ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

FIOSON PTY LTD

ON

PRELIMINARY CONTAMINATION SCREENING AND WASTE CLASSIFICATION

FOR

PROPOSED REDEVELOPMENT OF COMPASS CENTRE

AT

THE APPIAN WAY, BANKSTOWN, NSW

4 SEPTEMBER 2015 **REF: E28650KBrpt**

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ABBREVIATIONS

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	**BTEXN**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Chain of Custody	**COC**
Contaminant of Primary Concern	**CoPC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Ecological Assessment Criteria	**EAC**
Ecological Investigation Levels	**EILs**
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General Approvals of Immobilisation	**GAI**
General Solid Waste	**GSW**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**

ABBREVIATIONS

Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Restricted Solid Waste	**RSW**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
Standard Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Volatile Organic Chlorinated Compound	**VOCC**
Workplace, Health and Safety	**WHS**

EXECUTIVE SUMMARY

Fioson Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS) to undertake a Preliminary Contamination Screening (PCS) and waste classification for the proposed redevelopment of the Compass Centre located off The Appian Way at Bankstown, NSW. The site location is shown on Figure 1 and the PCS was confined to accessible areas of the site as shown on Figure 2 attached in the appendices.

The scope of work for the PCS included: review of site information; site inspection to identify Areas of Environmental Concern (AEC); preparation of a Conceptual Site Model (CSM); design and implementation of a sampling, analysis and quality plan (SAQP); interpretation of the analytical results against the adopted Site Assessment Criteria (SAC); Data Quality Assessment (DQA); and preparation of a report presenting the results of the study.

A review of the site information identified the following AEC at the site:

- Fill Material – The boreholes drilled for the investigation encountered fill at the site which ranged in depth from approximately 0.7mbgl to 1.2mbgl. The fill contained inclusions like ash which can contain contaminants. The overall site appears to have been historically filled to achieve existing levels. The fill may have been imported from various sources and can contain elevated concentrations of contaminants;
- Commercial Uses – The site has been used for various commercial/retail purposes since at least 1943. A detailed site history assessment and WorkCover record search should be undertaken to assess if dangerous chemicals including petroleum has been stored or used at the site. Leakage and spillage of chemical including petroleum hydrocarbons could have resulted in site contamination; and
- Hazardous Building Material – The buildings on the site have been constructed prior to 1990's. Hazardous building materials were used for construction purposes during this period. The material can pose a potential contamination source during demolition/development. A review of the historical aerial photographs indicate that many of the former buildings at the site were demolished prior to 1980's. The use of hazardous building material in the former buildings could have resulted in potential contamination.

Samples for this investigation were obtained from 3 sampling points as shown on the attached Figure 2. This density is approximately 14% of the minimum sampling density recommended by the EPA. The sampling locations were placed in accessible areas of the site. Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings.

Soil samples were collected from the fill and natural profiles based on field observations. Selected samples were analysed for a range of contaminants of potential concern (CoPC) as outlined in the SAQP. The results of the testing was assessed against the SAC.

Based on the scope of works undertaken, EIS consider that the site can be made suitable for the proposed development provided that the following recommendations are implemented to address the data gaps and to characterise the risks associated with the AEC:

- Undertake a Stage 2 ESA to address the data gaps identified in the PCS; and
- Undertake a Hazardous Materials Assessment (Hazmat) for the existing buildings prior to the commencement of demolition work.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

1 INTRODUCTION

Fioson Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake a Preliminary Contamination Screening (PCS) and waste classification for the proposed redevelopment of the Compass Centre located off The Appian Way at Bankstown, NSW.

The site location is shown on Figure 1 and the PCS was confined to accessible areas of the site as shown on Figure 2 attached in the appendices.

A geotechnical investigation was undertaken in conjunction with this study by JK Geotechnics[2]. The results of the investigation are presented in a separate report (Ref. 28650Zrpt, dated 2 September 2015[3]). This report should be read in conjunction with the JK report.

1.1 Proposed Development Details

EIS understand that the proposed development includes a mixed landuse consisting of:

- Four separate towers ranging between four and 16 storeys;
- Two basement level carparks and a half level above ground parking level. The proposed basements will extend to the site boundaries. Excavation for the basements is anticipated to extend to a maximum depth of approximately 6mbgl; and
- A podium level will be developed which will be accessible to residents and will include amenities such as communal outdoor spaces, a pool and gym.

1.2 Objectives

The objectives of the study include:

- Assess the potential for widespread site contamination;
- Provide a preliminary waste classification for the off-site disposal of soil; and
- Comment on the suitability of the site for the proposed development.

1.3 Scope of Work

The study was undertaken generally in accordance with an EIS proposal (Ref: EP9174KB) of 23 July 2015 and written acceptance from the client of 29 July 2015.

The scope of work included the following:

- Review of site information;
- A site inspection to identify Areas of Environmental Concern (AEC);
- Preparation of a Conceptual Site Model (CSM);
- Design and implementation of a sampling, analysis and quality plan (SAQP);

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

[2] Geotechnical consulting division of J&K

[3] Referred to as JK 2015 Report

- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment (DQA); and
- Preparation of a report presenting the results of the PCS.

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

Table 1-1: Guidelines and Regulations

Guidelines and Regulations
NSW Government Legislation (1997), *Contaminated Land Management Act 1997* [4]
NSW Government (1998), *State Environmental Planning Policy No. 55 – Remediation of Land* [5]
NSW Office of Environment and Heritage (OEH) (now EPA) (2011), *Guidelines for Consultants Reporting on Contaminated Sites* [6]
NSW EPA (1995), *Sampling Design Guidelines* [7]
NSW Department of Environment and Conservation (DEC) (now EPA) (2006), *Guidelines for the NSW Site Auditor Scheme (2nd edition)* [8]
NSW EPA (2015), *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* [9]
National Environment Protection Council (NEPC) (2013), *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* [10]

[4] referred to as CLM Act

[5] referred to as SEPP55

[6] referred to as Reporting Guidelines

[7] referred to as Sampling Design Guidelines

[8] referred to as Site Auditor Guidelines

[9] referred to as the Duty to Report Guidelines

[10] referred to as NEPM 2013

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	2 Fetherstone Street 83, 85 and 99 North Terrace Lots 19 and 20 The Appian Way 49 - 53 The Appian Way 3-7 Fetherstone Street 62 The Mall
Lot & Deposited Plan:	Lots 15 to 17 and 19 to 24 DP5541 (9 lots) Lot 27 DP5541 Lot 18B DP412699 Lot 1 in DP507818 SP71808 Lot 9 DP777510 Lot 1 DP207810 The site is identified as having 14 individual lots and 1 SP
Current Land Use:	Commercial
Proposed Land Use:	Mixed Use for Commercial and Residential
Local Government Authority (LGA):	Bankstown
Current Zoning:	Zone B4 – Mixed Use
Site Area (m^2):	Approx. 12,000m^2 (1.2 hectares)
RL (AHD in m) (approx.):	22 to 23
Geographical Location (MGA) (approx.):	N: 6245335 E: 318340
Site Plans:	See Appendices

2.2 Site Location and Regional Setting

The site is located in a predominantly commercial area of Bankstown as shown on Figure 1. The site is bounded by The North Terrace to the south, by Fetherstone Street to the west, by The Mall to the north and by The Appian Way to the east. Bankstown railway station is located to the south-west of the site beyond The North Terrace. The Bankstown Square shopping centre is located further to the east of the site.

2.3 Topography

The site is located in an undulating regional topography towards the toe of a south and south-west facing hillside.

2.4 Site Inspection

A walkover inspection of the site was undertaken by EIS on 18 August 2015. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken. Selected site photographs obtained during the inspection are attached in the appendices.

At the time of the inspection, several single and double storey buildings lined the southern and eastern parts of the site; a three storey library building was located over the north-west, two multi-storey brick buildings were located over the mid-west; and an asphaltic concrete (AC) carpark was located over the north-east and extended to Fetherstone Street via a laneway along the southern side of the library building. Both multi storey buildings had basement carparks with the number of basements unable to be identified in the northern multi storey building.

The basement for the southern mid-west multi storey building was accessed via a concrete driveway from Fetherstone Street. Within this basement were numerous inaccessible store rooms for the commercial properties. An electrical substation was located between the two multi storey buildings close to the end of this driveway. With the exception of the northern mid-west multi storey building the buildings were used for commercial purposes such as supermarkets, speciality stores, financial services, beautician services, electrical goods and fresh food. Within the basement the letters SWSAHS were painted on the concrete floor. This acronym could potentially be short for South West Sydney Area Health Service. The northern midwest multi storey building was used for commercial purposes on the ground floor and residential purposes above.

2.5 Surrounding Land Use

The immediate surrounds included the following landuses:

- North – open public space;
- South – commercial activities and railway line;
- East – commercial/shopping centre; and
- West – commercial activities.

2.6 Underground Services

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

Table 2-2: Summary of Relevant Services

Service	Location	Potential Migratory Pathway
Sewer	The Sydney Water plan shows a sewer which runs from the east to the north-west through the site. A copy of the plan is attached in the appendices.	The backfill around the sewer could act as a potential migratory pathway for mobile contaminants.
Council	The Bankstown council plan shows a voice/data cable running through the north-west section of the site from The Mall. A copy of the plan is attached in the appendices.	The backfill around the service could act as a potential migratory pathway for mobile contaminants.
Electrical	The Ausgrid plan shows numerous electrical services along the pedestrian walkways around the site. An electrical substation is located in the central-west section of the site as shown on the plan attached in the appendices.	The substation could have resulted in potential contamination in this section of the site.

2.7 Regional Geology

A review of the regional geological map of Penrith (1991[11]) indicates that the site is underlain by Bringelly Shale of the Wianamatta Group, which typically consists of shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff. Subsurface conditions encountered at the site are summarised in Section 6.1.

2.8 Acid Sulfate Soil (ASS) Risk

The site is not located in an ASS risk area.

2.9 Hydrogeology

A review of groundwater bore records available on the NSW Government Water Information[12] online database was undertaken on 1 September 2015. The search was limited to registered bores located within a radius of approximately 500m of the site.

The search did not identify any registered bores within the search area. A copy of the map is attached in the appendices.

A review of the regional geology and groundwater bore information indicates that the subsurface condition at the site is expected to consist of residual soils overlying relatively shallow bedrock. The

[11] Department of Mineral Resources, (1991), *1:100,000 Geological Map of Penrith (Series 9030)*

[12] http://www.waterinfo.nsw.gov.au/gw/

occurrence of groundwater that could be utilised as a resource for beneficial use is considered to be relatively low under such conditions. A perched aquifer in the subsurface may be present.

2.10 Receiving Water Bodies

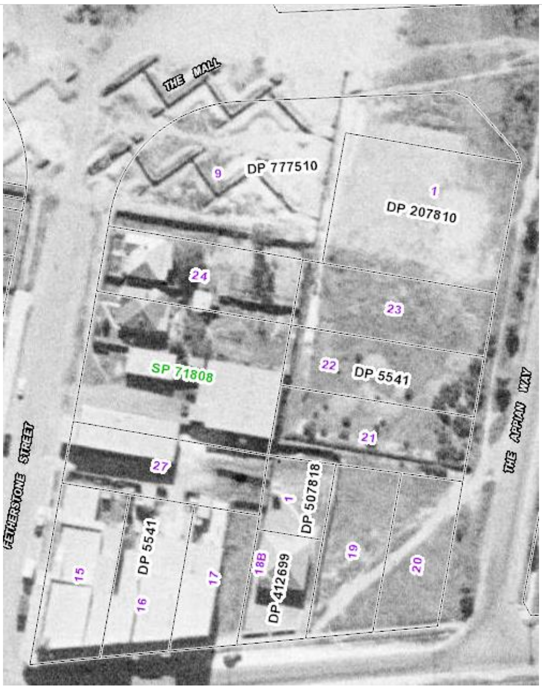
Surface water bodies were not identified in the immediate vicinity of the site. Surface water run-off is anticipated to enter the stormwater.

2.11 Review of Historical Aerial Photographs

Historical aerial photographs available at the NSW Department of Lands were reviewed for the study. A summary of the relevant information is presented in the following table:

Table 2-3: Summary of Historical Aerial Photos

Year	Details
1930	 The photograph was of very poor quality. The south-west section of the site appeared to be occupied by buildings. The remaining sections of the site were vacant and grassed. The immediate surrounds were generally vacant with scattered buildings which appeared to be low density residences.

1943[13]	 The west section of the site appeared to be occupied by numerous buildings. The buildings in the south-west section appeared to be predominantly commercial/retail. In the north-west section of the site, the landuse appeared to be residential. Trenching which appeared to be on a zig-zag pattern was located in the north-west corner of the site. The north-east and east sections of the site appeared to be vacant and grass covered. A small residential type building was located in the south section of the site. The immediate surrounds were generally low density commercial/retail with a few scattered residences. Bankstown railway station was located further to the south of the North Terrace.

[13] https://six.maps.nsw.gov.au/wps/portal/SIXViewer

1951	 The majority of the site appeared to be occupied by buildings. The buildings on the west section of the site appeared similar to the 1943 photograph. The north-east section of the site was occupied by an 'L' shaped building. The landuse appeared to be predominantly residential and commercial. The immediate surrounds appeared similar to the 1943 photograph.
1961	The majority of the site had been built upon. The landuse appeared to be predominantly commercial/retail. A relatively large building was located in the north-west section of the site which appeared similar to the existing council library. The east section of the site was vacant and grassed. A large shopping centre was located to the east of the site. Paul Keating Park was located to the north of the site beyond The Mall. The immediate surrounds appeared to be occupied by commercial/retail buildings.
1970	The multi-storey Compass Centre was located in the central section of the site. The majority of the site appeared to be occupied. Hardstand areas were located in the north and south sections of the site. Landscaped areas were located along the north site boundary adjacent to The Mall. The immediate surrounds were predominantly high density commercial/retail.
1978	The site and immediate surrounds appeared similar to the 1970 photograph.
1986	The site and immediate surrounds appeared similar to the 1978 photograph.
1994	The site and immediate surrounds appeared similar to the 1986 photograph.

2005	The site appeared similar to the present layout. A new multistorey building had been constructed to the north of the existing Compass Centre.
2014 (SIX Maps)	 The site appeared similar to the present layout.

2.12 NSW EPA Records

The NSW EPA records available online were reviewed for the study on 2 September 2015. A summary of the relevant information is provided in the following table:

Table 2-4: Summary of NSW EPA Online Records

Source	Details
CLM Act 1997[14]	There were no notices for the site under Section 58 of the Act.
NSW EPA List of Contaminated Sites[15]	The site is not listed on the NSW EPA register.
POEO Register[16]	There were no notices for the site on the POEO register.

[14] http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx

[15] http://www.epa.nsw.gov.au/clm/publiclist.htm

[16] http://www.epa.nsw.gov.au/prpoeoapp/

3 CONCEPTUAL SITE MODEL (CSM)

The CSM is based on a review of the site information outlined previously in this report. The Areas of Environmental Concern (AEC) identified in the CSM can either be a point source of contamination or widespread area/s impacted by current or historical activities. The CSM should be reviewed and updated when more information becomes available for the site.

Table 3-1: CSM

AEC / Extent	CoPC	Potential Exposure Pathway and Media	Potential Receptors
Fill Material – Entire Site The boreholes drilled for the investigation encountered fill at the site which ranged in depth from approximately 0.7mbgl to 1.2mbgl. The fill contained inclusions like ash which can contain contaminants. The overall site appears to have been historically filled to achieve existing levels. The fill may have been imported from various sources and can contain elevated concentrations of contaminants.	Heavy metals, TRH, BTEXN, PAHs, OCPs, OPPs, PCB, and asbestos	Direct Contact – dermal contact; ingestion; and inhalation of dust, vapours and fibres. Media - soil, groundwater and vapour.	Human Receptors – Site occupants; visitors; development and maintenance workers; and off-site occupants. Environmental Receptors – Flora and fauna at the site and immediate surrounds.
Commercial Uses – Point Source The site has been used for various commercial/retail purposes since at least 1943. A detailed site history assessment and WorkCover record search should be undertaken to assess if dangerous chemicals including petroleum has been stored or used at the site. Leakage and spillage of chemical including petroleum hydrocarbons could have resulted in site contamination.	Lead, TRH, BTEXN, PAHs and VOCs	Direct Contact – dermal contact; ingestion; and inhalation of dust and vapours. Media- soil, groundwater and vapour.	Human Receptors – As Above Environmental Receptors – As Above

AEC / Extent	CoPC	Potential Exposure Pathway and Media	Potential Receptors
Hazardous Building Material – Building Footprint The buildings on the site have been constructed prior to 1990's. Hazardous building materials were used for construction purposes during this period. The material can pose a potential contamination source during demolition/development. A review of the historical aerial photographs indicate that many of the former buildings at the site were demolished prior to 1980's. The use of hazardous building material in the former buildings could have resulted in potential contamination.	Asbestos, lead and PCBs	Direct Contact – dermal contact; ingestion; and inhalation of dust and fibres. Media – soil and air.	Human Receptors – As Above

4 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site.

The DQO process is detailed in the US EPA document *Guidance on systematic planning using the data quality process (2006*[17]*)* and the NSW DEC document *The Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006*[18]*)*.

These seven steps are applicable to this assessment as summarised in the table below:

Table 4-1: DQOs – Seven Steps

Step	Input
State the Problem	The CSM has identified AEC at the site which may pose a risk to the site receptors. An intrusive investigation is required to assess the risk and comment on the suitability of the site for the proposed development or intended landuse. The EIS project team will include: project principal (PP) and/or project associate (PA); project engineer/scientist (PE); and field engineer/scientist (FE) as outlined in the quality recorded checklist maintained for the project in accordance with our ISO 9001 certification.
Identify the Decisions/ Goal of the Study	The data collection is project specific and has been designed based on the following: • Review of site information; • Review of the CSM; • Development of Site Assessment Criteria (SAC) for each media; and • Data interpretation based on the following decision statements: 1) No single value exceeds 250% of the SAC; 2) Statistical analysis will be used to assess the laboratory data against the SAC when there are results above the SAC. The following criteria will be adopted: ➢ The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC; and ➢ The standard deviation (SD) of the results must be less than 50% of the SAC. 3) Statistical calculations will not be undertaken if all results are below the SAC; and 4) Statistical calculations will not be undertaken on Health Screening Levels (HSLs) as elevated point source contamination associated with petroleum hydrocarbons can pose a vapour risk to receptors.

[17] US EPA, (2006), *Guidance on Systematic Planning using the Data Quality Objectives Process.* (referred to as US EPA 2006)
[18] NSW DEC, (2006), *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

Step	Input
Identify Information Inputs	The following information will be collected: • Soil samples based on subsurface conditions; • Potential Asbestos Containing Material (ACM) encountered during the inspection; • The SAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report; • The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013; • Field screening information (i.e. PID data, presence of hydrocarbons etc.) and observations made during the field investigation will be taken into consideration in selecting the analytical schedule; and • Any additional information that may arise during the field work will also be used as data inputs.
Define the Study Boundary	The sampling will be confined to accessible areas of the site as shown in Figure 2. Fill has been identified as an AEC. The source of fill has not been established. Fill is considered to be heterogeneous material with PCC occurring in random pockets or layers. The presence of PCC in between sampling points cannot be measured. The areas excluded from the investigation are outlined in the data gaps.

Develop the analytical approach (or decision rule)	The following acceptable limits will be adopted for the data quality assessment:
	• 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.
	• Acceptable concentrations in Trip Spike (TS), Trip Blanks (TB) and Field Rinsate (FR) samples as applicable. Non-compliance to be documented in the report; and
	• Review of the QA/QC results reported in the laboratory reports. Non-compliance to be documented.

Specify the performance or acceptance criteria	NEPM 2013 defines decision errors as '*incorrect decisions caused by using data which is not representative of site conditions'*. This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as '*total study error'*. The study error can be managed through the correct choice of sample design and measurement. Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. In this case, for example, the PCC identified in the CSM is considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.

Step	Input
Optimise the design for obtaining data	The most resource-effective design will be used in an optimum manner to achieve the assessment objectives.

4.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 4-2: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The NSW EPA Sampling Design Guidelines recommend a sampling density based on the size of the investigation/site area. The guideline provides a minimum number of sampling points required for the investigation on a systematic sampling pattern. The guidelines recommend sampling from a minimum of 22 evenly spaced sampling points for this site with an area of approximately 12,000m^2. Samples for this investigation were obtained from 3 sampling points as shown on the attached Figure 2. This density is approximately 14% of the minimum sampling density recommended by the EPA.
Sampling Plan	The sampling locations were placed in accessible areas of the site.
Exclusion Areas (Data Gaps)	Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. These areas have been excluded from the investigation.
Sampling Equipment	Soil samples were obtained on 17 and 18 August 2015. Sampling locations were set out using a tape measure. In-situ sampling locations were cleared for underground services by an external contractor prior to sampling. The sample locations were drilled using a hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler. Reference should be made to the boreholes logs attached in the appendices for more details.
Sampling Collection and Field QA/QC	Soil samples were collected from the fill and natural profiles based on field observations. The sampling depths are shown on the logs attached in the appendices. Additional 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.

Aspect	Input
	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 in accordance with the SSP.
Field PID Screening for VOCs	A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for hydrocarbon 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. PID data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases.
Decontami-nation and Sample Preservation	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. Samples were preserved by immediate storage in an insulated sample container with ice or chill packs. 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.

4.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 4-3: Analytical Schedule

CoPC	Fill Samples	Natural Soil Samples
Heavy Metals	5	1
TRH/BTEXN	5	1
PAHs	5	1
OCPs/OPPs	3	Na
PCBs	3	Na
Asbestos in soil	3	Na
TCLP Metals	3	Na
TCLP PAHs	3	Na

4.3.1 Laboratory Analysis

The samples were analysed by the NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013 and other standards. Reference should be made to the laboratory report attached in the appendices for further details.

Table 4-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicate and trip blank samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	133022

5 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for the study is outlined in the table below. The SAC has been derived from the NEPM 2013 and other guidelines as applicable. The guideline values for individual contaminants are presented in the attached report tables.

Table 5-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs) (NEPM 2013)	The HIL-C criteria for 'commercial/industrial' have been adopted for this study. The proposed development includes basement levels over the majority of the site which is considered to be commercial landuse.
Health Screening Levels (HSLs) (NEPM 2013)	The HSL-C criteria for 'commercial/industrial' have been adopted for this study.
Management Limits and Direct Contact Limits (NEPM 2013)	These guidelines have only been used after considering the relevant HSLs for adverse effects of TRH contamination where necessary.
Asbestos	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion.
Ecological Assessment Criteria (EAC) (NEPM 2013)	A preliminary screening of ecological risk has been undertaken based on the limited information available at this stage. The EAC criteria for 'commercial/industrial' have been adopted for this study. Soil parameters: pH; cation exchange capacity (CEC); and clay content have not been analysed. On this basis, the EIL and ESL calculations have taken the 'worst case' scenario in order to generate the EAC. The ABC values for high traffic (25th percentiles) areas for old suburbs of NSW published in Olszowy et. al. (1995[19]) has been adopted for this assessment.
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[20]) has been adopted to classify the material for off-site disposal.

[19] 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.

[20] NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

6 INVESTIGATION RESULTS

6.1 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 6-1: Summary of Subsurface Conditions

Profile	Description (m in bgl)
Pavement	Asphaltic Concrete (AC) pavement was encountered at the surface in all the boreholes. The pavement ranged in thickness from approximately 20mm to 70mm.
Fill	Fill material was encountered beneath the pavement in all boreholes and extended to depths of approximately 0.6mbgl to 1.2mbgl. The fill typically comprised: sandy gravel and silty clay. The fill contained inclusions of: fine to coarse grained sand; igneous gravel; and ash.
Natural Soil	Silty clay natural soil was encountered beneath the fill in all the boreholes and extended to depths of approximately 4.4mbgl. The silty clay was low to high plasticity and orange brown to light grey. The clay contained inclusions of: ironstone gravel; root fibres; sand; and shale seams.
Bedrock	Shale bedrock was encountered beneath the clay in all of the boreholes. The Shale was grey and distinctly weathered on first contact.
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling. All boreholes remained dry on completion of drilling. Potable water was introduced for rock coring. Long term groundwater monitoring has not been undertaken at the site.

6.2 Field Screening

PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The results ranged from 0ppm to 2.8ppm equivalent isobutylene. These results indicate PID detectable VOCs. Samples with elevated PID readings were analysed for TRH and BTEXN.

6.3 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 6-2: Summary of Soil Laboratory Results

Analyte	Results Compared to SAC
Heavy Metals	**<u>HILs:</u>** All heavy metal results were below the HIL-C criteria. **<u>EILs:</u>** The majority of the heavy metal results were below the EIL-Commercial criteria. Fill sample BH1 (0-0.2m) encountered an elevated nickel concentration of 77mg/kg above the EIL criterion of 60mg/kg. **<u>WC:</u>** The majority of the results were less than the CT1 criteria. The two fill samples BH1 (0-0.2m) and BH2 (0-0.2m) encountered nickel concentrations above the CT1 criterion. TCLP leachates were prepared from selected fill samples and analysed for selected metals including nickel. The results were less than the TCLP1 criteria.
TRH	**<u>HSLs:</u>** All TRH results were below the HSL-C criteria. **<u>ESLs:</u>** All TRH results were below the ESL-Commercial criteria. **<u>WC:</u>** All TRH results were less than the CT1 criteria.
BTEXN	**<u>HSLs:</u>** All BTEXN results were below the HSL-C criteria. **<u>ESLs:</u>** All BTEXN results were below the ESL-Commercial criteria. **<u>WC:</u>** All BTEX results were less than the CT1 criteria.
PAHs	**<u>HILs:</u>** All PAH results were below the HIL-C criteria. **<u>HSLs:</u>** All naphthalene results were below the HSL-C criteria. **<u>ESLs:</u>** All benzo(a)pyrene results were below the ESL-Commercial criteria. **<u>EILs:</u>** All naphthalene results were below the EIL-Commercial criteria.

Analyte	Results Compared to SAC
	WC: All PAH results were less than the CT1 criteria. TCLP leachates were prepared from three selected fill samples and analysed for PAHs. The results were less than the TCLP1 criteria.
OCPs & OPPs	**HILs:** All OCP and OPP results were below the HIL-C criteria. **EILs:** All DDT results were below the EIL-Commercial criteria. **WC:** All OCP and OPP results were less than the relevant CT1 criteria.
PCBs	**HILs:** All PCB results were below the HIL-C criterion. **WC:** All PCB results were less than the CT1 criterion.
Asbestos	Asbestos was not detected in the samples analysed for the investigation.

7 DATA QUALITY ASSESSMENT

As part of the data quality assessment the following data quality indicators (DQIs) were assessed: precision, accuracy, representativeness, completeness and comparability as outlined in the table below. Reference should be made to the appendices for an explanation of the individual DQI.

Table 7-1: Assessment of DQIs

Completeness

Field Considerations:

- The investigation was designed as a preliminary screening and sampling was confined to accessible areas of the site (see Figure 2);
- Samples were obtained from various depths based on the subsurface conditions encountered at the sampling locations. All samples were recorded on the borehole logs. All sampling points are shown on the attached Figure 2;
- The investigation was undertaken by trained staff in accordance with the SSP; and
- Documentation maintained during the field work is attached in the appendices where applicable.

Laboratory Considerations:

- Selected samples were analysed for a ranged of CoPC as outlined in the SAQP;
- All samples were analysed by NATA registered laboratory in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate analytical methods and PQLs were used by the laboratory; and
- Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation.

Comparability

Field Considerations:

- The investigation was undertaken by trained staff in accordance with the SSP;
- The climate conditions encountered during the field work were noted on the site description record maintained in the job file; and
- Consistency was maintained during sampling in accordance with the SSP.

Laboratory Considerations:

- All samples were analysed in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate PQLs were used by the laboratory for all analysis (other than those outlined above);
- All primary, intra-laboratory duplicate and other QA/QC samples were analysed by the same laboratory; and
- The same units were used by the laboratory for all of the analysis.

Representativeness

Field Considerations:

- The investigation was designed to obtain appropriate media encountered during the field work as outlined in the SAQP; and
- All media identified in the SAQP was sampled.

Laboratory Considerations:

- All samples were analysed in accordance with the SAQP.

Precision

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- Analysis of field QA/QC samples including intra-laboratory duplicate and trip blank (TB) as outlined below;
- The field QA/QC frequency adopted for the investigation is outlined below;
- Calculation of the Relative Percentage Difference (RPD) from the primary and duplicate results (the RPD calculation equation is outlined in the attached appendices); and
- Assessment of RPD results against the acceptance criteria outlined in **Section 4.1.**

Intra-laboratory RPD Results:

Soil Samples at a frequency of 17% of the primary samples: Dup A is a soil duplicate of primary sample BH1 (0.5-0.75m).

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

Trip Blank (TB):

One soil TB (TBS1) was analysed for BTEX at a frequency of one blank per batch of volatiles. The results are presented in the attached report tables. The results were all less than the PQLs.

Accuracy

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- The analytical quality assessment adopted by the laboratory was in accordance with the NATA and NEPM 2013 requirements as outlined in the analytical report;
- A review of the report/s indicates the following comments noted by the laboratory:

Envirolab Report 133022 – Soil samples 133200-2,8 obtained for asbestos screening were sub-sampled by the lab as the sample size was outside the recommended ranged of 40-50g.

8 PRELIMINARY WASTE CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL

The preliminary waste classification of soil for off-site disposal is summarised in the following table:

Table 8-1: Preliminary Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Fill material in the investigation area	General Solid Waste (non-putrescible) (GSW)	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation. Alternatively, the fill material is considered to be suitable for re-use on the subject site (only) provided it meets geotechnical and earthwork requirements.
Natural clay soil and shale bedrock in the investigation area	Virgin excavated natural material (VENM)	VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

The PCS included very limited sampling from three boreholes drilled for the geotechnical investigation. Large sections of the site were not accessible during the study. Additional waste classification testing will be required to confirm the classification provided in the above table.

9 CONCLUSION

EIS consider that the report objectives outlined in **Section 1.2** have been addressed.

The CSM identified AEC at the site which could pose a risk to site receptors. Due to the preliminary nature of the study, the following data gaps remains:

- Areas beneath the existing buildings have not been assessed;
- The NSW EPA Sampling Design Guidelines recommend sampling from a minimum of 22 evenly spaced sampling points for this site. Samples for this study was confined to 3 boreholes drilled for the JK geotechnical investigation;
- A detailed site history assessment and WorkCover record search has not been undertaken to assess if dangerous chemicals including petroleum has been stored or used at the site;
- The presence of hazardous building materials in the existing buildings has not been assessed; and
- Only a preliminary waste classification has been undertaken.

Based on the scope of works undertaken, EIS consider that the site can be made suitable for the proposed development provided that the following recommendations are implemented to address the data gaps and to characterise the risks associated with the AEC:

1. Undertake a Stage 2 ESA to address the data gaps identified above; and

2. Undertake a Hazardous Materials Assessment (Hazmat) for the existing buildings prior to the commencement of demolition work.

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

9.1 Regulatory Requirement

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

Table 9-1: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2009[21]	The requirement to notify the NSW EPA regarding site contamination should be assessed once the results of the Stage 2 investigation work have been reviewed and a remedial strategy (if necessary) has been selected.
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

[21] NSW Department of Environment and Climate Change, (2009), *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.* (referred to as Duty to Report Contamination 2009)

Guideline	Applicability
	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.
UPSS Regulation 2008	The regulation states that '*A storage system must not be used unless groundwater monitoring wells are installed on the storage site*' and that the wells should be located '*with a view to maximising the likelihood that the wells will intercept contaminated groundwater*'. Installation of groundwater wells and subsequent monitoring is a requirement for new and existing underground fuel storage systems as of 1 June 2008. Under the regulation and the AS4976-2008[22], all storage systems must be removed from the site in compliance with Section 5 of the standards. In-situ abandonment should only be considered in special circumstances, e.g. where removal will cause serious risks to adjoining tanks, underground structures and adjoining buildings. Approval from the applicable authorities (i.e. WorkCover, Council, NSW EPA) may be required under these circumstances.
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 Department of Primary Industries Water (DPIW) and other relevant approvals (from discharge authorities like Sydney Water etc.) should be obtained prior to the commencement of dewatering.

[22] Standards Australia, (2008), *The Removal and Disposal of Underground Petroleum Storage Tanks.* (referred to as AS4976-2008)

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

10 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.

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

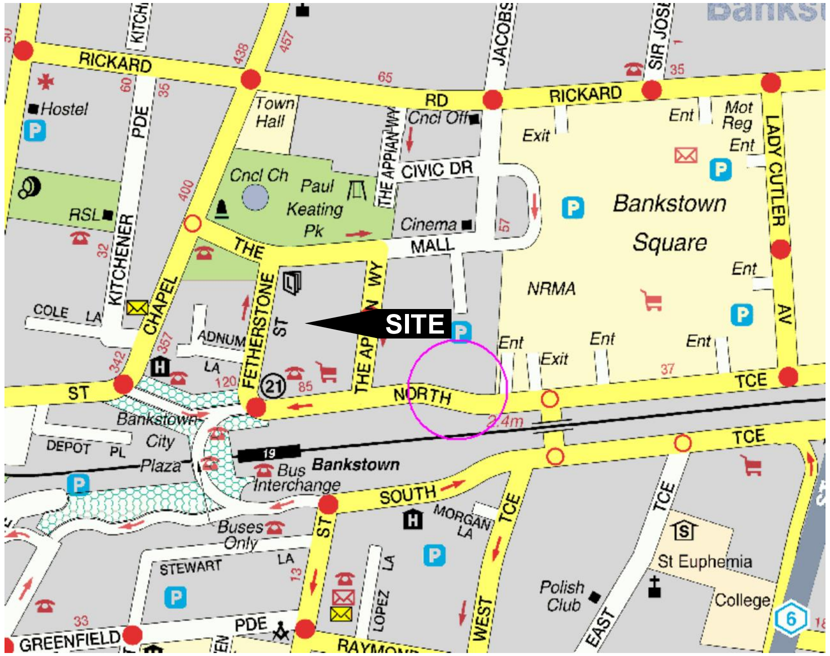
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

Appendix A: Report Figures



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: 251 Q16 and 252 A16

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

N

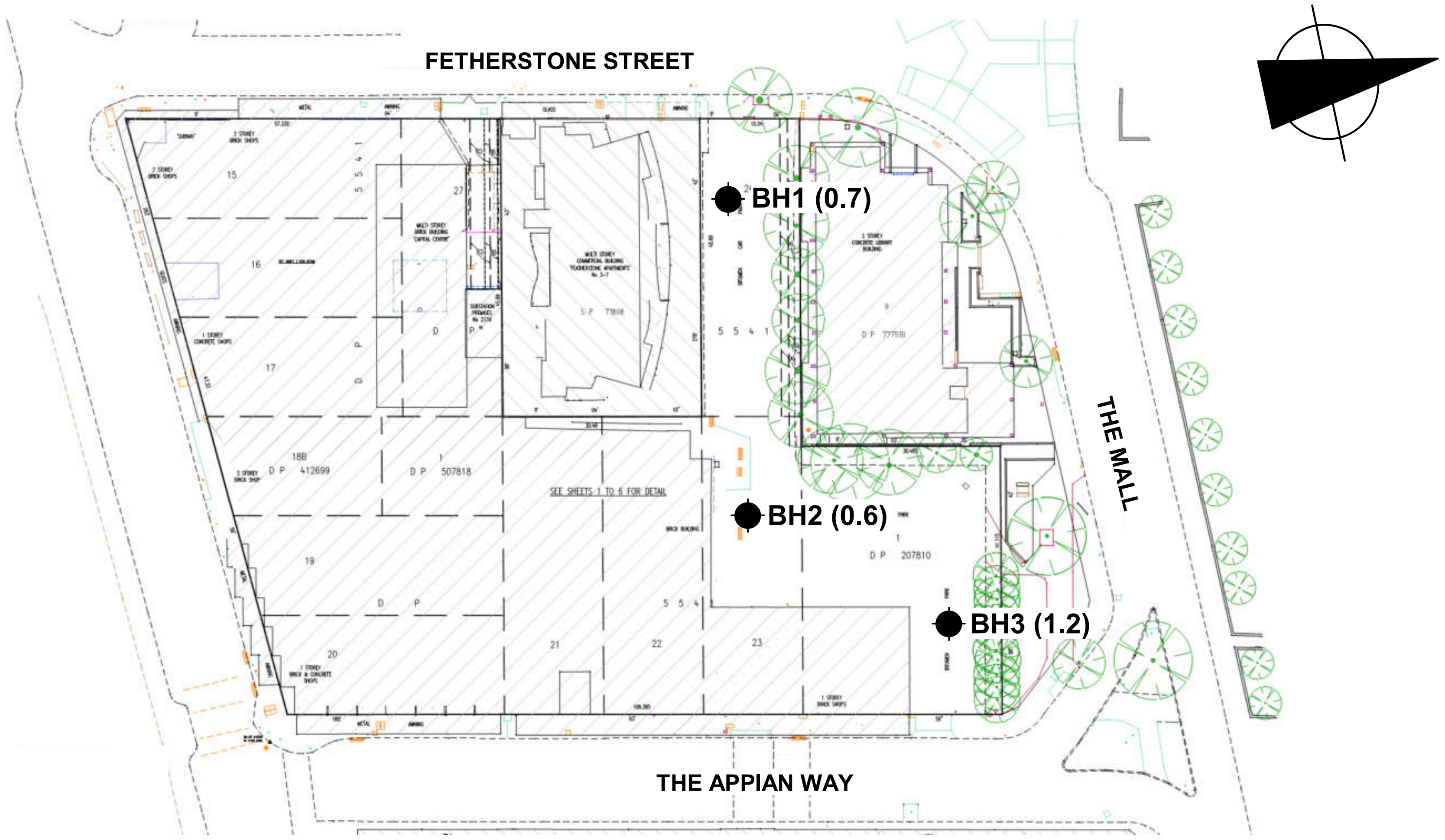
EIS
ENVIRONMENTAL INVESTIGATION SERVICES

Project Number: E28650KB

Title: SITE LOCATION PLAN

Figure: 1

Address: CNR NORTH TERRACE & FETHERSTONE STREET, BANKSTOWN, NSW



LEGEND

Borehole Location, Number and Depth of Fill in meters

Approximate Scale (m):

0 50

EIS

ENVIRONMENTAL INVESTIGATION SERVICES

Title:

SAMPLE LOCATION PLAN

Report Number: E28650KB

Figure Number: 2

Appendix B: Laboratory Summary Tables

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

			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)		
			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	TOTAL PCBs	ASBESTOS FIBRES
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]			3000	900	3600	240000	1500	730	6000	400000	4000	40	80	2000	2500	45	530	3600	50	2000	7	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	92	32	7	LPQL	77	48	0.1	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH1	0.5-0.75	Fill - Silty Clay	9	LPQL	55	15	22	0.2	37	30	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH1	1-1.2	Silty Clay	17	LPQL	31	20	22	0.1	20	28	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH2	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	56	64	8	LPQL	58	45	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH3	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	10	51	5	LPQL	38	30	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH3	0.2-0.5	Fill - Sandy Gravel	LPQL	LPQL	22	6	3	LPQL	23	14	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			6	6	6	6	6	6	6	6	6	6	3	3	3	3	3	3	3	3	3	3
Maximum Value			17	LPQL	92	64	22	0.2	77	48	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NC

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-D: 'Commercial/Industrial'
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 B
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]					**COMMERCIAL/INDUSTRIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1.2
BH1	0.5-0.75	Fill - Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1.2
BH1	1-1.2	Silty Clay	1m to <2m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.5
BH2	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2.8
BH3	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH3	0.2-0.5	Fill - Sandy Gravel	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.7
Total Number of Samples					6	6	6	6	6	6	6	6
Maximum Value					LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	2.8

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	NC: Not Calculated	PQL: Practical Quantitation Limit
HSLs: Health Screening Levels	NL: Not Limiting	LPQL: Less than PQL
NA: Not Analysed	SAC: Site Assessment Criteria	NEPM: National Environmental Protection Measure

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]					**COMMERCIAL/INDUSTRIAL**						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH1	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH1	0.5-0.75	Fill - Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH1	1-1.2	Silty Clay	1m to <2m	Clay	480	NL	6	NL	NL	NL	NL
BH2	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH3	0-0.2	Fill - Sandy Gravel	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH3	0.2-0.5	Fill - Sandy Gravel	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL

EIS

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

Land Use Category [1]				COMMERCIAL/INDUSTRIAL																			
				pH	CEC (cmol$_c$/kg)	Clay Content (% clay)	AGED HEAVY METALS-EILs						EILs		ESLs								
							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**	**Sample Description**	**Soil Texture**																				
BH1	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	LPQL	92	32	7	77 *(highlighted green)*	48	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH1	0.5-0.75	Fill - Silty Clay	Fine	NA	NA	NA	9	55	15	22	37	30	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH1	1-1.2	Silty Clay	Fine	NA	NA	NA	17	31	20	22	20	28	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH2	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	LPQL	56	64	8	58	45	LPQL	LPQL	LPQL	LPQL	500	850	LPQL	LPQL	LPQL	LPQL	LPQL
BH3	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	LPQL	10	51	5	38	30	LPQL	LPQL	LPQL	LPQL	LPQL	120	LPQL	LPQL	LPQL	LPQL	LPQL
BH3	0.2-0.5	Fill - Sandy Gravel	Coarse	NA	NA	NA	LPQL	22	6	3	23	14	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
Total Number of Samples							6	6	6	6	6	6	6	3	6	6	6	6	6	6	6	6	6
Maximum Value							17	92	64	22	77	48	LPQL	LPQL	LPQL	LPQL	500	850	LPQL	LPQL	LPQL	LPQL	LPQL

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 (highlighted green)
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

EIL AND ESL ASSESSMENT CRITERIA

Land Use Category [1]				COMMERCIAL/INDUSTRIAL																			
				pH	CEC (cmol$_c$/kg)	Clay Content (% clay)	AGED HEAVY METALS-EILs						EILs		ESLs								
							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**	**Sample Description**	**Soil Texture**																				
BH1	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	160	323	113	1800	60 *(highlighted grey)*	232	370	--	215	170	1700	3300	75	135	165	180	1.4
BH1	0.5-0.75	Fill - Silty Clay	Fine	NA	NA	NA	160	323	113	1800	60	232	370	640	215	170	2500	6600	95	135	185	95	1.4
BH1	1-1.2	Silty Clay	Fine	NA	NA	NA	160	323	113	1800	60	232	370	--	215	170	2500	6600	95	135	185	95	1.4
BH2	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	160	323	113	1800	60	232	370	640	215	170	1700	3300	75	135	165	180	1.4
BH3	0-0.2	Fill - Sandy Gravel	Coarse	NA	NA	NA	160	323	113	1800	60	232	370	640	215	170	1700	3300	75	135	165	180	1.4
BH3	0.2-0.5	Fill - Sandy Gravel	Coarse	NA	NA	NA	160	323	113	1800	60	232	370	--	215	170	1700	3300	75	135	165	180	1.4

TABLE D
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES (2014)
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total PCBs	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful [2]	Total Scheduled[3]		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	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	200	0.8	60	4	250	<50	<50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1 [1]			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2 [1]			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2 [1]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	92	32	7	LPQL	**77**	48	0.1	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH1	0.5-0.75	Fill - Silty Clay	9	LPQL	55	15	22	0.2	37	30	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH1	1-1.2	Silty Clay	17	LPQL	31	20	22	0.1	20	28	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH2	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	56	64	8	LPQL	**58**	45	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	150	570	720	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH3	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	10	51	5	LPQL	38	30	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	No asbestos detected
BH3	0.2-0.5	Fill - Sandy Gravel	LPQL	LPQL	22	6	3	LPQL	23	14	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
Total Number of samples			6	6	6	6	6	6	6	6	6	6	3	3	3	3	3	6	6	6	6	6	6	6	6	6	3
Maximum Value			17	LPQL	92	64	22	0.2	77	48	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	150	570	720	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

[1] - NSW EPA Waste Classification Guidelines (2014)

[2] - Assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion

[3] - Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde

Concentration above the CT1	VALUE
Concentration above SCC1	VALUE
Concentration above the SCC2	VALUE

Abbreviations:

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

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**							
BH1	0.5-0.75	Fill - Silty Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH2	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	LPQL	LPQL	LPQL	0.05	LPQL
BH3	0-0.2	Fill - Sandy Gravel	LPQL	LPQL	LPQL	LPQL	LPQL	0.04	LPQL
Total Number of samples			3	3	3	3	3	3	3
Maximum Value			LPQL	LPQL	LPQL	LPQL	LPQL	0.05	LPQL

Explanation:
1 - NSW EPA Waste Classification Guidelines (2014)

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

TABLE F
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 = BH1 (0.5-0.75m)	Arsenic	4	9	10	9.5	11
Dup Ref = DUPA	Cadmium	0.4	LPQL	LPQL	NC	NC
	Chromium	1	55	39	47.0	34
Envirolab Report: 133022	Copper	1	15	16	15.5	6
	Lead	1	22	21	21.5	5
	Mercury	0.1	0.2	0.3	0.3	40
	Nickel	1	37	24	30.5	43
	Zinc	1	30	32	31.0	6
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)pyrene TEQ	0.5	LPQL	LPQL	NC	NC
	TRH C_6-C_{10} (F1)	25	LPQL	LPQL	NC	NC
	TRH >C_{10}-C_{16} (F2)	50	LPQL	LPQL	NC	NC
	TRH >C_{16}-C_{34} (F3)	100	LPQL	LPQL	NC	NC
	TRH >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	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
If result is LPQL then 50% of the PQL is used for the calculation

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
TRH: Total Recoverable Hydrocarbons

TABLE G
SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TBS1
			18/08/2015
			133022
	mg/kg	µg/L	mg/kg
Benzene	1	1	LPQL
Toluene	1	1	LPQL
Ethylbenzene	1	1	LPQL
m+p-xylene	2	2	LPQL
o-xylene	1	1	LPQL

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

Values above PQLs/Acceptance criteria **VALUE**

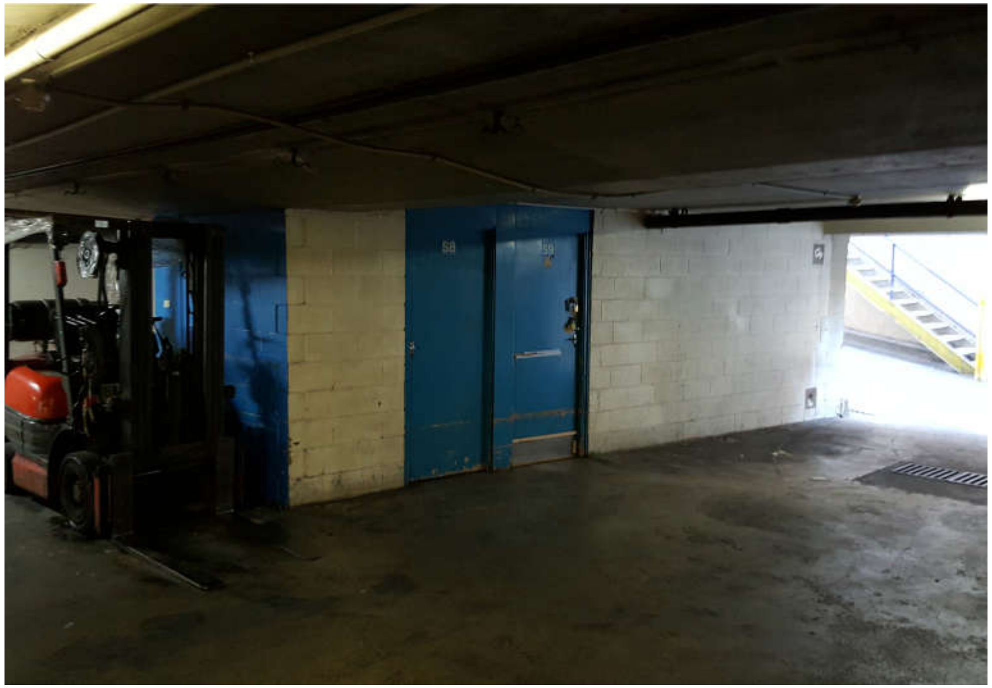
Abbreviations:
PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
TB: Trip Blank
TS: Trip Spike
RS: Rinsate Sample
TRH: Total Recoverable Hydrocarbons

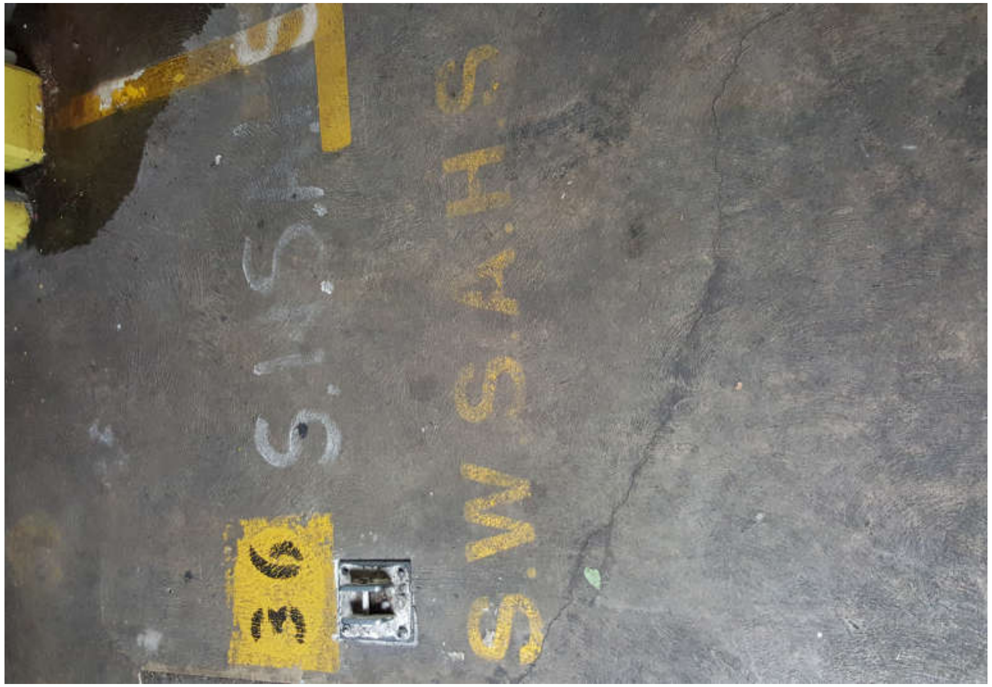
Appendix C: Site Information

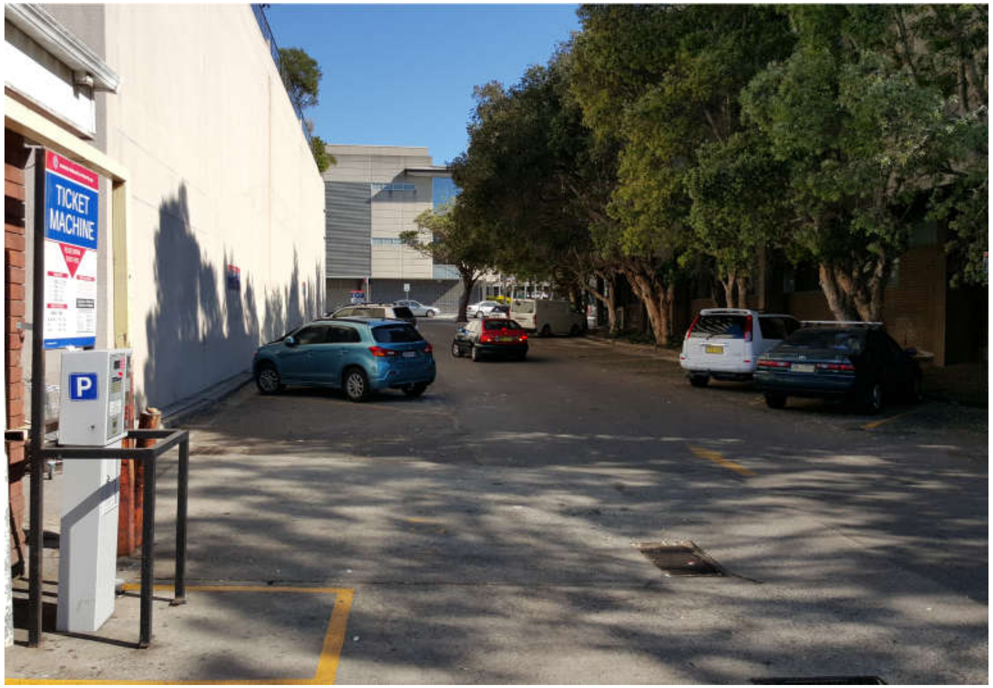
EIS

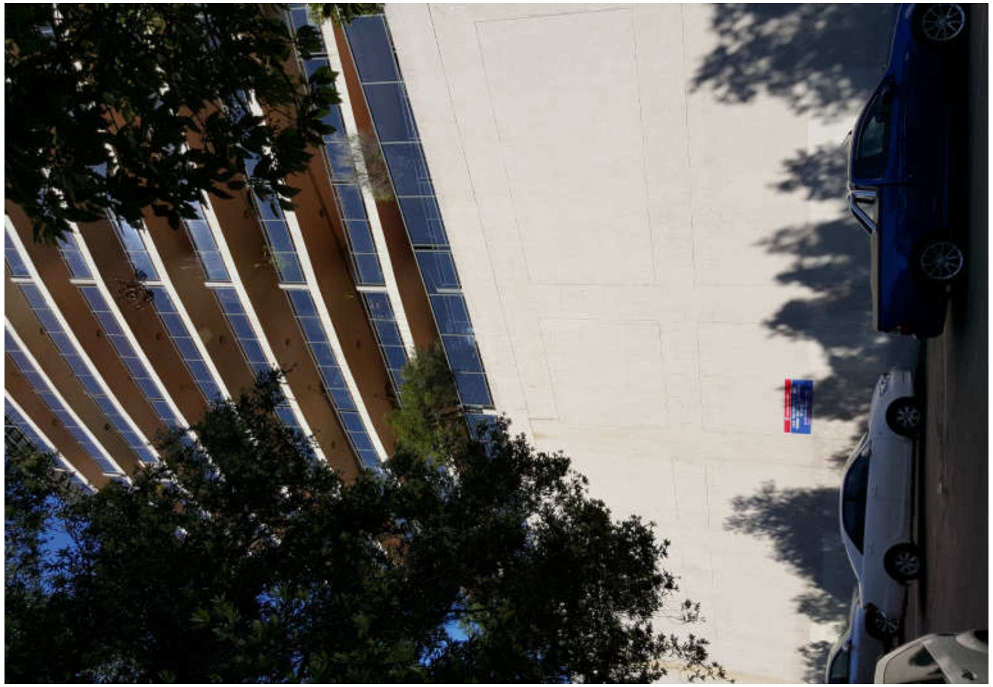
Selected Site Photos of 18 August 2015


PRIVATE
PARKING
BAMN
AUTHORISED
VEHICLES ONLY




S.W.S.A.H.S
36


TICKET
MACHINE
P

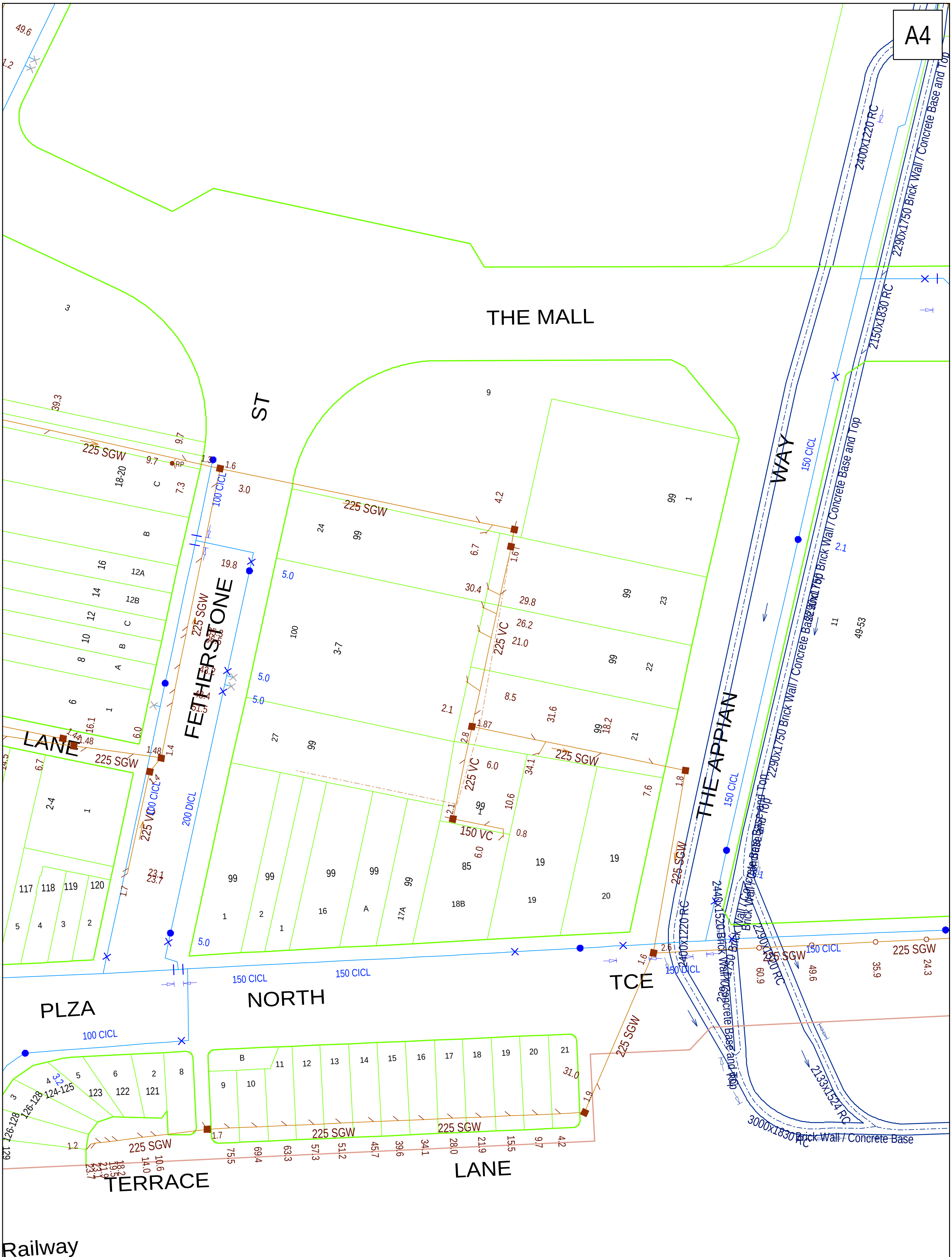



STRICTLY NO PARKING
AT ANY TIME
ISUZU


Target


Target

Selected Services Plans



DBYD Address:
n/a The Appian Way
Bankstown NSW 2200

DBYD Job No: 9611398

DBYD Sequence No: 47629061

No warranty is given that the information shown is complete or accurate.

SYDNEY WATER CORPORATION

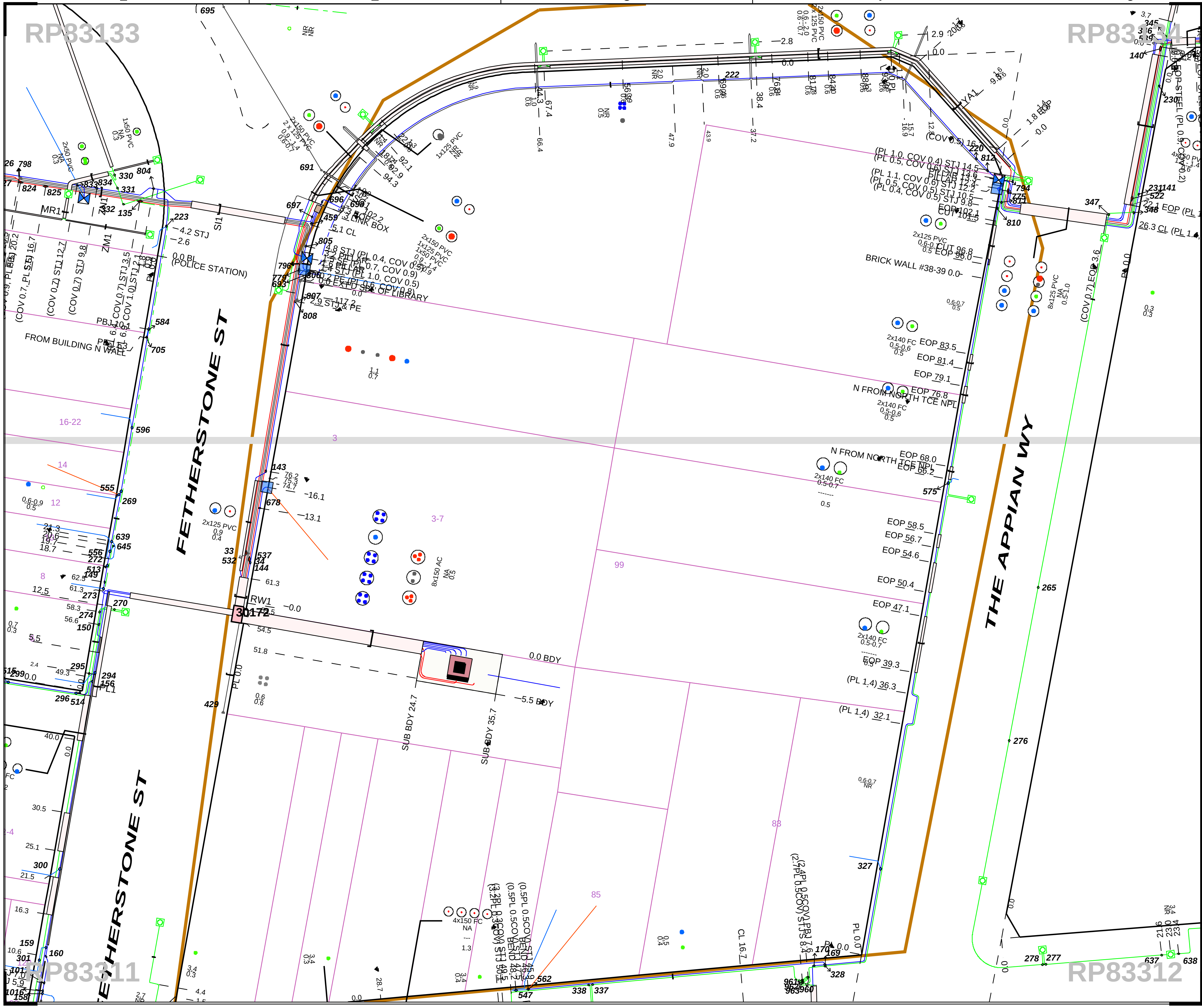
Scale: 1:1000

Date of Production: 01/09/2015

Plan 1 of 1

N

0m 5m 10m 15m 20m



JOINT DETAIL REPORT

No.	Bk-Pg	Pl/Cvr	Joint Location
Map: RP831			
220	609-29	2.24/0.63	2.2 W OF APPIAN WAY WPL
222	1670-NR		APPROX 40.8 W OF THE APPIAN WAY WPL
693	522-36	0.30/0.46	1.2 N OF POLICE STN EXT NBL
698	1670-31	0.76/2.00	11.8 N OF POLICE STD EXT NBL
775	BT06-513	1.10/0.60	12.2 N OF 38-39 N BRICK WALL
779	BT06-532	1.00/0.50	1.4 N OF EXD SBL OF THE LIBRARY
794	BT06-502	0.50/0.60	13.6 N OF 38-39 N BRICK WALL
796	BT06-532	0.70/0.90	1.5 N OF EXD SBL OF THE LIBRARY
805	BT06-538	0.40/0.50	4.8 N OF EXT'D SBL OF LIBRARY
806	BT06-538	0.60/0.80	0.2 N OF EXT'D SBL OF LIBRARY
807	BT06-538	0.50/1.00	2.9 S OF EXT'D SBL OF LIBRARY
808	BT06-538	0.60/0.80	2.9 S OF EXT'D SBL OF LIBRARY
810	BT06-545	0.40/0.50	9.8 N OF 38-39 N BRICK WALL
811	BT06-545	0.50/0.50	10.5 N OF 38-39 N BRICK WALL
812	BT06-545	1.00/0.40	14.5 N OF 38-39 N BRICK WALL
Map: RP833			
33	388-86	1.14/0.38	64.6 N OF NORTH TCE NPL
34	288-88	0.76/0.46	62.0 N OF NORTH TCE NPL
143	1634-16	0.71/0.51	
144	388-88	0.76/0.46	63.4 N OF NORTH TCE NPL
145	625-8	99.99/99.99	INSIDE PIT 1
146	1656-80	99.99/99.99	INSIDE PIT 1
147	426-77	99.99/99.99	INSIDE PIT 1
148	625-8	99.99/99.99	INSDIE PIT 1
327	888-376	0.70/0.60	12.0 N OF NORTH TCE NPL
427	625-8	99.99/99.99	INSIDE PIT 1
429	622-37	/0.46	EXT OF ADNUM LN NPL
532	338-88	0.99/0.46	64.6 N OF NORTH TCE NPL
537	338-88	0.91/0.46	64.6 N OF NORTH TCE NPL
575			65.7 N OF NORTH TCE NPL
678	2381-079	0.70/0.80	13.1 N OF S2139 CABLE EASEMENT NPL
989	BT14-0222		Pit RP30172

ISG GRID

RP74244	RP83133	RP83134
RP74422	RP83311	RP83312
RP74424	RP83313	RP83314

GRID

251P15	251Q15	252A15
251P16	251Q16	252A16
271P1	271Q1	272A1

Scale 1:543

Page 1 of 1

0 — 15 metres

N

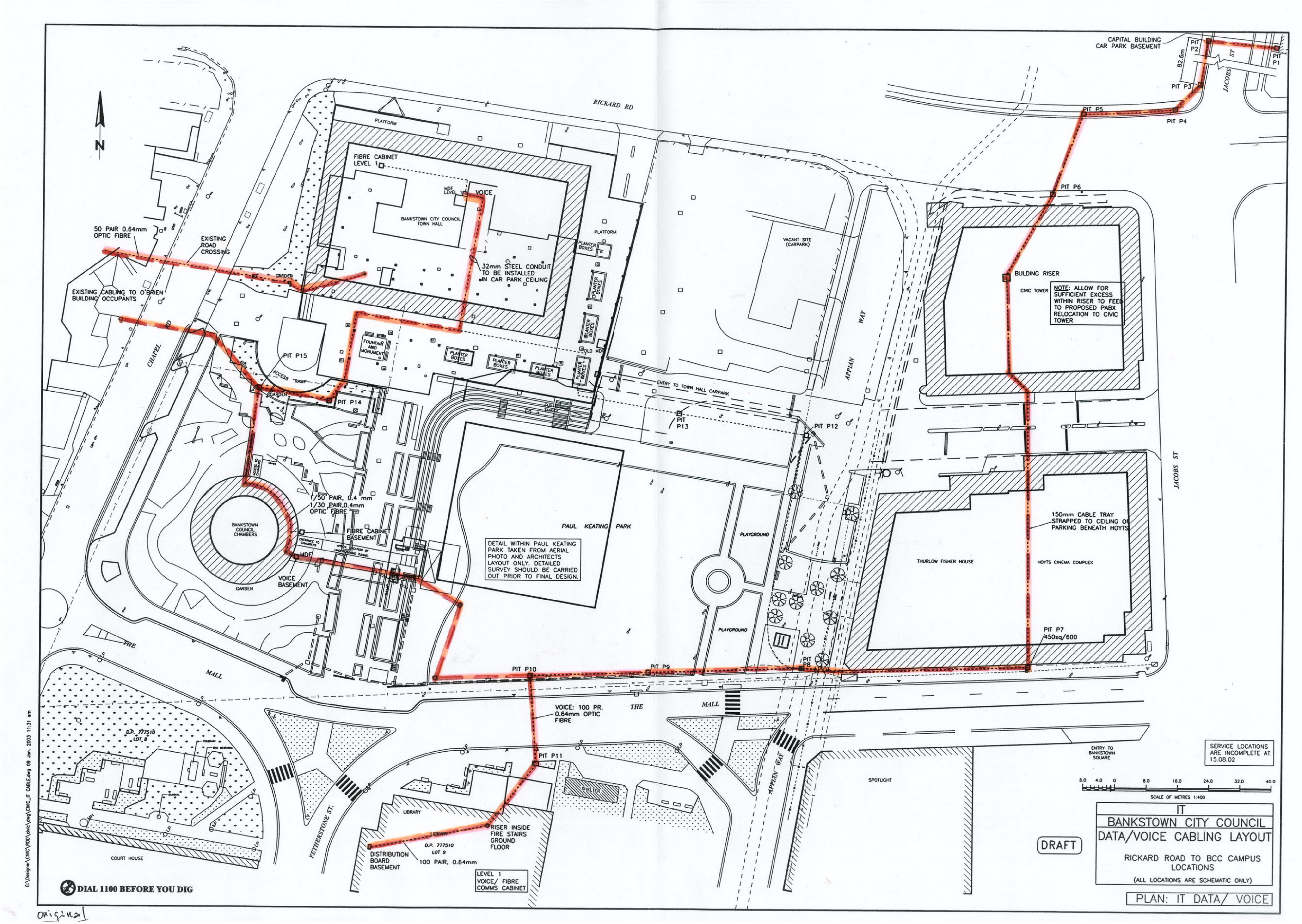
Distribution - 47629058
GMLA3

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE:

1 Sep 2015

Ausgrid

W A R N I N G : Ausgrid's plans show the position of assets at the time of installation and may not account for subsequent changes to road alignments, fences or buildings. The plans show no more than the presence or absence of Ausgrid assets in the street. Persons working near electricity networks must exercise care and will be held responsible for any damage caused. You must excavate by hand or use vacuum excavation to establish the location of Ausgrid underground cables and associated assets.Underground: Working near a cable may result in electric shock even if no contact is made. Any work in the vicinity of any cable should only be performed using safe work methods developed in accordance with the recommendations included in WorkCover Code of Practice for Excavation and WorkCover Guide for Work Near Underground Assets as well as recommendations of Ausgrid's Network Standard NS156. Overhead: Do not excavate near poles or towers until the stability of the foundation has been assessed by Ausgrid. Cables or earth conductors may be present close to substations, poles or towers. Workers must maintain safe approach distances and follow applicable WorkCover Codes of Practice. NOTE: You must keep this plan on site during excavation works and have on site a person trained to read this plan.


CAPITAL BUILDING
CAR PARK BASEMENT
PIT P1
PIT P2
PIT P3
PIT P4
PIT P5
PIT P6
82.6m
JACOBS ST
RICKARD RD
PLATFORM
FIBRE CABINET
LEVEL 1
MDF LEVEL 1
VOICE
BANKSTOWN CITY COUNCIL TOWN HALL
50 PAIR 0.64mm
OPTIC FIBRE
EXISTING
ROAD
CROSSING
32mm STEEL CONDUIT
TO BE INSTALLED
IN CAR PARK CEILING
PLANTER BOXES
EXISTING CABLING TO O'BRIEN
BUILDING OCCUPANTS
CHAPEL RD
FOUNTAIN AND MONUMENT
PIT P15
ACCESS RAMP
PIT P14
VACANT SITE
(CARPARK)
ENTRY TO TOWN HALL CARPARK
PIT
P13
PIT P12
APPIAN WAY
BULDING RISER
CIVIC TOWER
NOTE: ALLOW FOR
SUFFICIENT EXCESS
WITHIN RISER TO FEED
TO PROPOSED PABX
RELOCATION TO CIVIC
TOWER
1/50 PAIR, 0.4 mm
1/30 PAIR, 0.4mm
OPTIC FIBRE
BANKSTOWN COUNCIL CHAMBERS
FIBRE CABINET
BASEMENT
MDF
VOICE
BASEMENT
GARDEN
PAUL KEATING PARK
DETAIL WITHIN PAUL KEATING
PARK TAKEN FROM AERIAL
PHOTO AND ARCHITECTS
LAYOUT ONLY. DETAILED
SURVEY SHOULD BE CARRIED
OUT PRIOR TO FINAL DESIGN.
PLAYGROUND
THURLOW FISHER HOUSE
HOYTS CINEMA COMPLEX
150mm CABLE TRAY
STRAPPED TO CEILING OF
PARKING BENEATH HOYTS
PIT P7
450sq/600
PIT P8
PIT P9
PIT P10
THE MALL
VOICE: 100 PR,
0.64mm OPTIC
FIBRE
PIT P11
D.P. 777510
LOT 8
LIBRARY
RISER INSIDE
FIRE STAIRS
GROUND
FLOOR
D.P. 777510
LOT 9
DISTRIBUTION
BOARD
BASEMENT
100 PAIR, 0.64mm
LEVEL 1
VOICE/ FIBRE
COMMS CABINET
FETHERSTONE ST.
COURT HOUSE
SHELTER
SPOTLIGHT
ENTRY TO
BANKSTOWN
SQUARE
SERVICE LOCATIONS
ARE INCOMPLETE AT
15.08.02
SCALE OF METRES 1:400
DRAFT
IT
BANKSTOWN CITY COUNCIL
DATA/VOICE CABLING LAYOUT
RICKARD ROAD TO BCC CAMPUS
LOCATIONS
(ALL LOCATIONS ARE SCHEMATIC ONLY)
PLAN: IT DATA/ VOICE
DIAL 1100 BEFORE YOU DIG
original

Groundwater Bore Records

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  - Hunter Region
  - **Greater Sydney Region**
  - South Coast Region
  - Northwest Region
  - Central West Region
  - Southwest Region
  - Far West Region
  - Great Artesian Basin
  - Coal Basins

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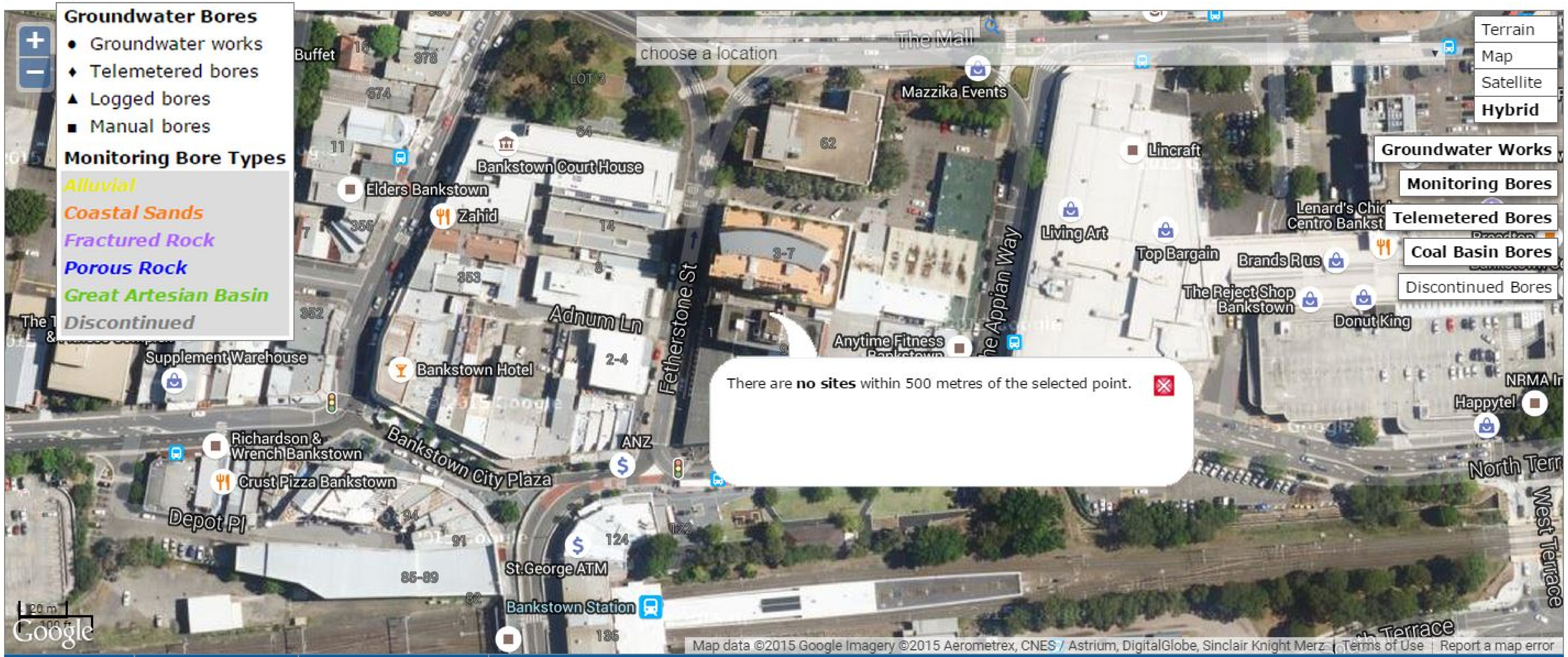
Greater Sydney Region

All data times are Eastern Standard Time

Map



Scale = 1 : 1693

Appendix D: Borehole Logs

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No.
1

Client: FIOSON PTY LTD
Project: PROPOSED REDEVOPMENT OF COMPASS CENTRE
Location: THE APPIAN WAY, BANKSTOWN, NSW

Job No. 28650Z
Method: SPIRAL AUGER JK350
R.L. Surface: ≈ 22.9m
Date: 17-8-15
Datum: AHD
Logged/Checked by: T.P./A.Z.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING		0		ASPHALTIC CONCRETE: 20mm.t	D			
				FILL: Sandy gravel, fine to medium grained igneous, blue grey, fine to coarse grained sand.	M			
	N = 8 5,3,5			FILL: Silty clay, high plasticity, dark brown, trace of fine grained igneous gravel and ash.	MC>PL			
		1	CH	SILTY CLAY: high plasticity, brown mottled light grey, race of fine grained ironstone gravel.	MC>PL	St	140 150 190	POSSIBLY FILL
				SILTY CLAY: high plasticity, orange brown, trace of fine to medium grained ironstone gravel.		VSt		
	N = 9 2,4,5			as above, but light grey mottled orange brown.		St	210 220 210	
		2	CL	SILTY CLAY: low to medium plasticity, orange brown and light grey, trace of fine grained sand.			180 180 180	
				SILY CLAY: low to medium plasticity, orange brown and light grey.	MC≈PL	VSt	380 250 320	
	N = 17 15,8,9	3		as above, but with XW shale seams, EL strength.	MC<PL	H		EXTREMELY LOW 'TC' BIT RESISTANCE
		4						VERY LOW RESISTANCE WITH LOW BANDS
	N = SPT 6/50mm REFUSAL		-	SHALE: grey, with M-H strength iron indurated bands.	DW	VL-L		
		5		as above, but without iron indurated bands.	SW	L		LOW RESISTANCE WITH MODERATE BANDS
				REFER TO CORED BOREHOLE LOG				
		6						
		7						

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 2

Client: FIOSON PTY LTD
Project: PROPOSED REDEVOPMENT OF COMPASS CENTRE
Location: THE APPIAN WAY, BANKSTOWN, NSW

Job No. 28650Z
Date: 17-8-15
Method: SPIRAL AUGER JK350
R.L. Surface: ≈ 22.1m
Datum: AHD
Logged/Checked by: T.P./A.Z.

Groundwater Record	Samples (ES, U50, DB, 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			ASPHALTIC CONCRETE: 70mm.t	D			
					-	FILL: Sandy gravel, fine to medium grained igneous, blue grey, fine to coarse grained sand.	M			
							MC>PL			
		N = 8 2,3,5			CL-CH	FILL: Silty clay, low to medium plasticity, dark brown, dark grey, with fine to medium grained sand, trace of fine grained igneous gravel.	MC>PL	F-St	100 130 90	
ON COMPLETION OF CORING			1			SILTY CLAY: medium to high plasticity, brown mottled light grey, trace of root fibres.				
		N = 16 6,8,8				as above, but without root fibres, trace of fine grained sand and fine grained ironstone gravel.		VSt	300 260 180	
ON 28/8/15			2							
		N > 27 12,20, 7/20mm REFUSAL	3			SILTY CLAY: medium to high plasticity, red brown mottled light grey and orange brown, trace of fine grained sand and fine to medium grained ironstone gravel.			230 310 240	EXTREMELY LOW TO VERY LOW 'TC' BIT RESISTANCE
						as above, but with iron indurated seam.				
			4			SILTY CLAY: medium to high plasticity, red brown mottled light grey and orange brown, trace of fine grained sand and fine to medium grained ironstone gravel.				
		SPT 21/80mm REFUSAL			-	SHALE: grey.	DW	VL-L		VERY LOW TO LOW 'TC' BIT RESISTANCE
			5				SW	M		LOW RESISTANCE
						REFER TO CORED BOREHOLE LOG				
			6							
			7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No.
3
1/2

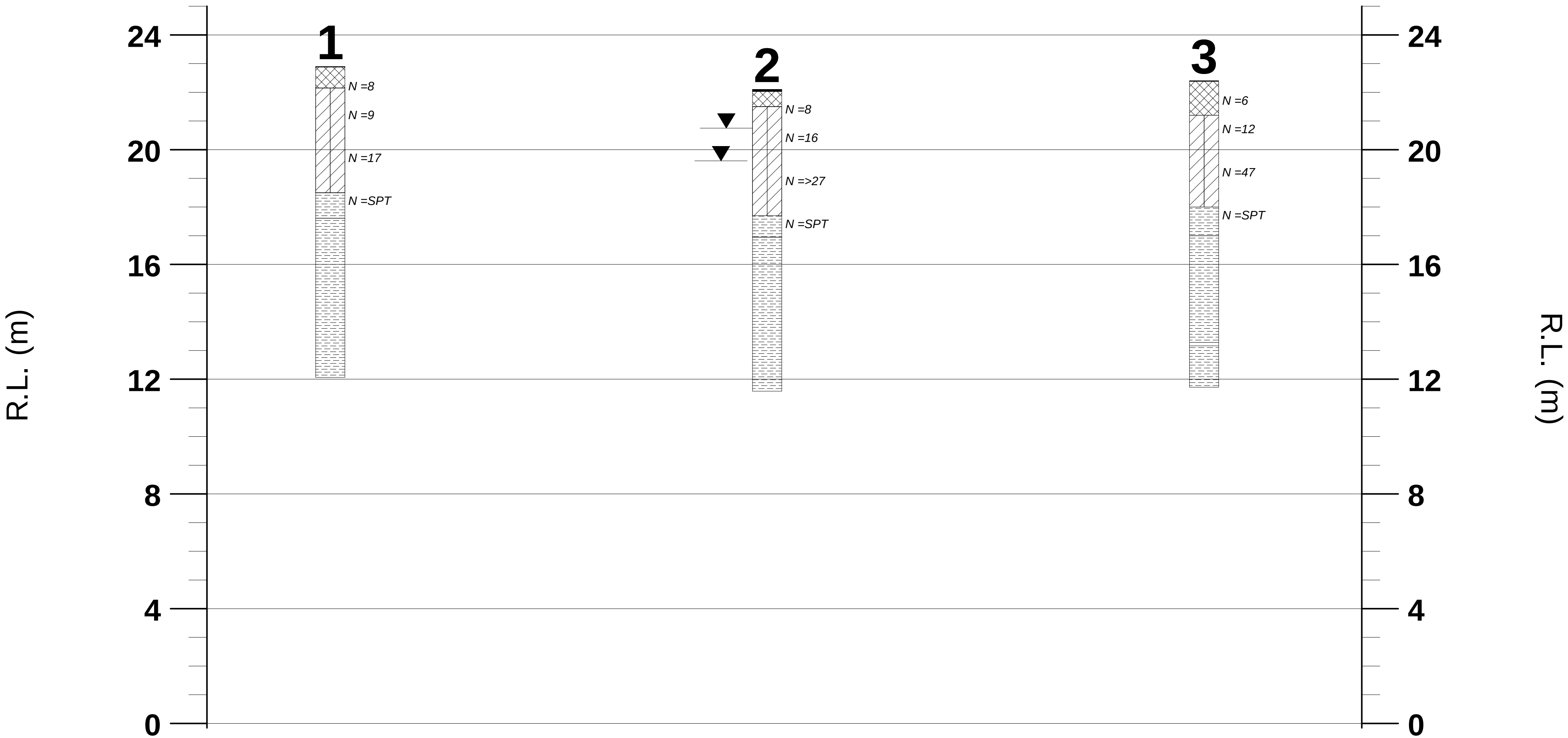
Client: FIOSON PTY LTD
Project: PROPOSED REDEVOPMENT OF COMPASS CENTRE
Location: THE APPIAN WAY, BANKSTOWN, NSW

Job No. 28650Z
Date: 18-8-15
Method: SPIRAL AUGER JK350
R.L. Surface: ≈ 22.4m
Datum: AHD
Logged/Checked by: T.P./A.Z.

Groundwater Record	Field Tests	Depth (m)	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION OF AUGERING		0	-	ASPHALTIC CONCRETE: 20mm.t	D			
				FILL: Sandy gravel, fine to medium grained igneous, blue grey, fine to coarse grained sand.	M			
	N = 6 5,3,3			FILL: Silty clay, medium to high plasticity, dark grey and brown, trace of fine grained sand and fine grained igneous gravel.	MC>PL			
		1	CL-CH	SILTY CLAY: medium to high plasticity, orange brown mottled light grey, trace of root fibres.	MC>PL	VSt		
	N = 12 4,6,6			as above, but trace of fine grained sand.			270 280 360	
		2		SILTY CLAY: medium to high plasticity, red brown mottled light grey and orange brown, trace of fine grained sand and fine to medium grained ironstone gravel.				
	N = 47 22,22,25	3		as above, but with iron indurated seam.			250 220 380	
				SILTY CLAY: medium to high plasticity, red brown mottled light grey and orange brown, trace of fine grained sand and fine to medium grained ironstone gravel.				
	N = SPT 18/80mm REFUSAL	4	-	SHALE: grey.	DW	VL-L		VERY LOW TO LOW 'TC' BIT RESISTANCE
		5			SW	M		LOW TO MODERATE RESISTANCE
		6		REFER TO CORED BOREHOLE LOG				
		7						

Samples columns: ES, U50, DB, DS

GRAPHICAL BOREHOLE SUMMARY



Asphaltic/ Bituminous Paving or Coal

Fill

Silty Clay

Shale

Core Loss/ Empty

Observed water level

N — SPT "N" VALUE

Nc — SOLID CONE BLOW COUNTS PER 150mm

NOTE: REFER TO BOREHOLE LOGS

Scale: 1 : 200 (vert) ; NTS (horiz)

JK Geotechnics

Job No.: 28650Z

Figure No.: 2

EXPLANATORY NOTES – ENVIRONMENTAL LOGS

INTRODUCTION

These notes have been provided to supplement the environmental report with regards to drilling and field logging. Not all notes are necessarily relevant to all reports. Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and manmade processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies involve gathering and assimilating limited facts about these characteristics and properties in order to understand the ground on a particular site under certain conditions. These conditions 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 (note that unless stated in the report, the soil classification is based on a qualitative field assessment, not laboratory testing):

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 shown in the following table:

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.

DRILLING OR EXCAVATION METHODS

The following is a brief summary of drilling and excavation methods currently adopted by the Company, and some comments on their use and application. All except test pits and hand auger drilling require the use of a mechanical drilling rig.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descend into the pit. The depth of penetration is limited to approximately 3m for a backhoe and up to 6m for an excavator. Limitations of test pits include problems associated with disturbance and difficulty of reinstatement; and the consequent effects on nearby structures. Care must be taken if construction is to be carried out near test pit locations to either properly re-compact 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 fill, 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 in-situ 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 (e.g. 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 locations 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 "Nc" on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

The borehole or test pit logs presented herein are an interpretation of the subsurface 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; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must 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 (e.g. bricks, concrete, plastic, slag/ash, 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. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes

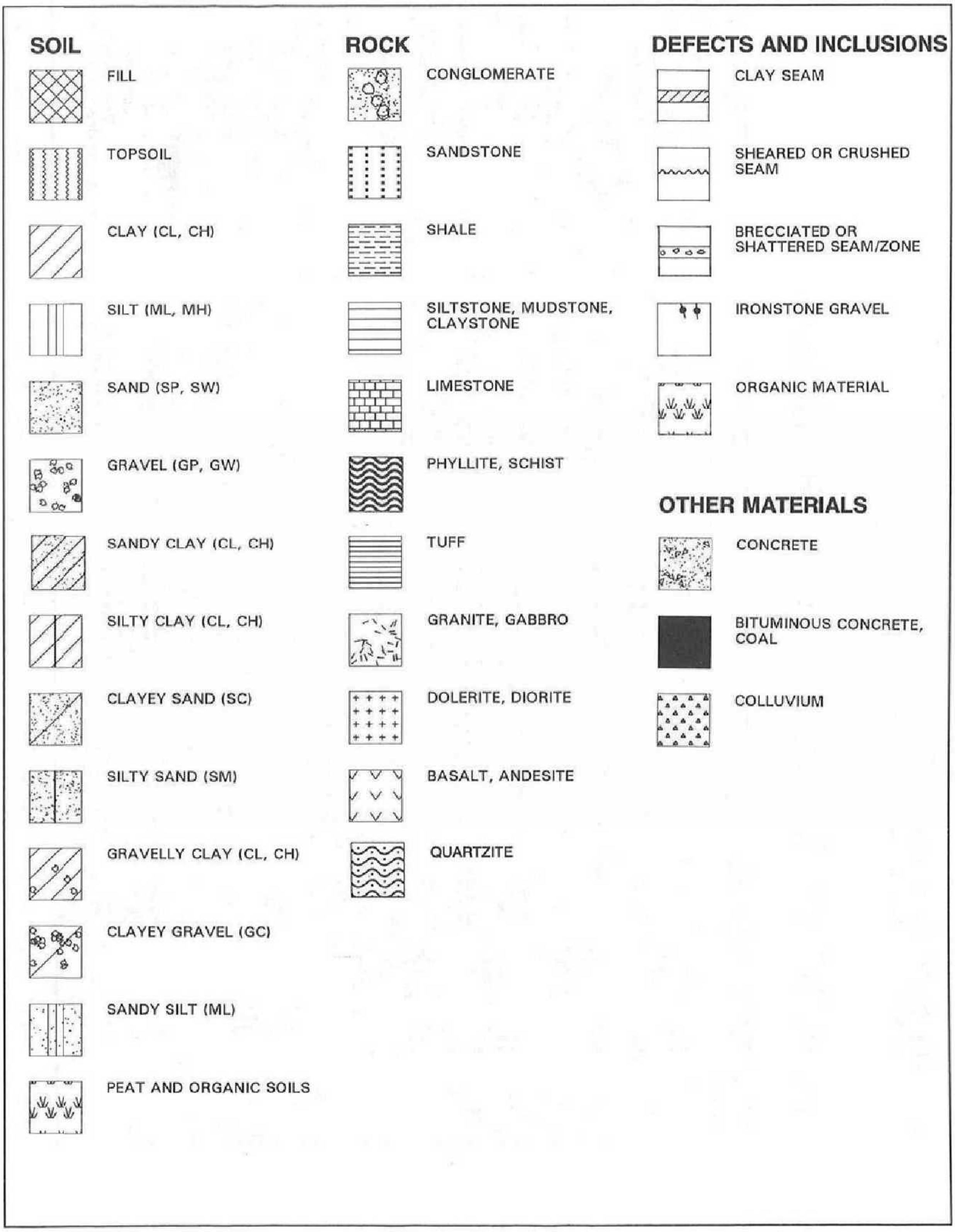
LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classifications and rocks strengths indicated on the environmental logs unless noted in the report.

SITE ANOMALIES

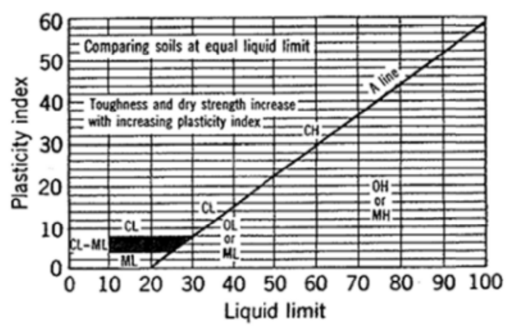
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, EIS should be notified immediately.

GRAPHIC LOG SYMBOLS FOR SOIL AND ROCKS



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	
			Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines			Not meeting all gradation requirements for *GW*	
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures			Atterberg limits below "A" line, or *PI* less than 4	Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures			Atterberg limits above "A" line, with *PI* greater than 7	
	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			$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines			Not meeting all gradation requirements for *SW*	
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures			Atterberg limits below "A" line or *PI* less than 5	Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures			Atterberg limits below "A" line with *PI* greater than 7	

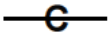
Identification Procedures on Fraction Smaller than 380 μm Sieve Size		Dry Strength (crushing character-istics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)	Group Symbols	Typical Names	Information Required for Describing Soils
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size	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.
		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 show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3 R	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 heads pace test).
Moisture (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)	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 25-5 0kPa
	F	FIRM – Unconfined compressive strength 50-1 00kPa
	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 o n tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (ID) 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.
	$\mathbf{T}_{60}$	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

LOG SYMBOLS CONTINUED

ROCK STRENGTH

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

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

ROCK STRENGTH

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

Appendix E: Laboratory Report/s & COC Documents

Envirolab Services Pty Ltd
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CERTIFICATE OF ANALYSIS 133022

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

Attention: Vittal Boggaram

Sample log in details:

Your Reference:	**E28650KB, Bankstown**	
No. of samples:	13 soils	
Date samples received / completed instructions received	20/08/15	/ 20/08/15

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:	27/08/15	/ 26/08/15
Date of Preliminary Report:	Not Issued	

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Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	133022-1	133022-2	133022-3	133022-5	133022-8
Your Reference	-------------	BH1	BH1	BH1	BH2	BH3
Depth	------------	0-0.2	0.5-0.75	1-1.2	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015	22/08/2015	22/08/2015
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	90	91	90	91

vTRH(C6-C10)/BTEXN in Soil				
Our Reference:	UNITS	133022-9	133022-12	133022-13
Your Reference	-------------	BH3	DUPA	TBS1
Depth	------------	0.2-0.5	-	-
Date Sampled		18/08/2015	18/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	90	96

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	133022-1	133022-2	133022-3	133022-5	133022-8
Your Reference	-------------	BH1	BH1	BH1	BH2	BH3
Depth	------------	0-0.2	0.5-0.75	1-1.2	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015	22/08/2015	22/08/2015
TRHC $_{10}$ - C $_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC $_{15}$ - C $_{28}$	mg/kg	<100	<100	<100	150	<100
TRHC $_{29}$ - C $_{36}$	mg/kg	<100	<100	<100	570	<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	500	<100
TRH>C $_{34}$-C $_{40}$	mg/kg	<100	<100	<100	850	120
Surrogate o-Terphenyl	%	84	85	84	87	98

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	133022-9	133022-12
Your Reference	-------------	BH3	DUPA
Depth	------------	0.2-0.5	-
Date Sampled		18/08/2015	18/08/2015
Type of sample		Soil	Soil
Date extracted	-	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015
TRHC $_{10}$ - C $_{14}$	mg/kg	<50	<50
TRHC $_{15}$ - C $_{28}$	mg/kg	<100	<100
TRHC $_{29}$ - C $_{36}$	mg/kg	<100	<100
TRH>C $_{10}$-C $_{16}$	mg/kg	<50	<50
TRH>C $_{10}$ - C $_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C $_{16}$-C $_{34}$	mg/kg	<100	<100
TRH>C $_{34}$-C $_{40}$	mg/kg	<100	<100
Surrogate o-Terphenyl	%	86	90

PAHs in Soil						
Our Reference:	UNITS	133022-1	133022-2	133022-3	133022-5	133022-8
Your Reference	-------------	BH1	BH1	BH1	BH2	BH3
Depth	------------	0-0.2	0.5-0.75	1-1.2	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Naphthalene	mg/kg	<0.1	<0.1	<0.1	0.2	<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	0.2	<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,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
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 calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	0.10	NIL (+)VE	NIL (+)VE	0.46	NIL (+)VE
Surrogate p-Terphenyl-d14	%	109	106	108	110	112

PAHs in Soil			
Our Reference:	UNITS	133022-9	133022-12
Your Reference	-------------	BH3	DUPA
Depth	------------	0.2-0.5	-
Date Sampled		18/08/2015	18/08/2015
Type of sample		Soil	Soil
Date extracted	-	21/08/2015	21/08/2015
Date analysed	-	21/08/2015	21/08/2015
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	110	111

Organochlorine Pesticides in soil					
Our Reference:	UNITS	133022-2	133022-5	133022-8	133022-12
Your Reference	-------------	BH1	BH2	BH3	DUPA
Depth	------------	0.5-0.75	0-0.2	0-0.2	-
Date Sampled		17/08/2015	17/08/2015	18/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015	22/08/2015
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	106	110	109

Organophosphorus Pesticides					
Our Reference:	UNITS	133022-2	133022-5	133022-8	133022-12
Your Reference	-------------	BH1	BH2	BH3	DUPA
Depth	------------	0.5-0.75	0-0.2	0-0.2	-
Date Sampled		17/08/2015	17/08/2015	18/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015	22/08/2015
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	103	106	110	109

PCBs in Soil					
Our Reference:	UNITS	133022-2	133022-5	133022-8	133022-12
Your Reference	-------------	BH1	BH2	BH3	DUPA
Depth	------------	0.5-0.75	0-0.2	0-0.2	-
Date Sampled		17/08/2015	17/08/2015	18/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	22/08/2015	22/08/2015	22/08/2015	22/08/2015
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	106	110	109

Acid Extractable metals in soil						
Our Reference:	UNITS	133022-1	133022-2	133022-3	133022-5	133022-8
Your Reference	-------------	BH1	BH1	BH1	BH2	BH3
Depth	------------	0-0.2	0.5-0.75	1-1.2	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Arsenic	mg/kg	<4	9	17	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	92	55	31	56	10
Copper	mg/kg	32	15	20	64	51
Lead	mg/kg	7	22	22	8	5
Mercury	mg/kg	<0.1	0.2	0.1	<0.1	<0.1
Nickel	mg/kg	77	37	20	58	38
Zinc	mg/kg	48	30	28	45	30

Acid Extractable metals in soil			
Our Reference:	UNITS	133022-9	133022-12
Your Reference	-------------	BH3	DUPA
Depth	------------	0.2-0.5	-
Date Sampled		18/08/2015	18/08/2015
Type of sample		Soil	Soil
Date prepared	-	21/08/2015	21/08/2015
Date analysed	-	21/08/2015	21/08/2015
Arsenic	mg/kg	<4	10
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	22	39
Copper	mg/kg	6	16
Lead	mg/kg	3	21
Mercury	mg/kg	<0.1	0.3
Nickel	mg/kg	23	24
Zinc	mg/kg	14	32

Moisture						
Our Reference:	UNITS	133022-1	133022-2	133022-3	133022-5	133022-8
Your Reference	-------------	BH1	BH1	BH1	BH2	BH3
Depth	------------	0-0.2	0.5-0.75	1-1.2	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	24/08/2015	24/08/2015	24/08/2015	24/08/2015	24/08/2015
Moisture	%	9.8	17	21	7.1	6.7

Moisture			
Our Reference:	UNITS	133022-9	133022-12
Your Reference	-------------	BH3	DUPA
Depth	------------	0.2-0.5	-
Date Sampled		18/08/2015	18/08/2015
Type of sample		Soil	Soil
Date prepared	-	21/08/2015	21/08/2015
Date analysed	-	24/08/2015	24/08/2015
Moisture	%	5.1	17

Asbestos ID - soils				
Our Reference:	UNITS	133022-2	133022-5	133022-8
Your Reference	-------------	BH1	BH2	BH3
Depth	------------	0.5-0.75	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil
Date prepared	-	25/08/2015	25/08/2015	25/08/2015
Date analysed	-	25/08/2015	25/08/2015	25/08/2015
Sample mass tested	g	Approx. 50g	Approx. 70g	Approx. 55g
Sample Description	-	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks	Brown coarse-grain soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Metals in TCLP USEPA1311				
Our Reference:	UNITS	133022-2	133022-5	133022-8
Your Reference	-------------	BH1	BH2	BH3
Depth	------------	0.5-0.75	0-0.2	0-0.2
Date Sampled Type of sample		17/08/2015 Soil	17/08/2015 Soil	18/08/2015 Soil
Date extracted	-	21/08/2015	21/08/2015	21/08/2015
Date analysed	-	21/08/2015	21/08/2015	21/08/2015
pH of soil for fluid# determ.	pH units	8.3	10.5	9.5
pH of soil for fluid # determ. (acid)	pH units	1.4	1.6	1.6
Extraction fluid used	-	1	1	1
pH of final Leachate	pH units	5.0	5.7	5.0
Arsenic in TCLP	mg/L	<0.05	<0.05	<0.05
Cadmium in TCLP	mg/L	<0.01	<0.01	<0.01
Chromium in TCLP	mg/L	<0.01	<0.01	<0.01
Lead in TCLP	mg/L	<0.03	<0.03	<0.03
Mercury in TCLP	mg/L	<0.0005	<0.0005	<0.0005
Nickel in TCLP	mg/L	<0.02	0.05	0.04

PAHs in TCLP (USEPA 1311)				
Our Reference:	UNITS	133022-2	133022-5	133022-8
Your Reference	-------------	BH1	BH2	BH3
Depth	------------	0.5-0.75	0-0.2	0-0.2
Date Sampled		17/08/2015	17/08/2015	18/08/2015
Type of sample		Soil	Soil	Soil
Date extracted	-	24/08/2015	24/08/2015	24/08/2015
Date analysed	-	24/08/2015	24/08/2015	24/08/2015
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	86	87	90

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. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) based upon AS 4439 and USEPA 1311. Additional information as required in AS4439.3 section 11 can be provided on request.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.

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.

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	-			21/08/2015	[NT]	[NT]	LCS-3	21/08/2015
Date analysed	-			22/08/2015	[NT]	[NT]	LCS-3	22/08/2015
TRHC $_{6}$ - C $_{9}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-3	110%
TRHC $_{6}$ - C $_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-3	110%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-3	104%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-3	107%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-3	117%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-3	112%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-3	112%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	95	[NT]	[NT]	LCS-3	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	[NT]	[NT]	LCS-3	21/08/2015
Date analysed	-			22/08/2015	[NT]	[NT]	LCS-3	22/08/2015
TRHC $_{10}$ - C $_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-3	104%
TRHC $_{15}$ - C $_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	95%
TRHC $_{29}$ - C $_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	90%
TRH>C $_{10}$-C $_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-3	104%
TRH>C $_{16}$-C $_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	95%
TRH>C $_{34}$-C $_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-3	90%
Surrogate o-Terphenyl	%		Org-003	88	[NT]	[NT]	LCS-3	93%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	[NT]	[NT]	LCS-3	21/08/2015
Date analysed	-			21/08/2015	[NT]	[NT]	LCS-3	21/08/2015
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-3	87%
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-3	85%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-3	92%
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-3	87%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-3	92%
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-3	88%
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-3	106%
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-d14	%		Org-012 subset	111	[NT]	[NT]	LCS-3	125%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	[NT]	[NT]	LCS-8	21/08/2015
Date analysed	-			22/08/2015	[NT]	[NT]	LCS-8	22/08/2015
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	87%
gamma-BHC	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-8	97%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	89%
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-8	100%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	103%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
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-8	99%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	109%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	87%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-8	107%
Endosulfan II	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]
Endrin Aldehyde	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-8	91%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	110	[NT]	[NT]	LCS-8	128%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	[NT]	[NT]	LCS-8	21/08/2015
Date analysed	-			22/08/2015	[NT]	[NT]	LCS-8	22/08/2015
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	88%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	110%
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	87%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	88%
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	85%
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-8	88%
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-008	110	[NT]	[NT]	LCS-8	118%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	[NT]	[NT]	LCS-8	21/08/2015
Date analysed	-			22/08/2015	[NT]	[NT]	LCS-8	21208/2015
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-8	119%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	110	[NT]	[NT]	LCS-8	118%

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 prepared	-			21/08/2015	[NT]	[NT]	LCS-5	21/08/2015
Date analysed	-			21/08/2015	[NT]	[NT]	LCS-5	21/08/2015
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-5	111%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-5	108%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-5	106%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-5	107%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-5	104%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-5	96%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-5	104%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-5	104%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2015	133022-2	21/08/2015 || 21/08/2015	LCS-W1	21/08/2015
Date analysed	-			21/08/2015	133022-2	21/08/2015 || 21/08/2015	LCS-W1	21/08/2015
Arsenic in TCLP	mg/L	0.05	Metals-020 ICP-AES	<0.05	133022-2	<0.05 || <0.05	LCS-W1	107%
Cadmium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	133022-2	<0.01 || <0.01	LCS-W1	110%
Chromium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	133022-2	<0.01 || <0.01	LCS-W1	104%
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	133022-2	<0.03 || <0.03	LCS-W1	102%
Mercury in TCLP	mg/L	0.0005	Metals-021 CV-AAS	<0.0005	133022-2	<0.0005 || <0.0005	LCS-W1	116%
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	133022-2	<0.02 || <0.02	LCS-W1	101%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			24/08/2015	[NT]	[NT]	LCS-W1	21/08/2015
Date analysed	-			24/08/2015	[NT]	[NT]	LCS-W1	24/08/2015
Naphthalene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	100%
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	101%
Phenanthrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	89%
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	105%
Pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	109%
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	97%
Benzo(bjk)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	108%
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	[NT]	[NT]	[NT]	LCS-W1	102%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	133022-8	21/08/2015
Date analysed	-	[NT]	[NT]	133022-8	21/08/2015
Arsenic in TCLP	mg/L	[NT]	[NT]	133022-8	113%
Cadmium in TCLP	mg/L	[NT]	[NT]	133022-8	114%
Chromium in TCLP	mg/L	[NT]	[NT]	133022-8	108%
Lead in TCLP	mg/L	[NT]	[NT]	133022-8	106%
Mercury in TCLP	mg/L	[NT]	[NT]	133022-8	114%
Nickel in TCLP	mg/L	[NT]	[NT]	133022-8	105%

Report Comments:

Asbestos: Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.

Note: Samples 133022-2,8 were sub-sampled from bags provided by the client.

Asbestos ID was analysed by Approved Identifier: Lulu Scott
Asbestos ID was authorised by Approved Signatory: Lulu Scott

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 (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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SAMPLE RECEIPT ADVICE

Client Details	
Client	Environmental Investigation Services
Attention	Vittal Boggaram

Sample Login Details	
Your Reference	E28650KB, Bankstown
Envirolab Reference	133022
Date Sample Received	20/08/2015
Date Instructions Received	20/08/2015
Date Results Expected to be Reported	27/08/2015

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	13 soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	12.8
Cooling Method	Ice
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

Please direct any queries to:

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

Sample and Testing Details on following page

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 Id	*Acid Extractable metals in soil*	*Asbestos ID - soils*	*Metals in TCLP USEPA1311*	*Organochlorine Pesticides in soil*	*Organophosphorus Pesticides*	*PAHs in Soil*	*PAHs in TCLP (USEPA 1311)*	*PCBs in Soil*	*svTRH (C10-C40) in Soil*	*vTRH(C6-C10)/BTEXN in Soil*	*On Hold*
BH1-0-0.2	✓					✓			✓	✓	
BH1-0.5-0.75	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH1-1-1.2	✓					✓			✓	✓	
BH1-1.2-1.5											✓
BH2-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2-0.4-0.5											✓
BH2-1-1.1											✓
BH3-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH3-0.2-0.5	✓					✓			✓	✓	
BH3-1-1.2											✓
BH3-1.5-1.7											✓
DUPA	✓			✓	✓	✓		✓	✓	✓	
TBS1										✓	

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	EIS Job Number: E28650KB Date Results Required: STANDARD Page: 1 OF 1	EIS ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Vittal Boggaram vboggaram@jkgroup.net.au

Location: BANKSTOWN, NSW

Sampler: TP

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 12a	Combo 3	OPPs	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
17/8/15	1	BH1	0-0.2	G, A	1.2	Sand (F)		X										
	2		0.5-0.75		1.2	Clay (F)	X		X									
	3		1-1.2		0.5	Clay (N)		X										
	4		1.2-1.5		0	Clay (N)												
	5	BH2	0-0.2		2.8	Sand (F)	X		X									
	6		0.4-0.5		0.6	Clay (F)												
	7		1-1.1		0.5	Clay (N)												
18/8/15	8	BH3	0-0.2		0	Sand (F)	X		X									
	9		0.2-0.5		0.7	Sand (F)		X										
	10		1-1.2		0	Clay (F)												
	11		1.5-1.7		0	Clay (N)												
	12	DUPA	-	G	-	-				X								
	13	TBS1	-	G	-	-								X				

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

Job No: 133022

Date Received: 20/8/15

Time Received: 15:00

Received by: D.F

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
Vittal B.S	20/8/15	15:00	David Ford - EIS	20/8/15

Appendix F: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE

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

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- 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.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- 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.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- 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).
- 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.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[24].
- 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.
- 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.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.

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

- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- 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, then the 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[25]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[26]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & 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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[25] US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[26] 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%.

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

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:

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