PLAN**

Report Number: 26904ZR

Figure Number: 1

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 201
1/2

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR
Date: 1-10-13
Method: HAND AUGER / WASHBORE
Logged/Checked by: R.C./
R.L. Surface: ≈ 80.4m
Datum: AHD

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■			■	REFER TO DCP TEST RESULTS	0			FILL: Silty sand, fine to medium grained, dark grey, trace of fine to coarse grained sandstone gravel and roots.	M			APPEARS POORLY COMPACTED
	■			■				SP	SAND: fine to medium grained, grey, with silt, trace of ash.	M	(L)		POSSIBLY FILL
	■			■		1			SAND: fine to medium grained, light grey, with silt.				
	■			■					as above, but orange brown.				
	■			■		2					(MD)		COMMENCE WASH BORE DRILLING
	■			■					as above, but orange brown and dark brown.				
	■			■		3					(D)		
	■			■		4					(VD)		
									REFER TO CORED BOREHOLE LOG				
						5							
						6							
						7							

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CORED BOREHOLE LOG

Borehole No. **201** 2/2

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 80.4m
Date: 1-10-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ EL VL L M H VH EH	DEFECT DETAILS DEFECT SPACING (mm) 500 300 100 50 30 10	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
		4		START CORING AT 4.20m					
				CORE LOSS 0.69m					
▼ ON COMPLETION OF CORING & WASH BORING 70% RETURN		5		SAND: fine to medium grained brown, with silt.	N/A	N/A			
				SANDSTONE: fine to coarse grained, light grey.	XW	EL-L			
				CORE LOSS 0.09m	XW-DW	EL-VL			- XWS, 0°, 20mm.t - XWS, 0°, 3mm.t - XWS, 0°, 65mm.t - XWS, 0°, 50mm.t - XWS, 0°, 200mm.t
		6		SANDSTONE: fine to coarse grained, light grey, with orange brown staining.					- XWS, 0°, 60mm.t - J, 58°, P, R, IS - J, 58°, XW INFILL 35mm.t
				CORE LOSS 0.20m					
		7		SANDSTONE: fine to coarse grained, light grey, with orange brown staining, and fine to medium grained gravel sized sub rounded quartz inclusions	XW-DW	EL-VL			- XWS, 0°, 180mm.t - XWS, 5°, 9mm.t - XWS, 11°, 6mm.t - XWS, 11°, 2mm.t - XWS, 0°, 4mm.t - 2x J, 60° & 65°, P, S, IS - XWS, 0°, 27mm.t
				SANDSTONE: fine to medium grained, light grey.	DW	VL-L			
		8		END OF BOREHOLE AT 8.11m					- J, 55°, P, S, IS
		9							
		10							

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BOREHOLE LOG

Borehole No. 202
1/2

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR **Method:** HAND AUGER **R.L. Surface:** ≈ 77.3m
Date: 2-10-13 **Datum:** AHD
Logged/Checked by: R.C./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING	■			■		0			FILL: Silty sand, fine to medium grained, grey, trace of roots.	D			APPEARS POORLY COMPACTED
	■			■					FILL: Silty sand, fine to medium grained, brown, with fine to medium grained sandstone gravel.	M			APPEARS MODERATELY COMPACTED
	■			■		1		SP	SAND: fine to medium grained, grey, with silt.	M	(MD)		
	■			■		2			as above, but light grey.		(L)		
				■				SM	SILTY SAND: fine to medium grained, dark brown.		MD		
									REFER TO CORED BOREHOLE LOG				
						3							
						4							
						5							
						6							
						7							

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CORED BOREHOLE LOG

Borehole No. 202 2/2

Client: SANDRICK

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 77.3m

Date: 2-10-13 | **Inclination:** VERTICAL | **Datum:** AHD

Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ (EL VL L M H VH EH)	DEFECT SPACING (mm) (500 300 100 50 30 10)	DEFECT DETAILS DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
		2		START CORING AT 2.65m					
				SILTY SAND: fine to medium grained, dark brown.	N/A	(MD)			REFER TO DCP TEST RESULTS SHEET
		3		SANDSTONE: fine to medium grained, light grey, with occasional dark grey laminae.	XW DW	EL VL			- J, 60°, P, R, IS - XWS, 20°, 15mm.t - J, 52°, P, S - J, 70°, P, S, SAND INFILL 18mm.t - J, 50°, P, R, IS
		4				L			
FULL RET-URN				CORE LOSS 0.02m SANDSTONE: fine to medium grained, light grey, with occasional orange brown staining.	DW	VL-L			- XWS, 0°, 30mm.t - XWS, 0°, 145mm.t - J, 50°, P, S - XWS, 10°, 4mm.t
		5				L			- XWS, 5°, 5mm.t - J, 58°, P, R, IS
		6							- XWS, 0-18°, 15mm.t - J, 66°, P, S, IS
		7		SANDSTONE: fine to medium grained, red brown, with fine to medium grained gravel sized sub rounded quartz inclusions.		VL			- J, 58°, P, R, IS - XWS, 0°, 31mm.t
					XW	EL			
		8		CORE LOSS 0.20m INTERBEDDED SANDSTONE: fine grained, grey, and SHALE: grey. END OF BOREHOLE AT 7.79m					
		9							

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BOREHOLE LOG

Borehole No. 203
1/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR **Method:** HAND AUGER **R.L. Surface:** ≈ 84.1m
Date: 30-9-13 **Datum:** AHD
Logged/Checked by: R.C./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING	■					0			FILL: Silty sand, fine to medium grained, grey, trace of fine to medium grained sandstone gravel and slag.	M			GRASS COVER APPEARS POORLY COMPACTED
	■			■		1		SM	SILTY SAND: fine to medium grained, dark grey, trace of root fibres.	M	(VL)		
									as above, but grey.				
				■		2		SP	SAND: fine to medium grained, light grey, trace of silt.		(L)		
											(MD)		
									REFER TO CORED BOREHOLE LOG				
						3							
						4							
						5							
						6							
						7							

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CORED BOREHOLE LOG

Borehole No. 203 2/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 84.1m
Date: 30-9-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, structure, minor components.)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ (EL VL L M H VH EH)	DEFECT SPACING (mm) (500 300 100 50 30 10)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
		2		START CORING AT 2.40m					
				CORE LOSS 0.20m					
FULL RET -URN		3		SANDSTONE: fine to coarse grained, orange brown.	XW	EL			
					DW	VL			- XWS, 0°, 23mm.t - XWS, 0°, 140mm.t
		4		as above, but light grey.					- J, 70°, P, R
		5		INTERBEDDED SHALE: light grey and dark grey banded and SILTY CLAY: high plasticity, light grey and dark bands, with thin DW, VL strength bands, trace of fine grained sand.	RS-XW	(H)-EL			
		6							- J, 68°, P, S, IS
		7		SANDSTONE: fine to medium grained, light grey, with grey and orange brown laminae, bedded at 0-5°.	DW	M			- Be, 20°, P, S - XWS, 8°, 3mm.t
		8		as above, but light grey, with occasional orange brown staining.					- XWS, 0-10°, 60mm.t - XWS, 12°, 3mm.t
		9							

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CORED BOREHOLE LOG

Borehole No. **203** 3/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 84.1m
Date: 30-9-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain character-istics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ EL VL L M H VH EH	DEFECT DETAILS DEFECT SPACING (mm) 500 300 100 50 30 10	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
FULL RET-URN				SANDSTONE: fine to medium grained, light grey, with occasional orange brown staining.	DW	M	•		- XWS, 18°, 1mm,t - J, 47°, P, S
		10		END OF BOREHOLE AT 9.97m					
		11							
		12							
		13							
		14							
		15							

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BOREHOLE LOG

Borehole No. 204
1/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR **Method:** HAND AUGER **R.L. Surface:** ≈ 81.8m
Date: 30-9-13 **Datum:** AHD
Logged/Checked by: R.C./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING	■			■	REFER TO DCP TEST RESULTS	0			FILL: Silty sand, fine to medium grained, grey, trace of root fibres.	D			APPEARS POORLY COMPACTED
	■			■		1		SP	SAND: fine to medium grained, light grey, with silt.	D-M	(VL)		
									REFER TO CORED BOREHOLE LOG				

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CORED BOREHOLE LOG

Borehole No. **204** 2/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 81.8m
Date: 1-10-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ (EL VL L M H VH EH)	DEFECT DETAILS: DEFECT SPACING (mm) (500 300 100 50 30 10)	DEFECT DETAILS: DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
		0							
		1		START CORING AT 1.17m					
				SAND: fine to medium grained, orange brown.	N/A	(L)			REFER TO DCP TEST RESULTS SHEET
						(MD)			
				CORE LOSS 0.38m					
		2							HP; 200,200,200,290kPa
FULL RET-URN				SILTY CLAY: medium plasticity, light grey.	RS	VSt			
				SANDSTONE: fine to medium grained, light grey, with orange brown staining, bedded at 0-15°.	XW	EL			- J, 63°, P, S
					DW	L-M			- XWS, 0°, 0mm.t
		3							- XWS, 0°, 12mm.t
						M			- XWS, 5°, 3mm.t
ON COMPLET-ION ▼		4							
				CORE LOSS 0.14m					
				SANDSTONE: fine to medium grained, light grey, with orange brown staining, bedded at 0-15°.	DW	M			
▼ AFTER 42 HRS		5							- J, 50°, P, S
									- J, 50-70°, Un, S
		6							- CS, 10°, 1mm.t
									XWS, 5°, 6mm.t
				CORE LOSS 0.03m	SW	H			
				SANDSTONE: fine to medium grained, light grey, with orange					- XWS, 6°, 20mm.t
		7							

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CORED BOREHOLE LOG

Borehole No. 204 3/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 81.8m
Date: 1-10-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, structure, minor components.)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ EL VL L M H VH EH	DEFECT SPACING (mm) 500 300 100 50 30 10	DEFECT DETAILS DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific	General
				brown staining.	SW	H				
				SANDSTONE: fine to medium grained, light grey, with grey and dark grey laminae, bedded at 5-15°.						
		8			DW	M			- XWS, 5°, 17mm.t	
		9		SANDSTONE:fine to medium grained, light grey, with orange brown staining and fine to medium grained gravel sized, sub rounded quartz inclusions.		L-M			- XWS, 5-10°, 40mm.t	
		10		END OF BOREHOLE AT 9.88m						
		11								
		12								
		13								
		14								

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BOREHOLE LOG

Borehole No. 205
1/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR
Date: 2-10-13
Method: HAND AUGER/ WASHBORE
R.L. Surface: ≈ 80.6m
Datum: AHD
Logged/Checked by: R.C./

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING				■	REFER TO DCP TEST RESULTS	0			FILL: Silty sand, fine to medium grained, grey, trace of root fibres.	M			GRASS COVER APPEARS POORLY COMPACTED
				■				SP	SAND: fine to medium grained, light grey, with silt.	M	(L)		
						1			as above, but orange brown.		(MD)		
				■		2							
						3							COMMENCE WASHBORE DRILLING WITH NO SAMPLING
						4			REFER TO CORED BOREHOLE LOG				
						5							
						6							
						7							

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CORED BOREHOLE LOG

Borehole No. 205 2/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 80.6m
Date: 3-10-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION (Rock Type, grain characteristics, colour, structure, minor components.)	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ (EL VL L M H VH EH)	DEFECT DETAILS: DEFECT SPACING (mm) (500 300 100 50 30 10)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
		2							
		3		START CORING AT 3.86m					
		4		CORE LOSS 0.14m					REFER TO DCP TEST RESULTS SHEET
				SAND: fine to medium grained, orange brown, with silt.	N/A	(MD)			
				SANDSTONE: fine to medium grained, light grey, with orange brown and dark brown staining, bedded at 0-20°.	DW	VL			- J, 60°, P, S, SAND INFILL 10mm.t - J, 56°, P, S, IS, XW INFILL 30mm.t - XWS, 10°, 3mm.t - XWS, 10°, 2mm.t - XWS, 7°, 2mm.t - XWS, 6°, 2mm.t - XWS, 6°, 2mm.t
		5				VL-L			- XWS, 5°, 8mm.t - XWS, 5°, 3mm.t - XWS, 0°, 60mm.t - J, Un, S, MAX. 50°, XW INFILL 45mm.t - XWS, 7°, 2mm.t
		6							- J, 50°, P, R - XWS, 20°, 140mm.t
FULL RET-URN		7		CORE LOSS 0.03m SANDSTONE: fine to medium grained, light grey.	DW	VL-L			
				CORE LOSS 0.66m					
		8		SANDSTONE: fine to coarse grained, light grey, with fine to medium grained gravel sized quartz.	DW	L			- XWS, 0°, 47mm.t - XWS, 0°, 195mm.t
				SANDSTONE: fine to medium grained, light grey.		M			- XWS, 0°, 30mm.t - J, 70-90°, Un, R
		9							

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CORED BOREHOLE LOG

Borehole No. **205** 3/3

Client: SANDRICK
Project: PROPOSED ALTERATIONS AND ADDITIONS
Location: ST CATHERINE'S SCHOOL, ALBION STREET, WAVERLEY, NSW

Job No. 26904ZR | **Core Size:** NMLC | **R.L. Surface:** ≈ 80.6m
Date: 3-10-13 | **Inclination:** VERTICAL | **Datum:** AHD
Drill Type: MELVELLE | **Bearing:** - | **Logged/Checked by:** R.C./

Water Loss/Level	Barrel Lift	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_S(50)$ EL VL L M H VH EH	DEFECT DETAILS DEFECT SPACING (mm) 500 300 100 50 30 10	DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
				SANDSTONE: fine to medium grained, light grey.	DW	M	•		- XWS, 0°, 70mm.t
		10					•		- XWS, 0°, 17mm.t
				END OF BOREHOLE AT 10.08m					
		11							
		12							
		13							
		14							
		15							

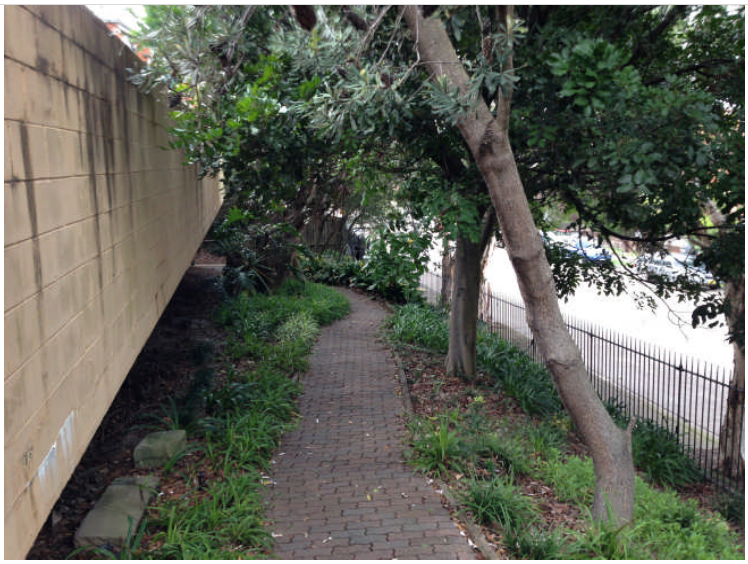
Appendix C2: Site Photos of 14 April 2014

Selected Site Photos taken on 14 April 2014

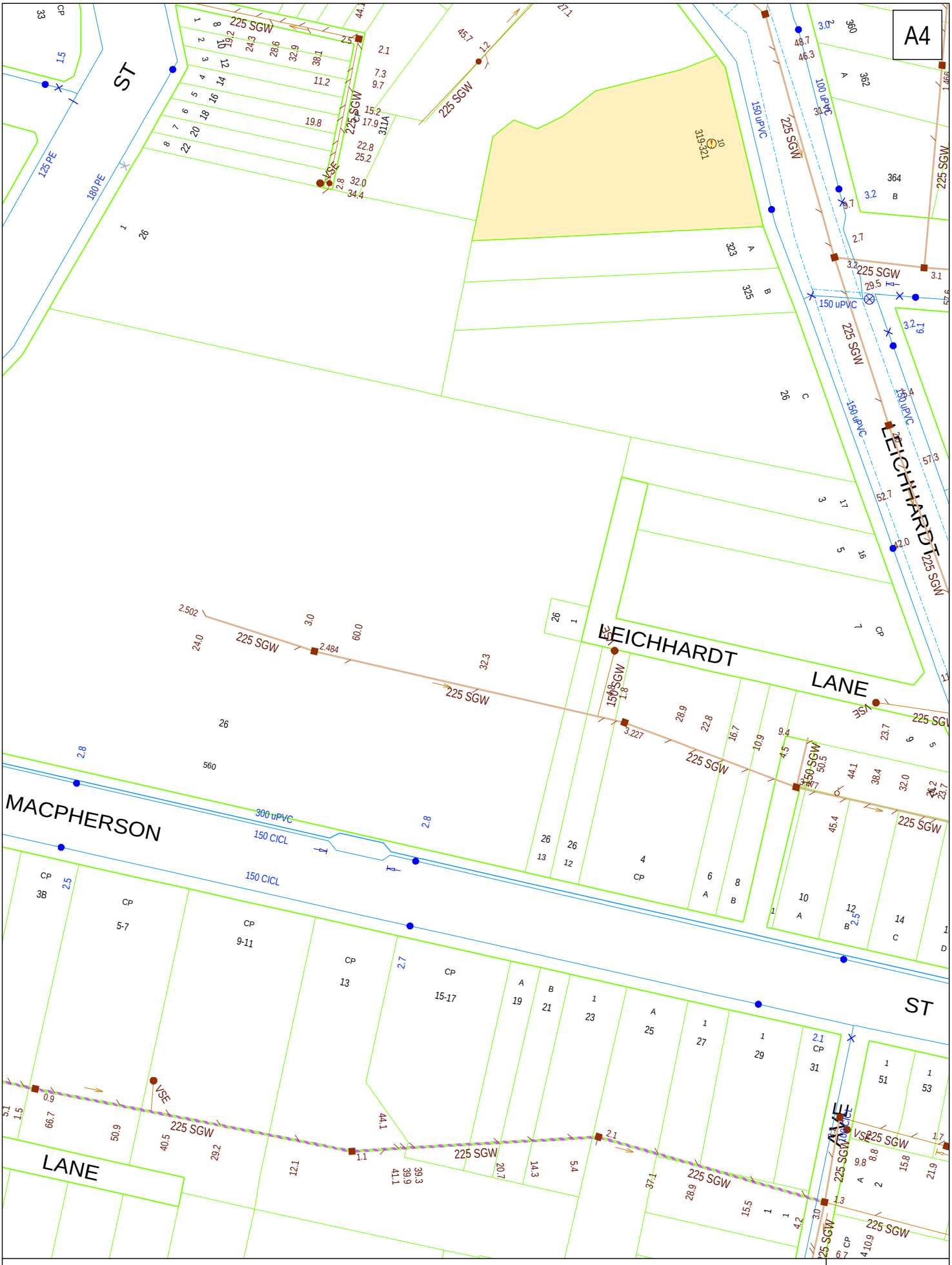
Photograph 1: Taken showing the south section of the site, facing south. The photo shows the above ground swimming pool located at the site

Photograph 2: Taken showing the central court yard area of the site, facing south-west. The photo shows the grass covered court yard and playing field beyond.

Photograph 3: Taken showing the north section of the site, facing north. The photo shows the existing school buildings in the north section.

	**Photograph 4:** Taken showing the south-west section of the site, facing south. The photo shows dense vegetation in this section of the site.
	**Photograph 5:** Taken showing the walkway along the south site boundary, facing east. The photo shows the above ground swimming pool located to the north of the walkway.

Appendix C3: DBYD Sewer Plan



DBYD Address:
26 Albion Street
Waverley NSW 2024

DBYD Job No: 7308841

DBYD Sequence No: 33486060

SYDNEY WATER CORPORATION

Scale: 1:1000

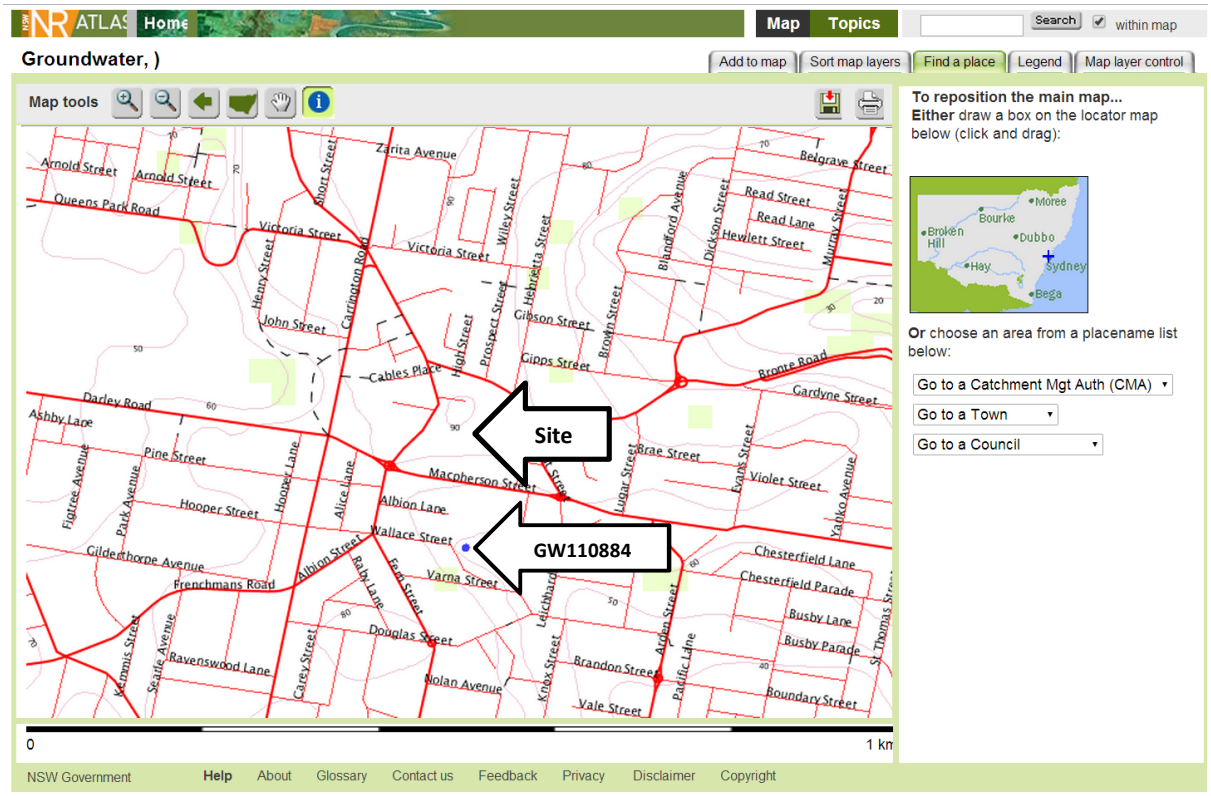
Date of Production: 09/04/2014

Plan 1 of 1

N

0m 5m 10m 15m 20m

Appendix C4: Groundwater Bore Records



Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Thursday, May 8, 2014

Works Details | Site Details | Form A | Licensed | Construction | Water Bearing Zones | Drillers Log

Work Requested -- GW110884

Works Details (top)

GROUNDWATER NUMBER	GW110884
LIC-NUM	10BL600695
AUTHORISED-PURPOSES	TEST BORE
INTENDED-PURPOSES	TEST BORE
WORK-TYPE	Spear
WORK-STATUS	
CONSTRUCTION-METHOD	Jetted - Water
OWNER-TYPE	Private
COMMENCE-DATE	
COMPLETION-DATE	2010-03-26
FINAL-DEPTH (metres)	4.50
DRILLED-DEPTH (metres)	4.50
CONTRACTOR-NAME	
DRILLER-NAME	

PROPERTY	BRONTE BOWLING CLUB
GWMA	-
GW-ZONE	-
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	10 - SYDNEY SOUTH COAST
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6246875.00
EASTING	338718.00
LATITUDE	33 54' 22"
LONGITUDE	151 15' 20"
GS-MAP	
AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

COUNTY	CUMBERLAND
PARISH	ALEXANDRIA
PORTION-LOT-DP	1//1093018

Licensed (top)

COUNTY	CUMBERLAND
PARISH	ALEXANDRIA
PORTION-LOT-DP	1 1093018

Construction (top)

Negative depths indicate Above Ground Level;H-Hole;P-Pipe;OD-Outside Diameter;
ID-Inside Diameter;C-Cemented;SL-Slot Length;A-Aperture;GS-Grain Size;Q-Quantity

HOLE-NO	PIPE-NO	COMPONENT-CODE	COMPONENT-TYPE	DEPTH-FROM (metres)	DEPTH-TO (metres)	OD (mm)	ID (mm)	INTERVAL	DETAIL
1		Hole	Hole	0.00	4.50	90			Jetted - Water

Water Bearing Zones (top)

no details

Drillers Log (top)

FROM	TO	THICKNESS	DESC	GEO-MATERIAL	COMMENT
0.00	1.10	1.10	SAND AND SANDSTONES		
1.10	2.50	1.40	SAND BROWN		
2.50	4.50	2.00	SAND,SILTY,BROWN,DECOMPOSED SANDSTONE		

Appendix C5: Council Section 149 Certificates

BP

17 APR 2014

PLANNING CERTIFICATE UNDER SECTION 149 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

Cert. No.29788
Page No: 1

Eis
PO Box 976
NORTH RYDE BC NSW 1670

Date: 15 April 2014
Receipt No. 1403585
Your reference: E2690410B

Property location	**ST Catherines Girls School, 26 Albion Street, WAVERLEY NSW 2024**
Parcel description:	**Lot 560 DP 1138118**
Owner:	**Council of St Catherine's School Waverley**
	26 Albion St **WAVERLEY NSW 2024**

[The next page is page 2]

Waverley Council | ABN: 12 502 583 608
PO Box 9, Bondi Junction NSW 1355 | DX 12006 Bondi Junction
PHONE **9369 8000** | FAX **9387 1820**
EMAIL waver@waverley.nsw.gov.au | WEB www.waverley.nsw.gov.au

In accordance with the requirements of section 149 of the Environmental Planning and Assessment Act 1979 (as amended), the following prescribed matters relate to the land at the date of this certificate.

ITEM 1

Names of relevant planning instruments and DCPs

(1) The name of each environmental planning instrument that applies to the carrying out of development on the land.

The following environmental planning instruments apply to the carrying out of development on the land:

Waverley LEP 2012 - Gazetted: 26 October 2012

- SEPP No. 4 Development Without Consent and Miscellaneous Complying Development
- SEPP No. 6 Number of Storeys in a Building
- SEPP No. 14 Coastal Wetlands
- SEPP No. 19 Bushland in Urban Areas
- SEPP No. 22 Shops and Commercial Premises
- SEPP No. 32 Urban Consolidation (Redevelopment of Urban Land)
- SEPP No. 33 Hazardous and Offensive Development
- SEPP No. 50 Canal Estates
- SEPP No. 55 Remediation of Land
- SEPP No. 64 Advertising and Signage
- SEPP No. 65 Design Quality of Residential Flat Development
- SEPP No. 70 Affordable Housing (Revised Schemes)
- SEPP No. 71 Coastal Protection
- SEPP (Affordable Rental Housing) 2009
- SEPP (Building Sustainability Index: BASIX) 2004
- SEPP (Exempt and Complying Development Codes) 2008
- SEPP (Housing for Seniors or People with a Disability) 2004
- SEPP (Infrastructure) 2007
- SEPP (Major Development) 2005
- SEPP (Temporary Structures) 2007
- SREP (Sydney Harbour Catchment)

Any enquiries regarding these SEPPs should be directed to the Department of Planning and Infrastructure on: ***(02) 9228 6333*** or http://www.planning.nsw.gov.au

(2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (unless the Director-General has notified the council that the making of the proposed instrument has been deferred indefinitely or has not been approved).

The following proposed environmental planning instruments apply to the carrying out of development on the land:

- Proposed Competition SEPP

Note : Any enquiries regarding these SEPPs should be directed to the Department of Planning on: ***(02) 9762 8000*** or http://www.planning.nsw.gov.au

(3) The name of each development control plan that applies to the carrying out of development on the land.

The following development control plan (DCP) applies to the land:

- Waverley DCP 2012 Amendment No. 2

(4) In this clause, proposed environmental planning instrument includes a planning proposal for a LEP or a draft environmental planning instrument.

ITEM 2

Zoning and land use under relevant LEPs

For each environmental planning instrument or proposed instrument referred to in clause 1 (other than a SEPP or proposed SEPP) that includes the land in any zone (however described):

(a) the identity of the zone, whether by reference to a name (such as "Residential Zone" or "Heritage Area") or by reference to a number (such as "Zone No 2(a)"),

(b) the purposes for which the instrument provides that development may be carried out within the zone without the need for development consent,

(c) the purposes for which the instrument provides that development may not be carried out within the zone except with development consent,

(d) the purposes for which the instrument provides that development is prohibited within the zone,

Waverley LEP 2012 - Gazetted: 26 October 2012

Zone SP2 Infrastructure

1 Objectives of zone

- To provide for infrastructure and related uses.
- To prevent development that is not compatible with or that may detract from the provision of infrastructure.

2 Permitted without consent

Nil

3 Permitted with consent

Roads; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose

4 Prohibited

Any development not specified in item 2 or 3

(e) whether any development standards applying to the land fix minimum land dimensions for the erection of a dwelling-house on the land and, if so, the minimum land dimensions so fixed,

The land is **not** subject to any development standards that fix minimum land dimensions for the erection of a dwelling house.

(f) whether the land includes or comprises critical habitat,

The land does **not** comprise critical habitat.

(g) whether the land is in a conservation area (however described),

The land **is** within a Heritage Conservation Area.

- The land is located within a Heritage Conservation Area - General identified in Waverley Local Environmental Plan 2012.

(h) whether an item of environmental heritage (however described) is situated on the land.

The land **contains** an Item of Environmental Heritage.

- The land contains a Heritage Item - General identified in Waverley Local Environmental Plan 2012.
- The land contains a Heritage Item- Landscape identified in Waverley Local Environmental Plan 2012.

ITEM 2A

Zoning and land use under State Environmental Planning Policy (Sydney Region Growth Centres) 2006

To the extent that the land is within any zone (however described) under:

(a) Part 3 of the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* ***(the 2006 SEPP),*** or

(b) A Precinct Plan (within the meaning of the 2006 SEPP), or

(c) A proposed Precinct Plan that is or has been the subject of community consultation or on public exhibition under the Act,

the particulars referred to in clause 2(a)-(h) in relation to that land (with a reference to "the instrument" in any of those paragraphs being read as a reference to Part 3 of the 2006 SEPP, or the Precinct Plan or proposed Precinct Plan, as the case requires).

The land is **not** subject to the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006.*

ITEM 3

Complying development

(1) The extent to which the land is land on which complying development may be carried out under each of the codes for complying development because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18 (1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

(2) The extent to which complying development may not be carried out on that land because of the provisions of clauses 1.17A (1) (c) to (e), (2), (3) and (4), 1.18 (1) (c3) and 1.19 of that Policy and the reasons why it may not be carried out under those clauses.

(3) If the council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, a statement that a restriction applies to the land, but it may not apply to all of the land, and that council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

General Housing Code

Complying development under the General Housing Code **may not** be carried out on the land. The land is affected by specific land exemption:

- land contains a Heritage Item.

- land is located within a Heritage Conservation Area - development is excluded from SEPP (Exempt and Complying Development) 2008, unless the development is for a detached outbuilding or swimming pool.

Rural Housing Code

There are no lands within the Waverley Council area that are affected by this Code.

Housing Alterations Code

Complying development under the Housing Alterations Code **may not** be carried out on the land. The land is affected by specific land exemption:

- land contains a Heritage Item.

General Development Code

Complying development under the General Development Code **may not** be carried out on the land. The land is affected by specific land exemption:

- land contains a Heritage Item.

Commercial and Industrial Alterations Code

Complying development under the Commercial and Industrial Alteration Code **may not** be carried out on the land. The land is affected by specific land exemptions:

- land contains a Heritage Item.

Commercial and Industrial (New Buildings and Additions) Code

Complying development under the Commercial and Industrial (New Building and Additions) Code **may not** be carried out on the land. The land is affected by specific land exemptions:

- land contains a Heritage Item.
- land is located within a Heritage Conservation Area.

Subdivisions Code

Complying development under the Subdivisions Code **may not** be carried out on the land. The land is affected by specific land exemptions:

- land contains a Heritage Item.

Demolition Code

Complying development under the Demolition Code **may not** be carried out on the land. The land is affected by specific land exemption:

- land contains a Heritage Item.

Fire Safety Code

Complying development under the Fire Safety Code **may not** be carried out on the land. The land is affected by specific land exemptions:

- land contains a Heritage Item.

Disclaimer: If a restriction applies to the land, the restriction may not apply to all of the land. Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Complying development may be able to be carried out on the land provided it meets the requirements and standards of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.*

ITEM 4

Coastal protection

Whether or not the land is affected by the operation of section 38 or 39 of the *Coastal Protection Act 1979,* but only to the extent that the council has been so notified by the Department of Services, Technology and Administration.

The land is **not** affected by Sections 38 or 39 of the *Coastal Protection Act 1979.*

ITEM 4A

Certain information relating to beaches and coasts

(1) In relation to a coastal council - whether an order has been made under Part 4D of the *Coastal Protection Act 1979* in relation to temporary coastal protection works (within the meaning of that Act) on the land (or on public land adjacent to that land), except where the council is satisfied that such an order has been fully complied with.

No.

(2) In relation to a coastal council:

(a) Whether the council has been notified under section 55x of the *Coastal Protection Act 1979* that temporary coastal protection works (within the meaning of that Act) have been placed on the land (or on public land adjacent to that land), and

No.

(b) If works have been so placed-whether the council is satisfied that the works have been removed and the land restored in accordance with that Act.

Not applicable.

(3) (Repealed)

ITEM 4B

Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

In relation to a coastal council - whether the owner (or any previous owner) of the land has consented in writing to the land being subject to annual charges under section 496B of the *Local Government Act 1993* for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

No.

Note "Existing coastal protection works" are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of section 553B of the *Local Government Act 1993.*

ITEM 5

Mine subsidence

Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961.*

The land is **not** proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961.*

ITEM 6

Road widening and road realignment

Whether or not the land is affected by any road widening or road realignment under:

(a) Division 2 of Part 3 of the *Roads Act 1993*, or

(b) any environmental planning instrument, or

(c) any resolution of the council.

The land is **not** affected by any road widening or road realignment under Division 2 of Part 3 of the Roads Act 1993, or any environmental planning instrument or any resolution of the Council.

ITEM 7

Council and other public authority policies on hazard risk restrictions

Whether or not the land is affected by a policy:

(a) adopted by the council, or

(b) adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the council,

that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

(a) The land is **not** affected by a policy adopted by Council that restricts the development of land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

(b) The land is **not** affected by a policy adopted by another public authority and notified to the Council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the Council, that restricts the development of land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

ITEM 7A

Flood related development controls information

(1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

The land is **not** subject to flood related development controls for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing).

(2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

The land is **not** subject to flood related development controls.

(3) Words and expressions in this clause have the same meanings as in the instrument set out in the Schedule to the Standard Instrument (Local Environmental Plans) Order 2006.

ITEM 8

Land reserved for acquisition

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

The land is **not** affected by any environmental planning instrument or proposed environmental planning instrument referred to in clause 1 that provides for the acquisition of the land by a public authority, as referred to in section 27 of the Act.

ITEM 9

Contributions plans

The name of each contributions plan applying to the land.

Waverley Council Development Contribution Plan 2006 (Amendment No.5).

ITEM 9A

Biodiversity certified land

If the land is biodiversity certified land (within the meaning of P*art 7AA of the Threatened Species Conservation Act 1995)*, a statement to that effect.

The land is **not** biodiversity certified land under Part 7AA of the *Threatened Species Conservation Act 1995.*

ITEM 10

Biobanking agreements

If the land is land to which a biobanking agreement under Part 7A of the *Threatened Species Conservation Act 1995* relates, a statement to that effect (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water).

Council has **not** been notified of any biobanking agreement under Part 7A of the *Threatened Species Conservations Act 1995* relating to the land.

ITEM 11

Bush fire prone land

If any of the land is bush fire prone land (as defined in the Act), a statement that all or, as the case may be, some of the land is bush fire prone land.

If none of the land is bush fire prone land, a statement to that effect.

The land is **not** bush fire prone land (as defined in the Act).

ITEM 12

Property vegetation plans

If the land is land to which a property vegetation plan under the *Native Vegetation Act 2003* applies, a statement to that effect (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under that Act).

Council has **not** been notified of any property vegetation plans under the *Native Vegetation Act 2003* applying to the land.

ITEM 13

Orders under Trees (Disputes Between Neighbours) Act 2006

Whether an order has been made under the *Trees (Disputes Between Neighbours) Act 2006* to carry out work in relation to a tree on the land (but only if the council has been notified of the order).

No.

ITEM 14

Directions under Part 3A

If there is a direction by the Minister in force under section 75P (2) (c1) of the Act that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect, a statement to that effect identifying the provision that does not have effect.

There is **no** direction under Part 3A.

ITEM 15

Site compatibility certificates and conditions for seniors housing

If the land is land to which *State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004* applies:

(a) a statement of whether there is a current site compatibility certificate (seniors housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(i) the period for which the certificate is current, and

(ii) that a copy may be obtained from the head office of the Department of Planning, and

Council has **not** been notified of any site compatibility certificate and conditions for seniors housing.

(b) a statement setting out any terms of a kind referred to in clause 18 (2) of that Policy that have been imposed as a condition of consent to a development application granted after 11 October 2007 in respect of the land.

Council has **not** been notified of any site compatibility certificate and conditions for seniors housing.

ITEM 16

Site compatibility certificates for infrastructure

A statement of whether there is a valid site compatibility certificate (infrastructure), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(a) the period for which the certificate is valid, and

(b) that a copy may be obtained from the head office of the Department of Planning.

Council has **not** been notified of any site compatibility certificate for infrastructure.

ITEM 17

Site compatibility certificates and conditions for affordable rental housing.

(1) A statement of whether there is a current site compatibility certificate (affordable rental housing), of which the council is aware, in respect of proposed development on the land and, if there is a certificate, the statement is to include:

(a) the period for which the certificate is current, and

(b) that a copy may be obtained from the head office of the Department of Planning.

Council has **not** been notified of any site compatibility certificate and condition for affordable rental housing.

(2) A statement setting out any terms of a kind referred to in clause 17(1) or 38 (1) of *State Environmental Planning Policy (Affordable Rental Housing) 2009* that have been imposed as a condition of consent to a development application in respect of the land.

Council has **not** been notified of any site compatibility certificate and condition for affordable rental housing.

ITEM 18

Paper subdivision information

(1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

Council is **not** aware of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

(2) The date of any subdivision order that applies to the land.

Council is **not** aware of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot.

(3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.

ITEM 19

Site verification certificates

A statement of whether there is a current site verification certificate, of which the council is aware, in respect of the land and, if there is a certificate, the statement is to include:

(a) the matter certified by the certificate, and

Note. A site verification certificate sets out the Director-General's opinion as to whether the land concerned is or is not biophysical strategic agricultural land or critical industry cluster land—see Division 3 of Part 4AA of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

(b) the date on which the certificate ceases to be current (if any), and

(c) that a copy may be obtained from the head office of the Department of Planning and Infrastructure.

Council has **not** been notified of any site verification certificates.

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

(a) that the land to which the certificate relates is significantly contaminated land within the meaning of that Act-if the land (or part of the land) is significantly contaminated land at the date when the certificate is issued,

No.

(b) that the land to which the certificate relates is subject to a management order within the meaning of that Act-if it is subject to such an order at the date when the certificate is issued,

No.

(c) that the land to which the certificate relates is the subject of an approved voluntary management proposal within the meaning of that Act-if it is the subject of such an approved proposal at the date when the certificate is issued,

No.

(d) that the land to which the certificate relates is subject to an ongoing maintenance order within the meaning of that Act-if it is subject to such an order at the date when the certificate is issued,

No.

(e) that the land to which the certificate relates is the subject of a site audit statement within the meaning of that Act-if a copy of such a statement has been provided at any time to the local authority issuing the certificate.

No.

Note: Section 26 of the *Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009* provides that a planning certificate must include advice about any exemptions under section 23 or authorisation under section 24 of that Act if the council is provided with a copy of the exemption or authorisation by the Co-ordinator General under that Act.

This land is **not** subject to an Order under Section 23 or authorisation under Section 24 of the *Nation Building and Jobs Plan (State Infrastructure Delivery)Act 2009* for the carrying out of development.

Information provided under S.149(2) is in accordance with the matters prescribed under Schedule 4 of the *Environmental Planning and Assessment Regulation 2000* and is provided only to the extent that the Council has been notified by the Department of Public Works or Department of Planning.

For the purpose of s.149(5) of the *Environmental Planning and Assessment Act, 1979,* the following additional information is provided with relation to development applications which have been determined.

When information pursuant to Section 149(5) is requested, the Council is under no obligation to furnish any of the information supplied herein pursuant to that Section.

No development consents have been granted by Council over the past 5 years relevant to this particular lot.

Additional Information Section 149 (5)

The land is **not** affected by any additional site specific information in accordance with Section 149(5) of the Environmental Planning and Assessment Act, 1979.

Council draws your attention to Section 149(6) which states that a Council shall not incur any liability in respect of any advice provided in good faith pursuant to sub-section (5).

The absence of any reference to any matters affecting the land shall not imply that the land is not affected by any matter not referred to in this Certificate.

Please contact the Council's Planning & Environmental Services Department for further information about any instruments or affectations referred to in the Certificate.

.....

ARTHUR KYRON
GENERAL MANAGER

Appendix C6: WorkCover Records

VB

NSW GOVERNMENT | WorkCover

24 APR 2014

WorkCover NSW
92-100 Donnison Street, Gosford, NSW 2250
Locked Bag 2906, Lisarow, NSW 2252
T 02 4321 5000 F 02 4325 4145
WorkCover Assistance Service 13 10 50
DX 731 Sydney workcover.nsw.gov.au

Our Ref: D14/050121
Your Ref: Vittal Boggaram

23 April 2014

Attention: Vittal Boggaram
Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

Dear Mr Boggaram,

RE SITE: 26 Albion St Waverley NSW

I refer to your site search request received by WorkCover NSW on 10 April 2014 requesting information on licences to keep dangerous goods for the above site.

A search of the Stored Chemical Information Database (SCID) and the microfiche records held by WorkCover NSW has not located any records pertaining to the above mentioned premises.

If you have any further queries please contact the Dangerous Goods Licensing Team on (02) 4321 5500.

Yours Sincerely

Brent Jones
Senior Licensing Officer
Dangerous Goods Team

Appendix D: Report Explanatory Notes

Appendix D1: Abbreviations

Abbreviations

ABC	Ambient Background Concentrations
ACL	Added Contaminant Limits
AC	Asbestos Cement
ACM	Asbestos-Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AHD	Australian Height Datum
As	Arsenic
ASL	Asbestos Health Screening Levels
ASS	Acid Sulfate Soil
AST	Above Ground Storage Tank
BA	Building Application
Bgl	Below Ground Level
BH	Borehole
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLM	Contaminated Land Management
CMP	Construction Management Plan
COC	Chain of Custody Documentation
Cr	Chromium
CSM	Conceptual Site Model
CT	Contamination Threshold
Cu	Copper
DA	Development Application
DBYD	Dial Before You Dig
DQI	Data Quality Indicators
DQOs	Data Quality Objective
DSI	Detailed Site Investigation
EAC	Ecological Assessment Criteria
EC	Electrical Conductivity
EILs	Ecological Investigation Levels
EMP	Environmental Management Plan
ENM	Excavated Natural Material
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
FR	Field Rinsate
GAI	General Approvals of Immobilisation
GSW	General Solid Waste
HILs	Health Based Investigation Level
HM	Heavy Metals
HMTV	Hardness Modified Trigger Values
HSLs	Health Screening Level
HW	Hazardous Waste
ISO	International Organisation of Standardisation
JK	Jeffery and Katauskas
LCS	Lab Control Spike
LNAPL	Light Non-Aqueous Phase Liquid
MGA	Map Grid of Australia
MW	Monitoring Well

Abbreviations

NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PCC	Potential Contaminants of Concern
PID	Photo-ionisation Detector
PQL	Practical Quantitation Limit
PSI	Preliminary Site Investigation
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
RL	Reduced Level
RPD	Relative Percentage Difference
RSW	Restricted Solid Waste
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SAS	Site Audit Statement
SAR	Site Audit Report
SCC	Specific Contamination Concentration
SD	Standard Deviation
SIX	Six Maps
SPT	Hardness Modified Trigger Values
sVOC	Semi-Volatile Organic Compounds
SWL	Standard Water Level
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TS	Trip Spike
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compounds
VOCC	Volatile Organic Chlorinated Compound
WA	Western Australia
WHS	Workplace, Health and Safety
Zn	Zinc

Appendix D2: SAC Explanatory Notes

SAC EXPLANATORY NOTES

A brief summary of the SAC applicable to this investigation is presented below. Reference should be made to the NEPM 2013 for further information.

1. Health Investigation Levels (HILs) - Soil

The NEPM 2013 includes Health Based Investigation Levels (HILs) for a range of contaminants based on the risk of exposure, duration of exposure, toxicity and land use (availability). The HILs are scientifically based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from exposure to contaminants (Tier 1 or 'screening stage').

The HILs are generally applicable to the top 3m of the soil profile for low-density residential land use. However, site specific conditions should determine the applicability of the HILs to soils below this depth for other land uses.

The HILs are divided into four categories outlined in the following table:

Table 1.1: HILs Categories – Soil

Category/Column	Land Use
HIL A	Residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake, no poultry); also includes children's day-care centres, preschools and primary schools.
HIL B	Residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats.
HIL C	Public open spaces like parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. Does not include undeveloped public open spaces such as urban bushland and reserves.
HIL D	Commercial/Industrial includes premises such as shops, offices, factories and industrial sites.

Where the proposed land use includes more than one land use category (for example a mixed-use development including residential/retail/commercial land uses) the exposure setting of the most 'sensitive' ground floor site use is considered to be the most appropriate.

2. Interim Soil Vapour HILs for Volatile Organic Chlorinated Compounds (VOCCs)

The NEPM 2013 includes interim soil vapour HILs for selected VOCCs [see Table 1A(2) of Schedule B (1), NEPM 2013] to assess the vapour inhalation/intrusion pathway. The interim guidelines provide Tier 1 guidance for health risks for soil contamination sources and

groundwater plumes associated with VOCCs. These values may be applied for general site assessments and sub-slab environments for evaluation of potential health risks for the 0-1m sub-slab profile. The VOCCs HILs for residential A and B (see landuse in Table 1.1 above) land uses are combined.

3. Health Screening Levels (HSLs) for Petroleum Compounds

The NEPM 2013 has adopted the HSLs for total petroleum hydrocarbon (TPH) compounds developed by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). The HSLs have been derived based on the recommended total recoverable hydrocarbons (TRH) analytical method which includes BTEX compounds and naphthalene.

HSLs have been derived for soil, groundwater and soil vapour and apply to exposure to petroleum hydrocarbons through the dominant vapour inhalation exposure pathway only. HSLs are applicable to the ground floor land use only.

HSLs are derived by taking into account multiple factors (referred to as the 'multiple lines of evidence approach') which are summarised in the table below.

Table 1.2: Multiple Factors Governing Site Specific HSLs

Factor	Description
Land use	HIL A to HIL D outlined in Table 1.1. The HSLs for Residential A and B land uses are combined. HSLs are applicable to the ground floor land use only.
Soil Type	The below classification is based on the soil texture classification in Table A1 of the standard AS1726: • Sand – Coarse grained soil; • Silt – Fine grained soil – silts and clays (liquid limit <50%); and • Clay – Fine grained soil – silts and clays (liquid limit >50%). Where there is reasonable doubt, a more conservative approach should be adopted or laboratory testing for particle size should be undertaken.
Soil Depth (mBGL)[1]	The soil depth range is outlined below: • 0m to <1m; • 1m to <2m; • 2m to <4m; and • >4m (4m+).
Groundwater (mBGL)[1]	Presence of moisture/groundwater is an important factor. The depth of occurrence, land use (outlined above) and soil type (outlined above) should be taken into account. The depth of occurrence is outlined below: • 2m to <4m;

Factor	Description
	• 4m to <8m; and • >8m (8m+).
Soil Vapour (mBGL)[1]	Presence of soil vapour, depth of occurrence, land use (outlined above) and soil type (outlined above) should be taken into account. The depth of occurrence is outlined below: • 0m to <1m; • 1m to <2m; • 2m to <4m; • 4m to <8m; and • >8m (8m+). Soil vapour measurements can provide a more accurate representation of vapour risk. This is preferred where contaminated groundwater is present at less than 2m below ground or basement levels.
Contaminants	BTEX, Naphthalene and TPH fractions F1-F4: • F1: C_6 – C_{10}. The BTEX concentration must be subtracted to obtain F1 value; • F2: >C_{10} – C_{16}. The naphthalene concentration must be subtracted to obtain the F2 value; • F3: >C_{16} – C_{34}; and • F4: >C_{34}. The F3 and F4 fractions are non-volatile and therefore not of concern for vapour intrusion. Exposure to these compounds can occur via direct contact. Reference should be made to the NEPM 2013 in the event direct contact can occur.

Bio-degradation	Account for bio-degradation due to the presence of oxygen:
	• Concentration of oxygen greater than >5% in soil vapour at a depth of 1m below the surface immediately adjacent to the concrete slab;
	• Maximum slab width of less than 15m, with oxygen access on both sides. A distance of 7-8m from the exposed soil at the slab boundary is considered the maximum lateral under-slab penetration of oxygen;
	• Provided the above conditions are met, the following bio-degradation factors can be applied:
	  ➢ Factor of x10 for depths to source of 2 to <4m; and
	  ➢ Factor of x100 for depths to source of 4m+ where the vapour source strength is 100mg/L (100,000mg/m^3) or less.
	• Bio-degradation is not applicable for depths less than 2m; and

Factor	Description
	• Not applicable to ecological receptors; and • Reference should also be made to management limits.
Other Factors	Consideration should also be given to the following: • Check the status and condition of the slab for the presence of cracks and deterioration. This can act as a preferential pathway; • Potential for direct contact to workers; and • The soil saturation concentration of a contaminant occurs when the pore water is at its solubility limit and soil vapour is at the maximum. When the HSLs exceed this limit, the vapour in soil or above the groundwater cannot result in an unacceptable vapour risk and is denoted as NL (not limited) in the HSLs tables.

Note:

mBGL – meters below ground level

a) Limitations of HSLs

A site specific approach of direct intervention should be development in the following cases:

- Identified contamination has an atypical petroleum composition;
- Groundwater contaminated with petroleum hydrocarbons is present at less than 2m below ground or basement surface;
- Contaminated groundwater or LNAPL is entering or in contact with a basement or building foundations;
- The impacted soil source thickness is >2m;
- A preferential migration pathway is present that could connect a vapour source to a building; and
- Hydrocarbon odour is present in buildings or utilities which indicate a preferential migratory pathway and an immediate human health risk.

b) Silica Gel Clean-Up

Soil samples are initially analysed for TRH 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).

Silica gel clean-up should remove these other compounds and result in a more accurate result for petroleum hydrocarbons. If undertaken these results have been referred to as TPH_{sgel} within this report.

4. Ecological Assessment Criteria (EAC)

The NEPM 2013 includes a methodology for developing site specific EAC for the protection of terrestrial ecosystems from site contamination. The EAC provide the basis for a Tier 1 site assessment of ecological risk. The factors to take into account for deriving site specific EAC are outlined in the following table:

Table 1.3: Factors for Deriving Site Specific EAC

Factor	Description
Land Use Setting	The EAC are applicable for the following generic land use settings based on protection of ecological significance: • Areas of ecological significance (99% protection); • Urban residential areas and public open space (80% protection); and • Commercial/Industrial land use (60% protection).
Application Depth	The EAC are applicable to the top 2m of soil at the finished surface/ground level which corresponds to the root zone and habitation zone of many species.
Ecological Investigation Levels (EILs)	EILs are derived for the following contaminants: • Aged contaminants (>2 years): Chromium III (CrIII), Copper (Cu), Lead (Pb), Nickel (Ni) and Zinc (Zn). The methodology for deriving site specific EILs for aged contaminants are outlined in below; and • Other contaminants with published EILs: Arsenic (As), DDT (pesticide) and Naphthalene (a PAH compound). EILs for fresh contaminants (i.e. present for less than 2 years) should be specifically derived for the site as outlined in NEPM 2013.
Ecological Screening Levels (ESLs)	ESLs apply to TRH fractions F1-F4 (see Table 1.2); BTEX and Benzo(a)pyrene (a PAH compound).

a) Ecological Investigation Levels (EILs)

The NEPM 2013 provides generic EILs for Arsenic, DDT and Naphthalene that are applicable to all soils as a total soil contaminant concentration. The EILs for the remaining aged contaminants (Cr III, Cu, Ni, Pb and Zn) are derived using the following methodology:

Table 1.4: Steps for Deriving Site Specific EILs

Step	Description
Step 1 – Soil Property	Analyse the soil samples for the following: • CEC ($cmol_c/kg$) to determine EILs for Cu, Ni and Zn; • pH (to determine EILs for Cu); and • Clay content (% clay) (to determine the EIL for CrIII).
Step 2 – Establish Added Contaminant Limits (ACLs)	The ACL is the added concentration of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required. The ACL take into account the biological availability of the elements in various soils. For establishing the site specific ACLs, consideration should be given to the soil parameters outlined in Step 1. The ACL for Cu may be determined by pH or CEC. The lower of the determined value should

Step	Description
	be selected for the EIL calculation. The ACL for Pb is taken directly from the published data.
Step 3 – Calculate the Ambient Background Concentration (ABC)	The ABC takes into account the naturally occurring background levels and contaminant levels introduced by anthropogenic activity like emissions from vehicles etc. The NEPM 2013 provides the following methods for calculating the ABC: • Method 1: The preferred method is to measure the ABC at an appropriate reference site where there is a high naturally occurring background; • Method 2: Obtain ABC from the urban metal level studies undertaken by Olszowy et al. (1995) or Hamon et al. (2004). The ABC in this method varies based on the contaminant and the soil iron and/or manganese concentrations; and • Method 3: ABCs for individual suburbs which high and low traffic areas for NSW are available for CrIII, Cu, Pb, Ni and Zn from Olszowy et al. (1995) (see NEPM 2013 Schedule B5b).
Step 4 – Calculate the EIL	EIL is calculated by summing the ACL and ABC: **EIL = ACL + ABC**

b) Ecological Screening Levels (ESLs) for Petroleum Compounds

Similar to the HSLs outlined above, the NEPM 2013 has adopted the ESLs for TPH compounds developed by the Canadian Council of the Ministers of the Environment (CCME) in the publication *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in soil* (CCME 2008[24]). Site specific ESLs are derived based on fresh contamination and should not be applied directly to the assessment of sediments. The following factors apply:

Table 1.5: Multiple Factors for Site Specific ESLs

Factor	Description
Land Use Setting and Application Depth	Refer to Table 1.1.
Soil Type	• Fine Grained – includes clays and silts; and • Coarse Grained – sands and gravels.
Contaminants	BTEX, Benzo(a)pyrene and TPH fractions F1-F4: • F1: C_6 – C_{10}. The BTEX concentration must be subtracted to obtain F1 value; • F2: >C_{10} – C_{16}. The naphthalene concentration must be

[24] CCME, (2008), *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in soil* (referred to as CWS PHC)

Factor	Description
	subtracted to obtain the F2 value; • F3: >C_{16} – C_{34}; and • F4: >C_{34}. The ESLs for F1 and F2 is of moderate reliability.

5. Management Limits for Petroleum Hydrocarbons

The NEPM 2013 has adopted the physical and aesthetic management limits outlined in the CWS PHC publication. These limits are applied after considering the relevant HSLs and ESLs for adverse effects of TPH contamination including: presence of free phase (LNAPL); fire hazards; explosive hazards; effects on buried infrastructure; and aesthetic considerations.

These limits are relevant for operating sites where significant sub-slab leakage of petroleum compounds has occurred and when decommissioning industrial and commercial sites.

6. Asbestos in Soil

The NEPM 2013 includes guidelines for the assessment of asbestos in soil. Asbestos is identified to occur as:

- ACM (asbestos containing material);
- Bonded ACM – e.g. fibro frags >7mm (identified during site inspection/sampling);
- Fibrous Asbestos (FA) – friable materials e.g. insulation products, weathered fibro that can be crushed by hand pressure, crumbled, woven materials etc (identified during site inspection/sampling); and
- Asbestos Fines (AF) –free fibres, fibre bundles, fibro frags <7mm (considered friable), generally only identified by laboratory.

The guidelines recommend undertaking a preliminary site investigation (PSI) if the site history or site inspection indicates the possibility or occurrence of potential asbestos contamination. In the event a detailed site investigation (DSI) is required, the NEPM 2013 recommends using the Western Australian (WA) Asbestos Guidelines 2009[25].

a) Criteria for PSI

EIS has adopted the 'presence/absence' method for the PSI in accordance with AS4964-2004[26]. If asbestos is present, the status of the asbestos material (friable or bonded/non-friable) is further considered due to the implications associated with site remediation and/or management. The presence of asbestos may require a DSI as outlined below.

[25] WA Department of Health, (2009), *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.* Published May 2009 (referred to as Western Australian Asbestos Guidelines 2009)

[26] Australian Standard 4964, (2004), *Method for the Qualitative Identification of Asbestos in Bulk Samples.* (referred to as AS4964)

b) Criteria for DSI

The Western Australian Asbestos Guidelines 2009 prescribe a site investigative model for a DSI. The WA guidelines are based on various studies but generally use the Dutch guidelines with a conservation factor of 10. The asbestos health screening levels (HSLs) adopted by NEPM 2013 is outlined in the table below:

Table 1.6: ASLs for DSI

Form of Asbestos	HSLs (w/w)			
	Residential A[1]	Residential B[2]	Recreational C[3]	Commercial / Industrial D[4]
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF[5] (Friable)	0.001%			
All forms	No Visible Asbestos at the Surface			

Notes:

1 to 4 – Refer to the landuse categories for HILs outlined in Table 1.1

5 – The guideline value only applies for analysis quantified by gravimetric procedures (see Section 4.10 of NEPM 2013). This is not applicable to free fibres.

The following considerations should be made for determining asbestos concentrations in soil:

- The occurrence of asbestos at the surface should be recorded on a grid system of 10m x 10m;
- Non-impacted soils should be excluded from the calculations to avoid dilution effects;
- Separate determination should be made for each stratum/unit of fill or soil;
- Averaging or using statistical procedures is not appropriate;
- Sub-surface samples obtained from boreholes and/or trenches, the calculation should be carried out per sample; and
- A weight-of-evidence approach is recommended for determining whether the exceedances are of concern.

The amount of asbestos in ACM for a measured/estimated amount of soil is expressed as a % weight for weight (%w/w). This can be estimated using the following expression:

$$\%\frac{w}{w}\ asbestos\ in\ soil = \frac{\%\ asbestos\ content \times bonded\ ACM\ (kg)}{soil\ volume\ (L) \times soil\ density\ (\frac{kg}{L})}$$

The % asbestos content within bonded ACM is estimated to be 15% by enHealth (2005). Soil density for sandy soils is approximately 1.65kg/L.

c) Limitation of adopting the Western Australian Asbestos Guidelines 2009

The following limitations have been identified for using the WA asbestos guidelines:

- The guidelines assume that the asbestos contamination is confined to the top 10cm of the soil profile;
- The guidelines are applicable to sandy soils which are the predominant soil type encountered in WA;

- The sampling methodology recommended in the guideline (wet soil, raking, tilling) may not be adequate in clayey and silty conditions;
- The presence of asbestos below the HSLs may still pose a risk to site receptors which will require remediation or management; and
- The sampling density recommend in the guideline (2 x NSW EPA density) may not be achievable for sites which are less than 500m^3 in area.

7. Waste Classification Criteria for Off-Site Disposal of Soil

Any material excavated for the proposed development will require a waste classification for off-site disposal in accordance with the Waste Classification Guidelines 2009.

Soils are classed into the following categories based on the chemical contaminant criteria outlined in the guidelines:

Table 1.7: Waste Categories

Category	Description
General Solid Waste (non-putrescible) (GSW)	• If SCC ≤ CT1 then TCLP not needed to classify the soil as GSW • If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as GSW
Restricted Solid Waste (non-putrescible) (RSW)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as RSW • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as RSW
Hazardous Waste (HW)	• If SCC > CT2 then TCLP not needed to classify the soil as HW • If TCLP > TCLP2 and/or SCC > SCC2 then treat as HW
Excavated Natural Material (ENM)	The criteria to classify material as ENM are outlined in The Excavated Natural Material Exemption (2012[27]).
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • that does not contain sulfidic ores or other waste; and • includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

Note:

[27] Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clase 51 and 51A, The excavated natural material exemption, 2012 (ENM exemption 2012)

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

a) General Approvals of Immobilisation (GAI)

Significant amounts of waste ash and gravely slag were available in the late nineteenth and early twentieth century as a result of the use of coal for industrial and domestic heating purposes. Widespread use of ash/slag waste (either as ash or mixed with other soil and waste materials) as fill material was common in the suburbs of Sydney at this time.

To account for the presence of ash and slag, the NSW EPA has published the following:

Table 1.8: GAIs

Approval Number	Waste Stream	Contaminants	Waste Assessment Requirements
1999/05[28]	Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated material	B(a)P and PAHs	The SCC limits for PAHs and B(a)P outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to the leachable concentration (TCLP) value of B(a)P alone. Disposal restrictions apply for material classified under this GAI.
2009/07[29]	Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials	Beryllium, Chromium (VI), lead, nickel, PAHs and B(a)P	The SCC limits for these contaminants outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to their leachable concentrations (TCLP) values alone.

Note:
SCC – Specific Contaminant Concentration
TCLP – Toxicity Characteristics Leaching Procedure
B(a)P - Benzo(a)pyrene
PAHs – Polycyclic Aromatic Hydrocarbons

8. Groundwater Investigation Levels (GILs)

The appropriate settings for current and potential uses of groundwater should be identified for establishing the GILs. Contaminated groundwater may pose a risk to receptors at the point of extraction or as a result of discharge into the receiving environment and groundwater resources.

[28] http://www.environment.nsw.gov.au/resources/waste/GenImmobApp_1999-05_Ash_ACNEM_or_CCNEM.pdf (GAI 1999/05)
[29] http://www.environment.nsw.gov.au/resources/waste/2009-07_Metallurgical_furnace_slag.pdf (GAI 2009/07)

The assessment should be designed to consider the risk of groundwater contamination to all potential on site and off site receptors.

In assessing groundwater contamination, NEPM 2013 has adopted the framework outlined in the National Water Quality Management Strategy which includes the following guidelines:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (AWQG) (2000). This includes a framework for developing guidelines for aquifer assessment. The guidelines provide water quality parameters for aquatic ecosystems (fresh and marine waters), industrial, agricultural, recreational and irrigation uses;
- Australian Drinking Water Guidelines (ADWG) (2011). Includes the Australian Drinking Water Guidelines used to assess drinking water quality; and
- Guidelines for Managing Risk in Recreational Water (GMRRW) (NHMRC 2008).

The NEPM 2013 has adopted HSLs for the assessment of petroleum hydrocarbons in groundwater.

The presence of elevated contaminants above the GILs triggers further investigation to assess the source(s) and the extent of the contamination. Guidance on the remediation and management of contaminated groundwater is outlined in *NSW DECCW Guidelines for the Assessment and Management of Groundwater Contamination (2007[30])*.

a) Hardness Modified Trigger Values (HMTVs)

Water hardness can affect the bioavailability of metals/metalloids in fresh water. Consequently, Section 3.4.3.2 of the ANZECC 2000 guidelines includes algorithms to derive hardness modified trigger values (HMTVs) for metals/metalloid concentrations in fresh water.

[30] NSW DECCW, (2007), *Guidelines for the Assessment and Management of Groundwater Contamination.* (referred to as Groundwater Contamination Guidelines 2007)

Appendix D3: Sampling Protocols and QA/QC Definitions

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

1. Prepare a test pit/borehole log or for stockpile sampling made a note of the sample description.
2. Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
3. Ensure all sampling equipment has been decontaminated prior to use.
4. Remove any surface debris from the immediate area of the sampling location.
5. Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
6. Collect samples for asbestos analysis and place in a zip-lock plastic bag.
7. Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
8. Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
9. Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[31].
10. Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
11. Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
12. Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

1. All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc.
2. Equipment and materials required for the decontamination procedure is outlined below:
   - Phosphate free detergent (Decon 90);
   - Potable water;
   - Stiff brushes; and
   - Plastic sheets.
3. Ensure the decontamination materials are clean prior to proceeding with the decontamination.
4. Fill both buckets with clean potable water and add phosphate free detergent to one bucket.

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[31] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

5. In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
6. Rinse sampling equipment in the bucket containing potable water.
7. Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes that equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

1. After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
2. Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
3. Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
4. Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques. Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
   - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
   - Filter paper for Micropore filtration system;
   - Bucket with volume increments;
   - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
   - Bucket with volume increments;
   - Flow cell;
   - pH/EC/Eh/T meters;
   - Plastic drums used for transportation of purged water;
   - Esky and ice;
   - Nitrile gloves;
   - Distilled water (for cleaning);
   - Electronic dip meter;
   - Low flow pump pack and associated tubing; and
   - Groundwater sampling forms.
5. If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.

6. Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
7. Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
8. Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
9. During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
10. All measurements are recorded on specific data sheets.
11. Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
12. All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
13. Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

1. All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
2. The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent;
   - Potable water;
   - Distilled water; and
   - Plastic Sheets or bulk bags (plastic bags).
3. Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
4. Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
5. Flush pump head with distilled water.
6. Change water and detergent solution after each sampling location.
7. Rinse sampling equipment in the bucket containing distilled water.
8. Place cleaned equipment on clean plastic sheets.
9. If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994[32]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[33]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations. *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit"* Keith 1991.

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

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[32] US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[33] Keith., H, (1991), *Environmental Sampling and Analysis, A Practical Guide.*

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel;
- Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result} - \text{Sample Result)}}{\text{Concentration of Spike Added}} \times 100$$

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$