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Report

Preliminary Environmental Site Assessment
Bankstown North Public School
332 Hume Highway
Bankstown NSW

Prepared for
JHD Architects
No 44 Little Oxford Street
DARLINGHURST NSW 2010

Ref: JG18129A-r2(rev2)
October 2018

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25th October 2018

Our Reference: JG18129A-r2(rev2)

JDH Architects
No 44 Little Oxford Street
DARLINGHURST NSW 2010

Attention: Ms Kasia Podrygajlo

Dear Madam

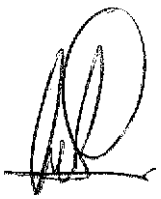
Re Preliminary Environmental Site Assessment Report
Bankstown North Public School
No 322 Hume Highway Bankstown

We are pleased to submit our Preliminary Environmental Site Assessment report for the proposed upgrades to be constructed at the above school located at No 322 Hume Highway Bankstown.

This report should be read in conjunction with our geotechnical report (ref JG18129A-r1 dated October 2018) and attached Important Information about your Environmental Site Assessment Report.

Should you have any queries, please contact the undersigned.

Yours faithfully
GeoEnviro Consultancy Pty Ltd



Solern Liew MIEA CPEng NER
Director

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1. INTRODUCTION

This report presents the results of our preliminary environmental site assessment for the proposed school upgrades to be constructed within the Bankstown North Public School at No 322 Hume Highway Bankstown as shown on Drawing No 1. The investigation was commissioned by Ms Kasia Podrygajlo of JDH Architect. The scope of this assessment was carried out in general accordance with our proposal referenced PG18489A dated 3rd August 2018.

This assessment was undertaken in conjunction with our geotechnical investigation report referenced in our report JG18129A-r1 dated October 2018.

We understand that the proposed development will include refurbishment of the existing buildings and construction of some new buildings. At this stage, details of the proposed development are not available and we have assumed that the proposed new buildings will be of low to medium rise (ie not exceeding 3 storeys).

2. OBJECTIVES AND SCOPE OF WORK

The objectives of this environmental site assessment were to;

- Review the site history and available site information from public records to assess the potential areas and contaminants of concern.
- Assess the subsurface soil contamination with limited chemical analysis including asbestos analysis and this is limited to the nominated borehole locations
- Provide comments on further remediation, management and /or investigation requirements (if any) considered suitable for the proposed redevelopment of the school, and
- Assess the waste classification of soils identified during our borehole investigation for offsite disposal

The scope of work conducted consisted of:

- A review of available information on the site history from aerial photographs.
- A search of records on previous notices issued by NSW EPA.
- A search of information on Groundwater Boreholes in the area from the NSW Natural Resource Atlas (NRA)

- A review of Canterbury Bankstown Council's Section 10.7(2) Zoning Certificates
- An inspection of the site to identify apparent or suspected areas of contamination and observing visible signs of soil contamination from the boreholes in particular presence of fill and Asbestos Containing Material (ACM).
- Soil sampling from the geotechnical boreholes and chemical analysis to detect the presence or otherwise of the contaminants of concern.

3. SITE INFORMATION

3.1 Site Locality and Description

Bankstown North Public School is situated on the northern side of the Hume Highway with Stacey Street forming the northern boundary and Beresford Avenue forming the eastern boundary. The site is irregular in shape with a frontage of about 150m to the Hume Highway and extending north by an average of about 180m. Total site area is about 2.6 hectares.

School buildings and carparks occupy eastern portion of the school premises with the remaining portions of the site consisting of playing fields and open space.

The school is situated within a mixed residential and industrial area with residential properties predominantly to the west and south and industrial area to the north.

3.2 Site Topography, Geological and Hydrogeology

Bankstown North Public School is situated on gently undulating terrain. Ground surface within the school premises slopes down in a general direction to the north west at angles of between 3 and 6 degrees.

Based on Google Earth, the school building area is at about Reduced Level (RL) 64m to 68m above the Australian Height Datum (AHD) with the remainder of the site between RL 62m AHD and RP 64m AHD.

The 1:100,000 Soil Landscape Map of Sydney Series 9030 prepared by the Soil Conservation Services of NSW indicates the site to be underlain by residual soil belonging to the Blacktown landscape grouping. Typically, soil consists of low permeability, highly plastic and moderately reactive soil.

The 1:100,000 Geological Map of Sydney indicated the underlying bedrock consists of Bringelly Shale of the Wianamatta Group consisting of shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff.

Surface water from the site is expected to flow west into Duck River and eventually further north into the Parramatta River. Groundwater is also expected to flow in a general direction towards the west into Duck River.

A study of groundwater conditions beneath the site and search of the NSW Department Infrastructure, Planning and Natural Resources groundwater database for the region was carried out. The search identified nine registered bores within 1km from the site. The following is a summary the two registered bore with relevant information;

Groundwater Number	**Authorised uses**	**Northing**	**Easting**	**Standing Water Level (m)**	**Water Bearing Zones (m)**	**Final Depth (m)**
GW109735	Monitoring Bore	6246624	318969	9.1	-	11.0
GW109734	Monitoring Bore	6246624	318933	1.8	-	4.0

Reference should be made to the Work Summary search in Appendix C for details. Based on the above information, groundwater is considered a resource in the immediate area of the site.

4. SITE HISTORY, RECORDS AND DATA

A desktop study of site history involving a review of Council's Section 10.7 certificates, NSW EPA search, groundwater search and aerial photographs was carried out in order to establish previous land use and to assess site contamination. Reference should be made to Appendix C for details of the searches.

The following is a summary of the historical and data searches;

4.1 Aerial Photographs

The following is a summary of the observations made from the review of historical aerial photos;

Year	Description
1961	The school premises was evident with school buildings constructed towards the eastern portion of the site. The remainder of the site was open space with grass cover. Hume Highway and Beresford Avenue were constructed. The adjoining northern and western properties consisted of residential properties with the current Bankstown Reservoir structure constructed to the south-east of the site.
1970	There was no significant change within the school site since the 1960s. The immediate surrounding properties also had little to no change and were used for residential purposes. The Chullora industrial area about 200m north of the site was built up.
1982	Some school buildings were removed within the site with the asphalt car park constructed. The remainder of the site had no change since the 1970s. The surrounding properties were still used for residential purposes with the Chullora industrial area established.

Year	Description
1991	Additional school buildings were constructed within the eastern portion of the site with the remainder of the site the same. The surrounding properties and region were in similar conditions since the 1980s. Stacey Street was yet to be formed.
2003	The school site appeared similar to its current form. Stacey Street was formed with the previous residential properties to the north removed as part of the Stacey Street construction. Residential properties remained to the west of the site with a commercial building constructed to the south-western property.

4.2 NSW EPA Records

A search of NSW OEH contaminated land register and licensing register indicate the site to have no records kept under the Contaminated Land Management Act 1997 and Environmentally Hazardous Chemical Act 1985. Refer to Appendix C for details of the NSW EPA search.

4.3 Council Section 10.7 (2) Certificate

A copy of the Section 10.7 (2) certificate was obtained from Canterbury Bankstown Council to determine conditions applicable to the site in relation to the Contaminated Land Management Act 1997 and Contaminated Land Management Amendment Act 2009. Reference may be made to the certificate attached in Appendix C.

The certificate indicates the following;

- The site is not within land declared to be an investigation area or remediation site under Part 3 of that Act.
- The site is not subject to an investigation order or a remediation order within the meaning of the Act
- The site is not the subject of a voluntary investigation proposal (or voluntary remediation proposal) the subject of the Environmental Protection Authority's agreement under Section 19 or 26 of that Act.
- The site is not the subject of a site audit statement within the meaning of Part 4 of that Act.

5. INVESTIGATION METHODOLOGY

5.1 Field Investigation

The field work for the investigation was carried out on the 2nd and 3rd October 2018 and consisted of drilling boreholes at twelve nominated locations (BH 1 to BH 12) as shown on the attached Drawing No 1.

Prior to borehole drilling, underground services checks were carried out using available drawing provided by Dial-Before-You-Dig. An underground services locator equipped with an electromagnetic device was engaged as an extra precautionary measure to reduce risk of damage to underground services caused by boreholes drilling.

The boreholes were drilled using a track mounted TCH05 drill rig equipped for site investigation purposes. The boreholes were drilled using continuous flight augers attached to a V-bit through topsoil, fill and into natural soil and in some boreholes into bedrock using a Tungsten Carbide (TC) bit to depths varying from 1.8mm to 4.6m below existing ground surface. BH 2 was terminated into crushed rock at a depth of about 2.0m below existing ground surface due to a possible service.

To assess the strength of the subsurface sandy soil, Standard Penetration Tests (SPT) were carried out in the boreholes. The SPT tests involved driving a split tube steel spoon into the ground using a standard weight (ie 63.5kg) hammer and measuring the penetration resistance in number of blow counts per 150mm penetration. Hand penetrometer tests were carried out the SPT split tube clayey samples in order to augment the SPT test results.

The boreholes were observed for groundwater during and upon completion of the borehole drilling.

Upon completion of the investigation, the boreholes were backfilled with drilling spoil. Details of the subsurface profiles are summarised on the Borehole Reports in Appendix A of this report.

5.2 Laboratory Analysis

Eight soil samples were taken from the boreholes for laboratory analysis by Envirolab Services Pty Ltd, a NATA accredited laboratory to aid assessment of soil contamination. The soil samples were analysed for contaminants of concern consisting of;

- Heavy Metals - Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Mercury (Hg), Lead (Pb), Nickel (Ni) and Zinc (Zn)
- Organochlorine Pesticides (OCP).
- Polychlorinated Biphenyls (PCB)
- Total Recoverable Hydrocarbons (TRH)
- Benzene, Toluene, Ethyl Benzene and Xylene (BTEX)
- Polycyclic Aromatic Hydrocarbon (PAH)
- pH.

The analytical program is presented in Table 1. Laboratory results for soil samples are summarised in Tables 2 to 8. The soil analysis was performed by Envirolab Services Pty Ltd, a laboratory accredited by the National Association of Testing Authorities (NATA). The analytical results and methods employed are presented in the Laboratory Test Report in Appendix D.

6. ASSESSMENT CRITERIA AND GUIDELINES

6.1 Assessment Criteria

The results of laboratory analyses for this investigation were compared with published Australian contamination assessment criteria. These Criteria were originally presented in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, November 1992 (ANZECC/NHMRC Guidelines, Reference 2). The OEH endorsed the use of these guidelines for the assessment of contaminated sites.

More recent guidelines such as those published by the OEH and National Environmental Health Forum (NEHF) (Reference 4) are commonly used to assess contaminant concentrations. The NEHF criteria which was recently updated by the National Environment Protection Council Service Corporation (NEPC) in the National Environmental Protection (Assessment of Contaminated Sites) Measure (NEPM) – Schedule B1 (Reference 5) includes health based soil investigation levels (HBILs) and this was adopted by OEH in May 2013.

HBILs are scientifically based, generic assessment criteria designed to be used in the first stage (Tier 1 or 'screening') of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario

For the purpose of assessing the contamination status of the site, the criteria for the most sensitive landuse, that being HBIL A- residential with garden/accessible soil, including children's day care centres, preschools and primary schools has been adopted as the Site Criteria.

The more recent updates to the NEPM criteria (Reference 5) have included Health Screening Levels (HSL) developed by the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) leading to the adoption of health criteria for TRH, BTEX and PAH. The HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land use scenarios, and the characteristics of building structures and they apply to different soil types and depths below surface up to 4 m depth.

For the purpose of assessing the contamination status of the site for TRH, BTEX and PAH, the HSL A and B (Low to high density residential) have been adopted.

The NEPC also includes EIL criteria for the protection of species based on 95% survival and this criteria is based on average background concentrations (ABC) for individual sites and added contaminant levels (ACL) calculated from survival rates for various species to contaminant exposures in different settings. For ecological levels for TPH, BTEX and PAH, the NEPC has provided ecological screening level (ESL) for the assessment. The EIL and ESL criteria have been included in the relevant tables as a sensitivity measure for the protection of ecological diversity within the site.

The results of laboratory analysis of individual samples have been directly compared with the Criteria. The relevant criteria are presented in the summary table of results (Table 2 to 8).

6.2 Waste Classification Guidelines

For off-site disposal of fill, contaminated material and surplus soil excavated as part of the proposed development works are regulated by the provision of the Protection of the Environment Operations Act (POEO Act 1997) and associated regulations and guidelines including the OEH guideline on Classifying Waste (Reference 14).
There are two types of chemical contaminants concentrations used to classify waste as follows;

- Specific contaminant concentration (SCC)
- Leachable concentration of any chemical contaminant using the toxicity characteristics leaching procedure (TCLP).

Classifying waste based on SCC alone is based on the following thresholds (ie CT1 & CT2);

Analytes	**Maximum values of specific contaminant concentration (SCC) for classification without TCLP**	
	General Solid Waste	Restricted Solid Waste
	CT1 (mg/kg)	CT2 (mg/kg)
Pb	100	400
Cd	20	80
Cr (IV)	100	400
Ni	40	160
As	100	400
Hg	4	16
OCP	NA	NA
PCB	NA	NA
Benzo(a)pyrene	0.8	3.2
PAH	NA	NA
TRH C_6-C_9[(a)]	NA	NA
TRH C_{10}-C_{36}[(a)]	NA	NA
Benzene	10	40
Toluene	288	1152
Xylenes	1000	4000

Note: TCLP – Leachable Concentration CT – Total Concentration Criteria
ND – Not Detected NA – Not Available

Classifying waste based on both SCC and TCLP is based on the following thresholds (ie TCLP1/TCLP2 and SCC1/SCC2);

Analytes	**Waste Classification**			
	General Solid Waste		**Restricted Solid Waste**	
	TCLP1	**SCC1**	**TCLP2**	**SCC2**
Pb	5	1500	20	6000
Cd	1	100	4	400
Cr	5	1900	20	7600
Ni	2	1050	8	4200
As	5	500	20	2000
Hg	0.2	50	20	200
OCP	NA	NA	NA	NA
PCB	NA	<50	NA	<50
Benzo(a)pyrene	0.04	10	0.16	23
PAH	NA	200	NA	800
TRH C_6-C_9[(a)]	NA	650	NA	2600
TRH C_{10}-C_{36}[(a)]	NA	10000	NA	40000
Benzene	0.5	18	2	72
Ethyl Benzene	30	1080	120	4320
Toluene	14.4	518	57.6	2073
Xylenes	50	1800	200	7200

Note: TC – Total Concentration (mg/kg) LP – Leachable Concentration (mg/L)
TCLP – Leachable Concentration Criteria SCC – Total Concentration Criteria
ND – Not Detected NA – Not Available

In this study, the waste was classified based on both SCC alone.

7. RESULTS OF THE INVESTIGATION

7.1 Subsurface Conditions

Reference should be made to the attached Borehole Reports in Appendix A for subsurface profiles encountered in the boreholes. The following is a summary of the subsurface profiles encountered in the boreholes during the investigation;

Pavement

Asphalt, Crushed Rock and Road Base was encountered on the surface of BH 2, 4 to 7, 9 and 10 within the car park area of the school. The pavement was found to have thickness ranging from 70mm to 250mm.

Topsoil/Fill

Topsoil/fill was encountered in BH 1, 3, 11 and 12 consisting of Clayey Silt of low liquid limit. The topsoil/fill was found to have thickness ranging from 300mm to 700mm.

Fill

Fill was encountered on beneath the pavement in BH 4, 5 and the surface of BH 8 comprising of Clayey Silt of low liquid limit. Thickness of the fill was found to range from 100mm to 500mm.

Natural Soil

Underlying the pavement, topsoil/fill and fill, natural soil was found in all boreholes except BH 2. The natural soil was found to consist predominantly of medium to high plasticity Silty Clay with the inclusions of ironstone and shale bands at lower depths in some test pits. Some Shaley Clay was encountered in BH 9 at a depth of about 2.2m below existing ground surface. Based on the SPT and hand penetrometer test results, the natural clayey soil was generally found to be very stiff to hard and dry to moist.

Some relatively weak (ie moist to wet and stiff) clay was encountered in BH 10 between 0.8m to 2.0m below existing ground surface.

Bedrock

Bedrock consisting of Shale and Siltstone was encountered in all boreholes except BH 2 at depths ranging from 1.2m to 3.0m below existing ground surface. The Shale and Siltstone bedrock was generally assessed to have low to medium strength and be extremely weathered to distinctly weathered.

Groundwater

Groundwater was not encountered in any of the boreholes during or shortly after completion of the site investigation.

7.2 Laboratory Test Results

Reference should be made to Table 1 for sampling schedule and Drawing No 1 for sampling location plan. The following is a summary of the laboratory test results and our assessment;

Heavy Metals

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for a range of heavy metals consisting of As, Cd, Cr, Cu, Pb, Hg, Ni and Zn. All individual samples analysed were found to have concentrations of heavy metals of concern to be within the Site Criteria. The results are summarised in Table 2.

Organochlorine Pesticides (OCP)

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for a range of organochlorine pesticides.

All concentrations of OCP were found to have negligible concentrations below detection limits and therefore within the Site Criteria. The results are summarised in Table 3.

Polychlorinated Biphenyls (PCB)

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for a range of Polychlorinated Biphenyls

All concentrations of PCB were found to be below detection limits and therefore within the Site Criteria. The results are summarised in Table 4.

Total Recoverable Hydrocarbons (TRH)

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for TRH. All concentrations of TRH were found to be below detection limits or within the Site Criteria. The results are summarised in Table 5.

Polycyclic Aromatic Hydrocarbons (PAH)

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for PAH. All concentrations of PAH were found to be below detection limits or within the Site Criteria.

BH 2 [0.2-0.3m] which was taken from the asphaltic driveway, was found to have slightly elevated concentration of Benzo(a)pyrene of 1.4mg/kg above the ESL Criteria of 0.7mg/kg. The slightly elevated concentrations of Benzo(a)pyrene in BH 2 is likely to be due to the leaching of PAH from the asphaltic driveway and does not constitute a contamination "hot-spot". The results are summarised in Table 6.

Asbestos

A total of eight individual samples (BH 1 [0.4-0.5m], BH 2 [0.2-0.3m], BH 3 [0.2-0.3m], BH 5 [0.1-0.2m], BH 6 [0.2-0.3m], BH 9 [0.1-0.2m], BH 10 [0.1-0.2m] and BH 12 [0.2-0.3m]) were analysed for the presence of Asbestos. All soil samples analysed did not detect respirable asbestos fibres. The results are summarised Table 7.

7.3 Quality Assurance/ Quality Control (QA/QC)

Chain of Custody Forms and Preservation

The fieldwork was carried out in accordance with standard written procedures which included collection of samples in new glass jars, preservation of samples in ice chests and transportation of samples to the contract laboratory under chain of custody documentation.

Laboratory QA

Envirolab Services carried out internal QA/QC procedures which normally includes one or more of the following;

- Preparation and analysis of duplicate and triplicate samples to assess precision of laboratory results,
- A spike and duplicate spike is prepared for each sample batch. This involves spiking a sample with a known concentration of contaminant to verify the absence of matrix effects and to assess precision,
- Analysis of sample batch as reagent blanks to monitor reagent purity and as an over-all procedural blank. Reagent blank will also be run after samples with a high concentration to prevent carry over.
- A surrogate is added to all samples to monitor sample matrix effects throughout all analytical stages by calculating the % recovery at the completion of the analysis.

The laboratory control results are included in the laboratory test reports in Appendix D.

QA/QC Assessment

The QA/QC indicators either all complied with the required standards or showed variations that would have no significant effect on the quality or interpretation of the data. It is therefore assessed that for the purposes of this analysis, the QA/QC results are adequate and the quality of the data is acceptable for use in this contamination assessment.

8. ASSESSMENT AND RECOMMENDATIONS

8.1 Preliminary Contamination Assessment

Based on a review of available historical records, the site has been used as a Primary School since at least the 1960s. Historical aerial photographs indicate the majority of the school buildings to have been constructed to the eastern portion of the site since the 1960 with the remainder of the site being predominantly vacant.

The borehole investigation indicates the site to be predominantly underlain by natural ground consisting Silty Clay and Shaley Clay overlying Siltstone and Sandstone bedrock. Some fill was encountered on beneath the pavement in BH 4 and BH 5 and the surface of BH 8 comprising of Clayey Silt of low liquid limit with thickness ranging from 100mm to 500mm.

Soil sampling was taken from eight boreholes and the samples were taken to Envirolab Services for laboratory analysis for a range of potential contaminants of concern such as Heavy metals (As, Cd, Cr, Cu, Hg, Pb, Ni and Zn), Organochlorine pesticides, Polychlorinated Biphenyls, Total Recoverable Hydrocarbons, Benzene, Toluene, Ethyl Benzene and Xylene, Polycyclic Aromatic Hydrocarbons and asbestos.

The laboratory test results indicate the soil samples from the selected boreholes to have concentrations of contaminants of concern within the Site Criteria. The slightly elevated concentrations of Benzo(a)pyrene in BH 2 is likely to be due to the leaching of PAH from the asphaltic driveway and this does not constitute a contamination “hot-spot”.

8.2 Investigation/Remediation/Management Option

The current preliminary contamination assessment did not encounter obvious signs of gross ground contamination; however, contamination may still exist within the school premises.

<u>PAH Contamination</u>

To address the elevated concentrations of PAH encountered in BH 2, additional investigation should be carried out should the redevelopment of the school involve removal of the asphaltic driveway and construction of school buildings. This would involve supervision and inspection of this area for any obvious signs of contamination (eg odour, staining and discolouration), soil sampling and laboratory analysis of this area to confirm presence or otherwise of contaminants (in particular hydrocarbon products) and remediation if required.

The PAH contaminated material if confirmed by additional testing should be remediated by excavation of the PAH contaminated soil and disposed off-site to a NSW EPA approved landfill. Validation sampling and laboratory testing should be carried out on the remediated area to ensure the underlying soil is clean of contaminants of concern within the Site Criteria and the affected area is adequately remediated.

Possible Asbestos and Rubbish Impacted Fill

Though buried rubbish fill and asbestos impacted fill was not encountered in our borehole investigation, it may still exist as such occurrence are common to school premises in particular in open space and playing fields.

Should asbestos and rubbish impacted fill be encountered during construction, site remediation to clean up the site will be required. All rubbish impacted soil where encountered should be remediated by excavation and disposal off site to a landfill and this should include classifying of waste in accordance to NSW EPA 2014 guidelines "Part 1 – Classifying Waste".

Asbestos impacted fill where encountered should be adequately remediated in accordance to the NEPM 2013 guidelines. The NEPM 2013 guidelines outline the preferred hierarchy of options for site clean-up and/or management as follows;

I. On-site remediation of the contaminated material for re-use within the site.

II. Excavation and disposal of material off-site to an approved landfill.

III. On-site encapsulation and containment with suitable capping layer.

The preferred remediation strategy was determined based on the following considerations;

- Human health issues; dust suppression should be implemented during remediation works – particularly for asbestos.

- Site remediation supervision and validation; all methods, whether treatment or disposal will require validation by experienced consultant and occupational hygienist prior to being considered suitable.

- Capping of the site involves providing a physical barrier between site users and the underlying impacted soil. For asbestos containing fill to be left onsite, a mechanism would need to be implemented to ensure that future exposure to site users or other persons does not occur. This would likely include implementation of a long term management plan to ensure the cap remains in place and that any works beneath the cap are undertaken using appropriate health and safety and environmental controls. Notification on the S149 certificate of the presence of capped asbestos containing soils may also be required. A mechanism to ensure the management plan is legally enforceable would also be required. Approval may also be required from the respective authorities for leaving contaminated soil on site

Other Contaminants

During the entire construction period, the site should be regularly monitored for any other contamination by an experienced environmental consultants and should contamination be encountered, all works should ceased and the Unexpected Finds Protocol as outlined in Appendix F should be initiated.

8.3 Waste Classification

For off-site disposal of surplus fill to a landfill, the material to be excavated from sites is regulated by the provision of the Protection of the Environment Operations Act (POEO Act 1997) and associated regulations and guidelines including the NSW EPA guideline on classifying waste (Reference 14).

Based on the laboratory test results, our waste classifications for the on-site material are as follows;

- Clayey Silt topsoil and topsoil/fill - General Solid Waste (Non putrescibles).
- Silty Clay/Clayey Silt fill - General Solid Waste (Non putrescibles).
- Natural Silty Clay, Siltstone and Sandstone - Virgin Natural Excavated Material (VENM).
- Crushed Rock (Road Base) - Restricted Solid Waste

Should buried rubbish fill containing Asbestos be encountered during the construction stage, we recommend all works to cease immediately and the attached “Unexpected Finds Protocol” as outlined in Appendix E be initiated. All asbestos impacted soil would be classified as “Special Wates – Asbestos” in accordance to the NSW EPA guidelines.

9. LIMITATIONS

The interpretation and recommendations submitted in this report are based in part upon data obtained from a limited number of boreholes. There is no investigation which is thorough enough to determine all site conditions and anomalies, no matter how comprehensive the investigation program is as site data is derived from extrapolation of limited test locations. The nature and extent of variations between test locations may not become evident until construction.

Groundwater conditions are only briefly examined in this investigation. The groundwater conditions may vary seasonally or as a consequence of construction activities on or adjacent to the site.

In view of the above, the subsurface soil and rock conditions between the test locations may be found to be different or interpreted to be different from those expected. If such differences appear to exist, we recommend that this office be contacted without delay.

The statements presented in this document are intended to advise you of what should be your realistic expectations of this report and to present you with recommendations on how to minimise the risk associated with groundworks for this project. The document is not intended to reduce the level of responsibility accepted by GeoEnviro Consultancy Pty Ltd, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in to doing.

Your attention is drawn to the attached "Explanatory Notes" in Appendix F and this document should be read in conjunction with our report.

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REFERENCES

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3. *Assessment of Orchard and Market Garden Contamination - Contaminated Sites Discussion Paper, NSW EPA 1999.*
4. *Health Based Soil Investigation Levels, National Environmental Health Forum Monographs Soil Series No. 1 – 1996*
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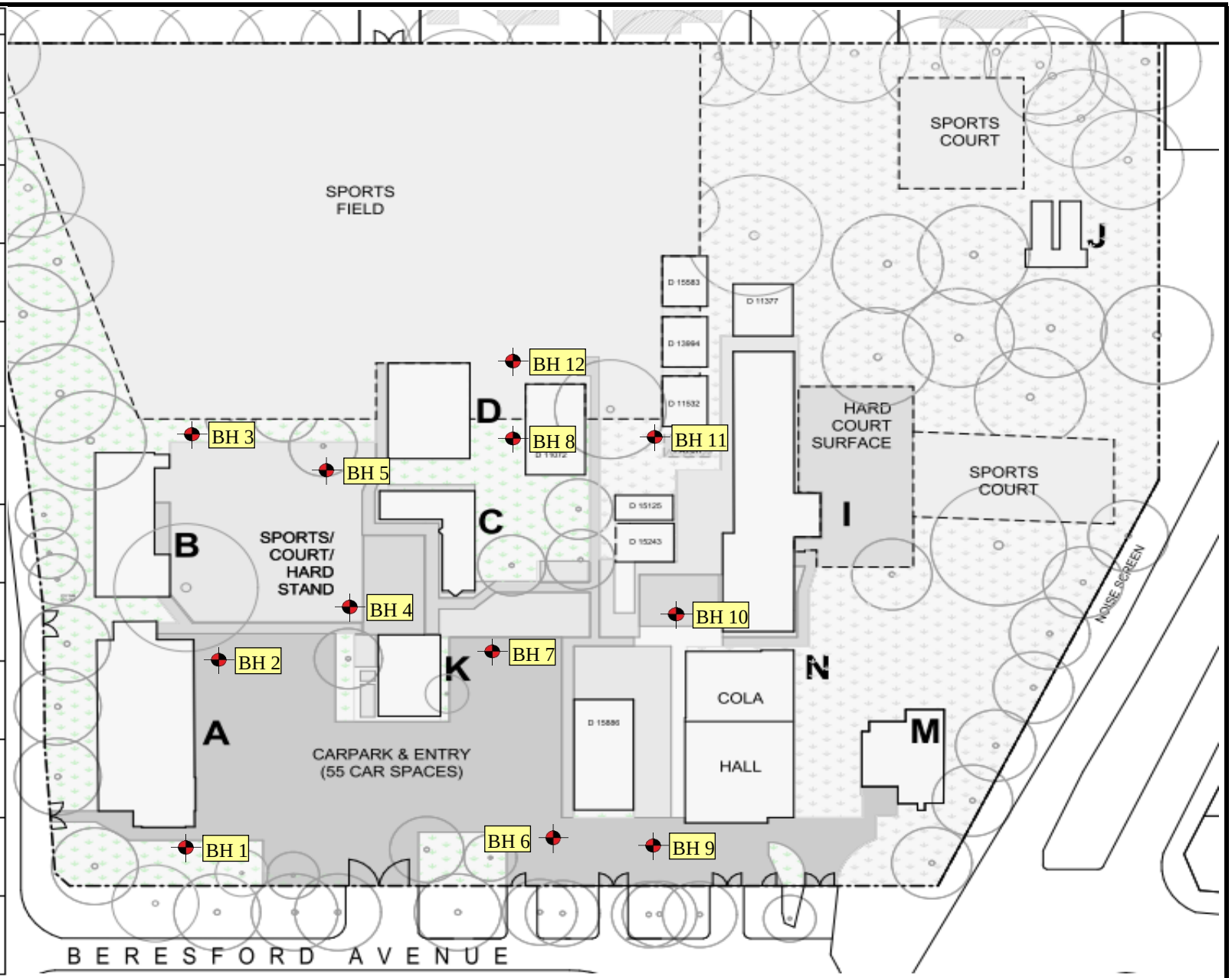
6. *Guidelines for Assessment Service Station Sites – NSW EPA 1994*
7. *Guidelines for the NSW Auditor Scheme, NSW EPA*
8. *Department of Land and Water Conservation – "Site Investigation for Urban Salinity".2002*
9. *Salinity Code of Practice – Western Sydney Regional Organisation of Councils Ltd – 2002*
10. *What do all the numbers mean? A guide for the interpretation of soil test results. – Department of Conservation and Land Management, 1992*
11. *Australian Standard, AS 2159-2009 "Piling – Design and Installation"*
12. *Australian Standard, AS 3600 -2009 "Concrete Structures"*
13. *Australian Standard, AS 3798 - 2007"Bulk Earthworks for Commercial and Residential Site"*
14. *Part 1 – Classifying Waste – 2014, NSW DEC*
15. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – ANZECC.*
16. *Australian Standard, AS 3798 - 2007"Bulk Earthworks for Commercial and Residential Site"*

Borehole	Depth (m)	Profile
1	0.00-0.50	Topsoil/Fill
	0.50-2.00	Natural
	2.00-2.80	Bedrock
2	0.00-0.07	Asphalt
	0.07-2.00	Crushed Rock
3	0.00-0.70	Topsoil/Fill
	0.70-2.70	Natural
	2.70-4.50	Bedrock
4	0.00-0.30	Fill
	0.30-1.20	Natural
	1.20-1.80	Bedrock
5	0.00-0.30	Asphalt
	0.30-0.70	Fill
	0.70-2.60	Natural
	2.60-3.20	Berock
6	0.00-0.21	Asphalt
	0.20-2.00	Natural
	2.00-3.00	Bedrock
7	0.00-0.19	Asphalt
	0.19-2.10	Natural
	2.10-3.00	Bedrock
8	0.00-0.50	Fill
	0.50-2.80	Natural
	2.80-4.60	Bedrock
9	0.00-0.25	Asphalt
	0.25-2.40	Natural
	2.40-3.50	Bedrock
10	0.00-0.25	Asphalt
	0.25-2.60	Natural
	2.60-4.00	Bedrock
11	0.00-0.40	Topsoil/Fill
	0.40-3.00	Natural
	3.00-4.30	Bedrock
12	0.00-0.40	Topsoil/Fill
	0.40-2.80	Natural
	2.80-4.10	Bedrock



Legend

Borehole

GeoEnviro Consultancy
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Drawn By: AT	Date: 8/10/18	JDH Architects Bankstown North Public School Test Pit Location Plan	
Checked By: SL	Date: 8/10/18		
Revision By:	Date:		
Scale: Not to Scale	A3	Project No: JG18129A	Drawing No: 1

Sample	Depths (m)	Sample Date	Sample Type	Analysis														
				pH	Heavy Metals								OCP	PCB	TRH	BTEX	PAH	Asbestos
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn						
BH 1	0.4-0.5	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 2	0.2-0.3	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 3	0.2-0.3	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 5	0.1-0.2	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 6	0.2-0.3	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 9	0.1-0.2	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 10	0.1-0.2	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
BH 12	0.2-0.3	2/03/2018	Soil	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

Note: O denotes tested

GeoEnviro Consultancy

TABLE 1

Analytical Program

JDH Architects

Proposed School Upgrade

Bankstown North Public School

Sample	Depths (m)	pH	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
BH 1	0.4-0.5	6.8	10	<0.4	15	15	32	<0.1	9	44
BH 2	0.2-0.3	11.5	<4	<0.4	18	39	22	<0.1	13	44
BH 3	0.2-0.3	7.9	11	<0.4	15	21	72	0.2	9	45
BH 5	0.1-0.2	8.5	12	<0.4	13	31	64	0.1	9	110
BH 6	0.2-0.3	5.3	14	<0.4	15	17	10	<0.1	4	30
BH 9	0.1-0.2	9.5	<4	<0.4	45	33	8	<0.1	52	31
BH 10	0.1-0.2	8.7	8	<0.4	42	33	10	<0.1	45	49
BH 12	0.2-0.3	5.8	5	<0.4	13	14	22	<0.1	11	43
HBILs 'A' Criteria			**100**	**20**	**100 (VI)**	**6000**	**300**	**40**	**400**	**7400**
EIL Criteria*			**109**	**NA**	**417**	**161**	**1113**	**NA**	**179**	**223**

EIL Derivation

ABC[4]	**9**	**NA**	**17**	**21**	**13**	**NA**	**9**	**43**
ACL[5]	**100**	**NA**	**400**	**140**	**1100**	**NA**	**170**	**180**

Notes

1) All results are expressed as mg/kg and pH (units).

2) Figures in bold italics exceed the EIL Criteria

3) Figures in bold italics and underlined exceed the HBIL 'A' Criteria

4) Ambient Background Concentrations

5) Added Contaminant Limits

* EIL = ABC+ACL

GeoEnviro Consultancy

TABLE 2
Summary of Analytical Results - Heavy Metals

JDH Architects

Proposed School Upgrade

Bankstown North Public School

Sample	Depths (m)	HCB	alpha-BHC	gamma-BHC	beta-BHC	Heptachlor	delta-BHC	Aldrin	Heptachlor Epoxide	gamma-Chlordane	alpha-chlordane	Endosulfan I	pp-DDE	Dieldrin	Endrin	pp-DDD	Endosulfan II	pp-DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor	Total OCP
BH 1	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 2	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 3	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 5	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 6	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 9	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 10	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 12	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
HBILs 'A' Criteria		**10**				**6**		**6**		**50**		**270**	**240**	**6**	**10**	**240**		**240**			**300**	

Notes

1) All results are expressed as mg/kg and pH (units).

2) Figures in bold italics exceed the HBILs 'A' Criteria

GeoEnviro Consultancy

TABLE 3
Summary of Analytical Results - OCP

JDH Architects

Proposed School Upgrade

Bankstown North Public School

Sample	Depths (m)	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260	Total PCB
BH 1	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 2	0.2-0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	ND
BH 3	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 5	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 6	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 9	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 10	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
BH 12	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	ND
HBILs 'A' Criteria									**1**

Notes

1) All results are expressed as mg/kg and pH (units).

2) Figures in bold italics exceed the HBILs 'A' Criteria

GeoEnviro Consultancy

TABLE 4
Summary of Analytical Results - PCB

JDH Architects

Proposed School Upgrade

Bankstown North Public School

Prepared By: SL Date: 24/05/2019
Checked By:__SG___Date:24/05/2019

Sample	Depths (m)	C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	C_{10}-C_{36}	F1 [4] C_6-C_{10}	F2 [5] $>C_{10}$-C_{16}	F3 C_{16}-C_{34}	F4 C_{34}-C_{40}	Volatile Organic Compounds (VOC)					
											Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene
BH 1	0.4-0.5	<25	<50	<100	<100	<250	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<1
BH 2	0.2-0.3	<25	<50	180	320	410	<25	<50	400	400	<0.2	<0.5	<1	<2	<1	<1
BH 3	0.2-0.3	<25	<50	<100	<100	<250	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<1
BH 5	0.1-0.2	<25	<50	<100	190	<250	<25	<50	190	220	<0.2	<0.5	<1	<2	<1	<1
BH 6	0.2-0.3	<25	<50	<100	<100	<250	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<1
BH 9	0.1-0.2	<25	<50	370	460	<250	<25	<50	710	440	<0.2	<0.5	<1	<2	<1	<1
BH 10	0.1-0.2	<25	<50	<100	<100	<250	<25	<50	<100	<100	<0.2	<0.5	<1	<2	<1	<1
BH 12	0.2-0.3	<25	<50	180	<100	<250	<25	<50	200	100	<0.2	<0.5	<1	<2	<1	<1
HSLs 'A and B' Criteria (CLAY) 0m to <1m							**50**	**280**			**0.7**	**480**	**480**	**110**		**5**
1m to <2m							**90**				**1**			**310**		
2m to < 4m							**150**				**2**					
4m+							**290**				**3**					
ESL Criteria							**180**	**120**	**1300**	**5600**	**65**	**105**	**125**	**45**		

Notes

1) All results are expressed as mg/kg unless otherwise specified

2) Figures in bold exceed the HSLs 'A and B' Criteria

3) ND Not detected

4) F1 is C_6-C_{10} minus the sum of the BTEX concentrations

5) F2 is $>C_{10}$-C_{16} Minus Napthalene

6) Figures in bold italics exceed the ESL Criteria

GeoEnviro Consultancy

TABLE 5

Summary of Analytical Results - TRH and VOC

JDH Architects

Proposed School Upgrade

Bankstown North Public School

Sample	Depths (m)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(a)pyrene TEQ	Total PAHs
BH 1	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	0.2	0.3	0.1	0.1	<0.1	0.1	<0.5	1.3
BH 2	0.2-0.3	<0.1	0.1	0.2	0.1	2.5	0.4	3.4	3.2	1.4	1.3	2.1	***1.4***	0.7	0.2	0.9	2	19.9
BH 3	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	0.1	0.3	0.2	<0.1	<0.1	0.1	<0.5	1.2
BH 5	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	0.1	0.2	0.1	0.1	<0.1	0.2	<0.5	1.1
BH 6	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.5	ND
BH 9	0.1-0.2	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.2	<0.05	<0.1	<0.1	<0.1	<0.5	0.3
BH 10	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.5	ND
BH 12	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.5	ND
HBILs 'A' Criteria		**3**															**3***	**300**
ESL Criteria													**0.7**					

Notes

1) All results are expressed as mg/kg

2) Figures in bold italics exceed the ESL Criteria

3) Figures in bold italics that have been underlined exceed the HBIL 'A' Criteria

* B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products

PAH Species	TEF
Benzo(a)anthracene	0.1
Benzo(a)pyrene	1
Benzo(b+j)fluoranthene	0.1
Benzo(k)fluoranthene	0.1
Benzo(g,h,i)perylene	0.01
Chrysene	0.01
Dibenzo(a,h)anthracene	1
Indeno(1,2,3-c,d)pyrene	0.1

GeoEnviro Consultancy

TABLE 6
Summary of Analytical Results - PAH

JDH Architects
Proposed School Upgrade
Bankstown North Public School

Sample	Depths (m)	Asbestos
BH 1	0.4-0.5	ND
BH 2	0.2-0.3	ND
BH 3	0.2-0.3	ND
BH 5	0.1-0.2	ND
BH 6	0.2-0.3	ND
BH 9	0.1-0.2	ND
BH 10	0.1-0.2	ND
BH 12	0.2-0.3	ND
HBILs 'A' Criteria		**0.01% / 0.001%** [1]

Note: ND = Not detected

Measured in %w/w

1) Bonded Asbestos Contaminaint Material / Fiberous Asbestos and Asbestos Fines

2) Figures in bold italics exceed the HBILs 'A' Criteria

GeoEnviro Consultancy

TABLE 7

Summary of Analytical Results - Asbestos

JDH Architects

Proposed School Upgrade

Bankstown North Public School

APPENDIX A

Borehole Reports

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Borehole Report

Borehole no: 1

Client: JDH Architects
Job no: JG18129A

Project: Proposed School Upgrade
Date: 2-3/10/18

Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Topsoil/Fill: Clayey Silt: low liquid limit, brown with fine to medium grained gravel and fine grained sand	D			
						CI-CH	Silty Clay: medium to high plasticity, brown and grey	D			
				1.0							
			6,12/70mm N>12			CI	Silty Clay: medium plasticity, brown grey with ironstone bands	D-M	H	>600	SPT bouncing at 1.22m
TC				2.0							
							Shale/Siltstone: grey and brown, low strength extremely weathered to distinctly weathered				
							As above but medium strength				
				3.0			End of BH 1 at 2.8m				Near TC Refusal
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Borehole Report

Borehole no: 2

Client: JDH Architects

Job no: JG18129A

Project: Proposed School Upgrade

Date: 2-3/10/18

Location: Bankstown North Public School

Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt: 70mm.t				
				1.0			Crushed Rock				
				2.0							BH terminated at 2.0m due to possible service
							End of BH 2 at 2.0m				
				3.0							
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Borehole Report

Borehole no: 3

Client: JDH Architects
Job no: JG18129A
Project: Proposed School Upgrade
Date: 2-3/10/18
Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -
Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Topsoil/Fill: Clayey Silt: low liquid limit, brown with fine to medium grained gravel	D			
			3,5,7 N=12	1.0		CI-CH	Silty Clay: medium to high plasticity, brown red grey	D-M	H	480 490	
						CI	Silty Clay: medium plasticity, grey				
			9,12/70mm	2.0			As above but with shale bands	D			V bit refusal at 2.8m
TC			N>12	3.0			Shale: grey-dark grey with siltstone bands, low strength with some medium strength bands, extremely to distinctly weathered				SPT bouncing at 2.72m
				4.0			As above medium strength				TC bit refusal at 4.5m
				5.0			End of BH 3 at 4.5m				
				6.0							
				7.0							
				8.0							

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Borehole Report

Borehole no: 4

Client: JDH Architects
Job no: JG18129A

Project: Proposed School Upgrade
Date: 2-3/10/18

Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt & Roadbase				
							Fill: Clayey Silt: low liquid limit, brown	D			
						CH	Silty Clay: high plasticity, red brown	D	(H)		SPT bouncing at 1.18m
				1.0							
			13,12/30mm			CI	Silty Clay: medium plasticity, grey brown with trace of siltstone bands	D	H		V bit refusal at 1.2m
TC			N>12				Shale/Siltstone: grey brown, low to medium strength, extremely weathered to distinctly weathered				TC bit refusal at 1.8m
				2.0			End of BH 4 at 1.8m				
				3.0							
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Borehole Report

Borehole no: 5

Client: JDH Architects
Job no: JG18129A

Project: Proposed School Upgrade
Date: 2-3/10/18

Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt & Crushed Rock				
							Fill: Clayey Silt: low liquid limit, brown	D			
				1.0		CI-CH	Silty Clay: medium to high plasticity, red brown	D-M	H	>600	
			6,10,11 N=21			CI	Silty Clay: medium plasticity, brown red with ironstone bands				
				2.0			As above but grey	D			V bit refusal at 2.2m
TC							As above but with shale bands				SPT bouncing at 2.58m
			12/80mm N>12	3.0			Shale: grey brown, low to medium strength, extremely weathered to distinctly weathered				
							As above but medium strength				TC bit refusal at 3.2m
							End of BH 5 at 3.2m				
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 6

Client: JDH Architects
Job no: JG18129A
Project: Proposed School Upgrade
Date: 2-3/10/18
Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -
Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt: 60mm.t, Crushed Rock: 150mm.t				
						CH	Silty Clay: high plasticity, red brown	D-M			
				1.0							
			5,12,19 N=31			CI-CH	Silty Clay: medium to high plasticity, red and grey		H	>600	
						CI	Silty Clay: medium plasticity, grey brown with ironstone gravel bands	D			V bit refusal at 1.6m
TC				2.0							
							Shale/Siltstone: grey and brown, low strength with some medium strength bands, extremely to distinctly weathered				
				3.0			As above but medium strength				TC bit refusal at 3.0m
							End of BH 6 at 3.0m				
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 7

Client: JDH Architects

Job no: JG18129A

Project: Proposed School Upgrade

Date: 2-3/10/18

Location: Bankstown North Public School

Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt: 40mm.t, Crushed Rock: 150mm.t				
						CH	Silty Clay: high plasticity, red brown	D			
									(H)		
				1.0		CI	Silty Clay: medium plasticity, grey brown				
			6,18/100mm N>18								SPT bouncing at 1.25m
TC							Siltstone: brown, low strength, extremely weathered with clay bands				V bit refusal at 1.6m
				2.0							
							Shale/Siltstone: grey and brown, low strength extremely weathered to distinctly weathered				
				3.0			As above but medium strength				TC bit refusal at 3.0m
							End of BH 7 at 3.0m				
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 8

Client: JDH Architects
Job no: JG18129A
Project: Proposed School Upgrade
Date: 2-3/10/18
Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -
Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Fill: Clayey Silt: low liquid limit, brown	D			
						CI	Silty Clay: medium plasticity, grey brown	D-M			
				1.0							
			2,3,6 N=9						H	>600	
							As above but with trace of ironstone bands				
				2.0							V bit refusal at 2.4m
TC							As above but with shale bands		H	>600	SPT bouncing at 2.65m
			11/150mm N>11				Siltstone: grey, low to medium strength, extremely weathered to distinctly weathered				
				3.0			Shale: grey, low strength with some bands of medium strength shale, extremely to distincly weathered				
				4.0			As above but medium strength				TC bit refusal at 4.6m
							End of BH 8 at 4.6m				
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 9

Client: JDH Architects

Job no: JG18129A

Project: Proposed School Upgrade

Date: 2-3/10/18

Location: Bankstown North Public School

Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt: 50mm.t, Crushed Rock 200mm.t				
						CI-CH	Silty Clay: medium to high plasticity, red brown	D-M			
			7,19,12 /30mm N>31	1.0		CI	Silty Clay: medium plasticity, grey brown with ironstone gravel	D	H	>600	SPT bouncing at 1.33m
				2.0							V bit refusal at 2.2m
TC						CI	Shaley Clay: medium plasticity, grey brown with shale bands				
			11,20/130mm N>20	3.0			Shale: grey brown, low strength, extremely weathered to distinctly weathered with siltstone bands				SPT bouncing at 2.78m
							As above but medium strength				TC bit refusal at 3.5m
							End of BH 9 at 3.5m				
				4.0							
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 10

Client: JDH Architects
Job no: JG18129A

Project: Proposed School Upgrade
Date: 2-3/10/18

Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -

Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Asphalt & Roadbase				
						CI-CH	Silty Clay: medium to high plasticity, grey brown	M			
				1.0		CI	Silty Clay: medium plasticity, grey brown	M-W			
			1,2,3 N=5						St	150	
				2.0			As above but with ironstaining	M			
								D			SPT bouncing at 2.69m
TC			10,8/40mm N>8	3.0			Shale: grey brown, low strength, extremely weathered to distinctly weathered				V bit refusal at 2.6m
							As above but with some medium strength bands				
				4.0			As above but medium strength				TC bit refusal at 4.0m
							End of BH 10 at 4.0m				
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 11

Client: JDH Architects
Job no: JG18129A
Project: Proposed School Upgrade
Date: 2-3/10/18
Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -
Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Topsoil/Fill: Clayey Silt: low liquid limit, brown with trace of gravel	D			
						CH	Silty Clay: high plasticity, red brown	D			
				1.0		CI	Silty Clay: medium plasticity, grey brown				
			7,10,12 N=22						H	>600	
				2.0			As above but grey				
											SPT bouncing at 2.64m
			13/140mm N>13	3.0			As above but with shale bands		H	>600	V bit refusal at 3.0m
TC							Shale: grey brown, low strength, extremely weathered to distinctly weathered				
				4.0			As above but with some medium strength bands				
							As above but medium strength				
							End of BH 11 at 4.6m				
				5.0							
				6.0							
				7.0							
				8.0							

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Borehole Report

Borehole no: 12

Client: JDH Architects
Job no: JG18129A
Project: Proposed School Upgrade
Date: 2-3/10/18
Location: Bankstown North Public School
Logged by: SG

Drill Model and Mounting: TCH05 | Slope: 90° | R.L. Surface: -
Hole Diameter: 100mm | Bearing: Vertical | Datum: AHD

Method	Support	Water	Notes: Samples, Tests, etc	Depth(m)	Classification Symbol	Unified Soil Classification	Material Description (Soil Type, Plasticity or Particle Characteristic, colour, secondary and minor component)	Moisture Content	Consistency/Density Index	Hand Penetrometer kPa	Structure and Additional Observations
V	NIL	DRY					Topsoil/Fill: Clayey Silt: low liquid limit, brown				
						CH	Silty Clay: high plasticity, red brown	D-M			
				1.0		CI	Silty Clay: medium plasticity, grey brown with ironstone bands		VSt	350	
			5,13,13 N=26								
				2.0			As above but with shale gravel		H	>600	
TC			3,16/150mm N>16	3.0			Shale: dark grey, low strength, extremely weathered				SPT bouncing at 2.8m V bit refusal at 3.0m
							As above but low to medium strength, extremely weathered to distinctly weathered				
				4.0			As above but distinctly weathered				TC bit refusal at 4.1m
							End of BH 12 at 4.1m				
				5.0							
				6.0							
				7.0							
				8.0							

APPENDIX B

Sampling Quality Assurance Plan

SAMPLING LOCATION AND RECORDING

The position of all sampling points shall be approximated with reference to site features and boundaries and recorded on a site plan. All sampling locations shall be labelled with a unique number with prefix as follows;

- BH - Boreholes including hand auger boreholes
- TP – Test pit excavation

Soil types shall be recorded in accordance with the geotechnical classifications detailed in AS1726-1993 Geotechnical Site Investigations. A field log shall record the following but not limited to the following information;

- Profile type – fill, natural, bedrock etc
- Depths of profile type
- Soil classification including composition, properties and characteristics.
- Groundwater conditions.
- Depths of samples collected.
- Unusual or unexpected conditions including odour, colour etc.

SOIL SAMPLING

Sampling equipment used shall be in sound working order and free of oil leaks. Soil samples recovered from the testpits were collected directly from an undisturbed lump of soil from the backhoe bucket. Care was taken to ensure that cross contamination between samples do not occur

Immediately after collection, samples were placed in new jars and stored in cooled conditions while in the field and in transit to the laboratory.

Field personnel will be responsible for the labelling of all sample containers. Labelling shall be completed using permanent markers. Each sample shall be labelled with the following information;

- Project Number
- Sample Identification Number.
- Sampling depth.

SAMPLE CUSTODY

A Laboratory Test Request & Chain of Custody (COC) form shall be completed for each sample set collected. The form is maintained as a record of sample collection, transfer, shipment and receipt by the laboratory. When physical possession of samples is transferred, both the individual relinquishing the samples and the individual receiving them shall sign, date and record the time on the COC.

Any samples damage shall be reported to the field personnel so that resampling could take place.

APPENDIX C

EPA Searches, Groundwater Bores & Section 10.7(2)

Search results

Your search for:LGA: Bankstown City Council

Matched 31 notices relating to 9 sites.

Search Again

Refine Search

Suburb	Address	Site Name	Notices related to this site
CHESTER HILL	127 Orchard ROAD	Former Orica, Chester Hill	4 former
PADSTOW	55 Bryant STREET	Exide	2 current and 1 former
REVESBY	33-35 Violet STREET	Bituminous Products	2 current and 1 former
REVESBY	21 Marigold STREET	Mirotone Pty Ltd	2 current
VILLAWOOD	66 Christina ROAD	Former Electrical Component Manufacturer	1 current and 4 former
VILLAWOOD	2 Christina ROAD	Former Orica Crop Care	2 current and 1 former
VILLAWOOD	49 Miowera ROAD	Former Siemens/Westinghouse	9 former
VILLAWOOD	110A Christina ROAD	Nepotian (Former Toll) Site	1 current
YAGOONA	117-153 Rookwood ROAD	Galserv Galvanising Services	1 current

Page 1 of 1

19 October 2018

NSW Office of Water
Work Summary

GW112136

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 30/01/2003 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246651.0 **Latitude:** 33°54'18.0"S
Elevation Source: Unknown **Easting:** 318953.0 **Longitude:** 151°02'30.6"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work type, status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112135

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 28/11/2001 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246635.0 **Latitude:** 33°54'18.5"S
Elevation Source: Unknown **Easting:** 318961.0 **Longitude:** 151°02'30.9"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work type, status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112134

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 29/01/2003 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246619.0 **Latitude:** 33°54'19.0"S
Elevation Source: Unknown **Easting:** 318958.0 **Longitude:** 151°02'30.8"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work type, status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112133

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 29/01/2003 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246625.0 **Latitude:** 33°54'18.8"S
Elevation Source: Unknown **Easting:** 318963.0 **Longitude:** 151°02'31.0"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work type, status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112132

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 02/04/2013 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246645.0 **Latitude:** 33°54'18.2"S
Elevation Source: Unknown **Easting:** 318958.0 **Longitude:** 151°02'30.8"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated work type, status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112131

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 28/01/2003 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246623.0 **Latitude:** 33°54'18.9"S
Elevation Source: Unknown **Easting:** 318968.0 **Longitude:** 151°02'31.2"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW112130

Licence: 10BL161854 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:**
Completion Date: 28/01/2003 **Drilled Depth:**

Contractor Name:
Driller: Unkown Unknown
Assistant Driller:

Property: 7-ELEVEN 301 HUME HWY BANKSTOWN 2200 NSW **Standing Water Level:**
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1 575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246623.0 **Latitude:** 33°54'18.9"S
Elevation Source: Unknown **Easting:** 318932.0 **Longitude:** 151°02'29.8"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated status, drill method & drilled depth.

NSW Office of Water
Work Summary

GW109735

Licence: 10BL162770 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Well
Work Status:
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:** 11.00 m
Completion Date: 04/12/2003 **Drilled Depth:** 11.00 m

Contractor Name: IT ENVIRONMENTAL
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: MOBIL OIL CNR HUME HIGHWAY & BORONIA RD GREENACRE 2190 **Standing Water Level:** 9.100
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246624.0 **Latitude:** 33°54'18.9"S
Elevation Source: Unknown **Easting:** 318969.0 **Longitude:** 151°02'31.2"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	11.00	100			Unknown
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	Pvc Class 18	0.00	6.30	50	49		
1	1	Opening	Screen	6.20	11.00	50		1	PVC

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.15	0.15	CONCRETE	Conglomerate	
0.15	2.10	1.95	FILL	Fill	
2.10	4.30	2.20	CLAY	Clay	
4.30	11.00	6.70	SHALE	Shale	

NSW Office of Water
Work Summary

GW109734

Licence: 10BL162770 **Licence Status:** ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Well
Work Status:
Construct.Method:
Owner Type: Private

Commenced Date: **Final Depth:** 4.00 m
Completion Date: 03/11/2003 **Drilled Depth:** 4.00 m

Contractor Name: Macquarie Drilling
Driller: Bryan Patrick Clancy
Assistant Driller:

Property: MOBIL OIL CNR HUME HIGHWAY & BORONIA RD GREENACRE 2190 **Standing Water Level:** 1.800
GWMA: **Salinity:**
GW Zone: **Yield:**

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBE	CUMBE.3	1//575922
Licensed:			

Region: 10 - Sydney South Coast **CMA Map:**
River Basin: - Unknown **Grid Zone:** **Scale:**
Area/District:

Elevation: 0.00 m (A.H.D.) **Northing:** 6246624.0 **Latitude:** 33°54'18.9"S
Elevation Source: Unknown **Easting:** 318933.0 **Longitude:** 151°02'29.8"E

GS Map: - **MGA Zone:** 0 **Coordinate Source:** Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	P.V.C.	0.00	1.00	60			Screwed
1	1	Opening	Screen	1.00	4.00	60		1	PVC, Screwed

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.20	0.20	CONCRETE	Conglomerate	
0.20	2.40	2.20	FILL	Fill	
2.40	4.00	1.60	CLAY	Clay	

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PLANNING CERTIFICATE

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Geoenviro Consultancy Pty Ltd
PO Box 1543
NORTH RYDE NSW 2113

CERTIFICATE DETAILS

NUMBER	20183843	**DATE**	16-Oct-2018

RECEIPT AND REFERENCE DETAILS

FEE	$53.00		
RECEIPT NUMBER	4014457	**RECEIPT DATE**	11-Oct-2018
REFERENCE	JG18129A:42463		

PROPERTY DESCRIPTION

PROPERTY	322 Hume Highway, BANKSTOWN NSW 2200		
TITLE	Lot 14 DP 1000689		
PARISH	Liberty Plains	**COUNTY**	CUMBERLAND

PLANNING INSTRUMENTS

In accordance with Section 10.7(2) and at the date of this certificate the following Environmental Planning Instruments apply to the land.

Bankstown Local Environmental Plan 2015 Gazetted on 05-Mar-2015

LAND ZONING

SP2 Infrastructure: Educational Establishment

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SECTION 10.7(2) DETAILS

In accordance with section 10.7(2) of the Environmental Planning and Assessment Act 1979 (as amended) and at the date of this certificate, the following prescribed matters relate to the land.

1. NAMES OF RELEVANT PLANNING INSTRUMENTS AND DCPs

Affected by Bankstown Local Environmental Plan 2015 Amendments and Planning Proposals in respect of general information as detailed in Appendix 1.

Affected by State Environmental Planning Policies (SEPP's), Proposed State Environmental Planning Policies and Deemed State Environmental Planning Policies as detailed in Appendix 2.

Affected by Bankstown Development Control Plan 2015 (refer to Appendix 3 which lists the contents chapters within the DCP).

2. ZONING AND LAND USE UNDER RELEVANT LEPs

Unless specified otherwise in this section of the certificate, the land does not include or comprise critical habitat, is not in a conservation area and has no environmental heritage item on the land.

The purposes for which the plan or instrument provides that development may be carried out within the zone without the need for development consent are specified in clause 3.1 of the LEP 2015 plan and the land use table as detailed in Appendix 4. Reference should be made to the LEP 2015 plan as a whole for details.

The purposes for which the plan or instrument provides that development may not be carried out within the zone except with development consent are specified in Part 2 and clause 3.2 of the LEP 2015 plan and detailed in Appendix 4. Reference should be made to the LEP 2015 plan as a whole for details.

The purposes for which the plan or instrument provides that development is prohibited within the zone are specified in Part 2 and clauses 4.1A-2(c), 4.1B-2(4), 6.6 and 6.8 of the LEP 2015 plan and detailed in Appendix 4. Reference should be made to the LEP 2015 plan as a whole for details.

2A. ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

Unless specified otherwise in this section of the certificate, the land is not within any zone or land use under a Precinct Plan, a proposed Precinct Plan or Part 3 of State Environmental Planning Policy (Sydney Region Growth Centres) 2006.

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3. COMPLYING DEVELOPMENT

Housing Code

Complying development under the Housing Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may not** be carried out on the land.
The land is non complying because the land has been identified by an environmental planning instrument as being either one of the following zones:-

- B5 Business Development, B6 Enterprise Corridor, B7 Business Park
- IN1 General Industrial, IN2 Light Industrial
- SP1 Special Activities, SP2 Infrastructure
- RE1 Public Recreation, RE2 Private Recreation
- E1 National Park and Nature Reserves
- Land unzoned under LEP 2015.....*refer to the Land Zoning of this certificate on page 1.*

OR
The land is affected by one or more of the following 4 exemptions:-

- A Heritage item ..... *refer to clause 2 of this certificate,*
- Land in the 25 or higher ANEF contour ..... *refer to clause 7 of this certificate,*

(Unless the development is only for the erection of ancillary development, the alteration of or an addition to ancillary development or the alteration of a dwelling house)

- Acid sulfate soils class 1 or 2 ..... *refer to clause 7 of this certificate,*
- Land in a vegetated buffer area ..... *refer to clause 7 of this certificate.*

Note: If the land has been rendered non complying due to an exemption listed above, you are advised to check with Council for the extent of the exemption. The Code may render the land complying for any land which is outside the extent of the exemption. Reference should be made to the "Planning Maps" on Council's website www.bankstown.nsw.gov.au which identifies the land exemptions.

Housing Alterations Code

Complying development under the Housing Alterations Code within the provisions of "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may not** be carried out on the land.
The land is non complying because the land has been identified by an environmental planning instrument as being either one of the following zones:-

- B5 Business Development, B6 Enterprise Corridor, B7 Business Park
- IN1 General Industrial, IN2 Light Industrial
- SP1 Special Activities, SP2 Infrastructure
- RE1 Public Recreation, RE2 Private Recreation
- E1 National Park and Nature Reserves
- Land unzoned under LEP 2015.....*refer to the Land Zoning of this certificate on page 1.*

OR
The land is affected by the following exemption:-

- A Heritage item .....*refer to clause 2 of this certificate.*

Note: If the land has been rendered non complying due to an exemption listed above, you are advised to check with Council for the extent of the exemption. The Code may render the land complying for any land which is outside the extent of the exemption. Reference should be made to the "Planning Maps" on Council's website www.bankstown.nsw.gov.au which identifies the land exemptions.

Subdivisions Code (strata subdivision)

Complying development under the Subdivisions Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may** be carried out on the land.

Rural Housing Code

Complying development under the Rural Housing Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may not** be carried out on the land.
The land is non complying because the land has been identified by an environmental planning instrument as being either one of the following zones:-

- R2 Low Density Residential, R3 Medium Density Residential, R4 High Density Residential
- B1 Neighbourhood Centre, B2 Local Centre, B4 Mixed Use, B5 Business Development, B6 Enterprise Corridor, B7 Business Park
- IN1 General Industrial, IN2 Light Industrial
- SP1 Special Activities, SP2 Infrastructure
- RE1 Public Recreation, RE2 Private Recreation
- E1 National Park and Nature Reserves

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- Land unzoned under LEP 2015..... *refer to the Land Zoning of this certificate on page 1.*

OR

The land is affected by one or more of the following 4 exemptions:-

- A Heritage item ..... *refer to clause 2 of this certificate,*
- Land in the 25 or higher ANEF contour..... ..... *refer to clause 7 of this certificate,*

(Unless the development is only for the erection of ancillary development, the alteration of or an addition to ancillary development or the alteration of a dwelling house)

- Acid sulfate soils class 1 or 2 ..... *refer to clause 7 of this certificate,*
- Land in a vegetated buffer area ..... *refer to clause 7 of this certificate,*

Note: If the land has been rendered non complying due to an exemption listed above, you are advised to check with Council for the extent of the exemption. The Code may render the land complying for any land which is outside the extent of the exemption. Reference should be made to the "Planning Maps" on Council's website www.bankstown.nsw.gov.au which identifies the land exemptions.

General Development Code

Complying development under the General Development Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may** be carried out on the land.

Demolition Code

Complying development under the Demolition Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may** be carried out on the land.

Fire Safety Code

Complying development under the Fire Safety Code within "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may** be carried out on the land.

Commercial and Industrial Alterations Code

Complying development under the Commercial and Industrial Alterations Code within the provisions of "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may not** be carried out on the land.

The land is non complying because the land has been identified by an environmental planning instrument as being either one of the following zones:-

- RU4 Primary Production Small Lots
- R2 Low Density Residential, R3 Medium Density Residential, R4 High Density Residential
- SP1 Special Activities, SP2 Infrastructure
- RE1 Public Recreation, RE2 Private Recreation
- E1 National Park and Nature Reserves
- Land unzoned under LEP 2015..... *refer to the Land Zoning of this certificate on page 1.*

OR

The land is affected by one of the following exemptions:-

- A Heritage item ..... *refer to clause 2 of this certificate.*
- A Flood Control Lot .....*refer to clause 7A of this certificate.*

Note: If the land has been rendered non complying due to an exemption listed above, you are advised to check with Council for the extent of the exemption. The Code may render the land complying for any land which is outside the extent of the exemption. Reference should be made to the "Planning Maps" on Council's website www.bankstown.nsw.gov.au which identifies the land exemptions.

Further: Although the land is non complying for Subdivisions 9 & 10, the Code may render the land complying for Subdivisions 1-8 and 11-12. Reference should be made to "Part 5 – Commercial and Industrial Alterations Code" of the SEPP for details.

Commercial and Industrial (New Buildings and Additions) Code

Complying development under the Commercial and Industrial (New Buildings and Additions) Code within the provisions of "State Environmental Planning Policy (Exempt and Complying Development Codes) 2008" **may not** be carried out on the land.

The land is non complying because the land has been identified by an environmental planning instrument as being either one of the following zones:-

- RU4 Primary Production Small Lots
- R2 Low Density Residential, R3 Medium Density Residential, R4 High Density Residential
- SP1 Special Activities, SP2 Infrastructure
- RE1 Public Recreation, RE2 Private Recreation

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- E1 National Park and Nature Reserves
- Land unzoned under LEP 2015.....*refer to the Land Zoning of this certificate on page 1.*

OR

The land is affected by one of the following exemptions:-

- A Heritage item ..... *refer to clause 2 of this certificate.*
- Acid Sulfate Soils class 1 or 2 .....*refer to clause 7 of this certificate*
- A Vegetated Buffer Area.....*refer to clause 7 of this certificate*

Note: If the land has been rendered non complying due to an exemption listed above, you are advised to check with Council for the extent of the exemption. The Code may render the land complying for any land which is outside the extent of the exemption. Reference should be made to the "Planning Maps" on Council's website www.bankstown.nsw.gov.au which identifies the land exemptions.

4. COASTAL PROTECTION

Unless specified otherwise in this section of the certificate, the land is not affected by the operation of Section 38 or 39 of the Coastal Protection Act 1979.

4A. CERTAIN INFORMATION RELATING TO BEACHES AND COASTS

Unless specified otherwise in this section of the certificate, the land is not subject to an order under Part 4D of the Coastal Protection Act 1979 in relation to temporary coastal protection works (or on public land adjacent to the land) and, Council has not been notified under Section 55X of the Coastal Protection Act 1979 that temporary coastal protection works have been placed on the land (or on public land adjacent to the land).

4B. ANNUAL CHARGES UNDER LOCAL GOVERNMENT ACT 1993 FOR COASTAL PROTECTION SERVICES THAT RELATE TO EXISTING COASTAL PROTECTION WORKS

Unless specified otherwise in this section of the certificate, the owner (or any previous owner) has not consented in writing that the land is subject to annual charges under Section 496B of the Local Government Act 1993 for coastal protection services that relate to existing coastal protection works.

5. MINE SUBSIDENCE

Not affected by Section 15 of the Mine Subsidence Compensation Act 1961, proclaiming land to be a mine subsidence district.

6. ROAD WIDENING AND REALIGNMENT

Not affected by any road widening or road realignment under (1) Division 2 of Part 3 of the Roads Act 1993; or (2) any Environmental Planning Instrument; or (3) any resolution of Council. However, the property fronts an existing or proposed arterial/main road. Please check with the Roads and Maritime Services for possible effects.

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7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS

Unless specified otherwise in this section of the certificate, the land is not affected by policies adopted by Council or by any other authority (that has notified Council of its adoption) that restricts development of the land. For bush fire prone land refer to section 11. For flood prone land refer to section 7A.

Affected by a resolution of Council adopting a policy concerning the management of contaminated land. That policy applies to all land in the City of Canterbury-Bankstown and will restrict development of the land if the circumstances set out in the policy prevail. A copy of the policy is available on Council's website at www.bankstown.nsw.gov.au or from the Customer Service Area.

Note: Additional information regarding contaminated land matters for this property may also be provided on part 5 of this section 10.7 planning certificate. For further information contact Council on 9707 9000.

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

Unless specified otherwise in this section of the certificate, the land is not affected by flood related development controls.

A Flood control lot.

The property is affected by a policy known as Bankstown Development Control Plan 2015, Part B12 - Flood Risk Management and clause 6.3 – Flood planning of the LEP 2015, by reference to the Rookwood Road Catchment Flood Study, February 2010 (a copy of which is available for inspection at Council's Offices), which categorises land affected by the 100 year flood into two flood risk precincts:

- High flood risk precinct – Land below the 100 year flood that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties; and
- Medium flood risk precinct - Land below the 100 year flood that is not subject to a high hydraulic hazard and where there are no evacuation difficulties.

Bankstown Development Control Plan 2015 includes flood related development controls for properties based on the relevant flood risk precinct. Contact Council for information about the flood risk precinct applying to this property.

8. LAND RESERVED FOR ACQUISITION

Not affected by either an Environmental Planning Instrument or proposed Environmental Planning Instrument referred to in clause 5.1 providing for the acquisition of the land or part of the land by a public authority, as referred to in Section 27 of the Environmental Planning & Assessment Act. Reference should be made to the LEP 2015 plan as a whole for details.

9. CONTRIBUTION PLANS

Affected by Bankstown City Council Section 94A Development Contributions Plan 2009 which allows Council to impose a levy on development within the City of Canterbury-Bankstown in accordance with Directions issued by the Minister for Planning. The levy will be spent on the provision of public works and infrastructure. Date of commencement 8th June 2009. For further details on the plan contact Council on 9707 9000 or visit Council's website – www.bankstown.nsw.gov.au

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9A. BIODIVERSITY CERTIFIED LAND

Unless specified otherwise in this section of the certificate, the land is not biodiversity certified land within the meaning of Part 7AA of the Threatened Species Conservation Act 1995.

10. BIOBANKING AGREEMENTS

Unless specified otherwise in this section of the certificate, the land is not subject to a Biobanking Agreement under Part 7A of the Threatened Species Conservation Act 1995, made by the Department of Environment, Climate Change and Water that has notified Council of the existence of the agreement.

11. BUSHFIRE PRONE LAND

Unless specified otherwise in this section of the certificate, the land is not bushfire prone.

12. PROPERTY VEGETATION PLANS

Unless specified otherwise in this section of the certificate, the land is not subject to a Property Vegetation Plan under the Native Vegetation Act 2003, as approved by any other authority that has notified Council of the existence of the plan.

13. ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

Unless specified otherwise in this section of the certificate, the land is not subject to a Tree Order under the Trees (Disputes Between Neighbours) Act 2006, made by an authority that has notified Council of the existence of the order.

14. DIRECTIONS UNDER PART 3A

Unless specified otherwise in this section of the certificate, the land is not subject to a Direction by the Minister under section 75P (2) (c1) of the Act that a provision of an EPI does not have an effect.

15. CONDITIONS AFFECTING SENIORS HOUSING

Unless specified otherwise in this section of the certificate, the land is not subject to a development application granted after 12.10.2007 under SEPP (Housing for Seniors or People with a Disability) 2004 setting out the terms of any conditions imposed under clause 18(2) or a current site compatibility certificate issued under clause 25 of the SEPP.

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16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

Unless specified otherwise in this section of the certificate, the land is not subject to a development application under clause 19 of SEPP (Infrastructure) 2007 where a valid site compatibility certificate has been issued.

17. SITE COMPATIBILITY CERTIFICATES & CONDITIONS FOR AFFORDABLE RENTAL HOUSING

Unless specified otherwise in this section of the certificate, the land is not subject to a development application under SEPP (Affordable Rental Housing) 2009 where a valid site compatibility certificate and conditions have been issued.

18. PAPER SUBDIVISION INFORMATION

Unless specified otherwise in this section of the certificate, the land is not subject to a paper subdivision or subdivision order.

19. SITE VERIFICATION CERTIFICATES

Unless specified otherwise in this section of the certificate, the land is not subject to a current site verification certificate of which the Council is aware in respect to Division 3 of Part 4AA of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

20. LOOSE–FILL ASBESTOS INSULATION

A residential dwelling erected on this land has not been identified in the Loose–Fill Asbestos Insulation Register as containing loose–fill ceiling insulation. Contact NSW Fair Trading for more information.

MATTERS ARISING UNDER THE CONTAMINATED LAND MANAGEMENT ACT, 1997

Unless specified otherwise in this section of the certificate, there are no matters arising under Section 59(2) of the Contaminated Land Management Act 1997.

MATTERS ARISING UNDER THE NATION BUILDING AND JOBS PLAN (STATE INFRASTRUCTURE DELIVERY) ACT, 2009

Unless specified otherwise in this section of the certificate, there are no matters arising under Section 26 of the Nation Building and Jobs Plan (State Infrastructure Delivery) Act 2009.

This completes the prescribed matters for the certificate under section 10.7(2) of the Environmental Planning and Assessment Act 1979, as amended. While this certificate indicates the zoning of the land, it is suggested that the relevant Planning Instrument be inspected on Council's website under Development – Planning Maps or at Council's Customer Service Centre to provide an overall view of the area and the site's surrounding zonings.

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Please contact Council's general enquiries number listed at the bottom of this sheet for further information about any matter referred to in this certificate.

M. Ratkun

Melissa Ratkun
Manager Information Management

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Appendix 1

Bankstown Local Environmental Plan 2015 Amendments & Planning Proposals.

(relating to general information only which may affect part or the whole of the City)

Note: As of 1 July 2009, Draft LEP's have been replaced with "Planning Proposals". A planning proposal is a document that explains the intended effect of, and justification for, a proposed LEP.

Nil

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Appendix 2

State Environmental Planning Policies (SEPP's), Proposed SEPP's and Deemed SEPP's

Note: The names of the relevant instrument's plus their gazettal dates are listed below. For further details please refer to the Department of Planning website www.planning.nsw.gov.au under the heading "Planning System – Legislation and Planning Instruments".

SEPP No.19 – Bushland in Urban Areas, gazetted 24.10.1986
SEPP No.21 – Caravan Parks, gazetted 24.4.1992
SEPP No.30 – Intensive Agriculture, gazetted 8.12.1989
SEPP No.32 – Urban Consolidation (Redevelopment of Urban Land), gazetted 15.11.1991
SEPP No.33 – Hazardous and Offensive Development, gazetted 13.3.1992
SEPP No.50 – Canal Estate Development, gazetted 10.11.1997
SEPP No.55 – Remediation of Land, gazetted 28.8.1998
SEPP No.62 – Sustainable Aquaculture, gazetted 25.8.2000
SEPP No.64 – Advertising and Signage, gazetted 16.3.2001
SEPP No.65 – Design Quality of Residential Flat Development, gazetted 26.7.2002
SEPP – (Housing for Seniors or People with a Disability) 2004, gazetted 31.3.2004
SEPP – (Building Sustainability Index: BASIX) 2004, gazetted 25.6.2004
SEPP – (Major Development) 2005, gazetted 1.8.2005
SEPP – (Mining, Petroleum Production and Extractive Industries) 2007, gazetted 16.2.2007
SEPP – (Miscellaneous Consent Provisions) 2007, gazetted 26.10.2007
SEPP – (Infrastructure) 2007, gazetted 21.12.2007
SEPP – (Exempt and Complying Development Codes) 2008, gazetted 12.12.2008
SEPP – (Affordable Rental Housing) 2009, gazetted 31.7.2009
SEPP – (Sydney Drinking Water Catchment) 2011, gazetted 21.1.2011

PROPOSED SEPP - Competition SEPP, 27.7.2010

Note: As of 1 July 2009, regional environmental plans (REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. The removal of the REP layer is intended to simplify the State's planning system. All existing REPs (listed below) are now deemed State environmental planning policies (SEPPs).

Deemed SEPP – Greater Metropolitan Regional Environmental Plan No. 2 – Georges River Catchment, gazetted 5.2.1999

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Appendix 3

Bankstown Development Control Plan 2015

DATE OF COMMENCEMENT – 13th May 2015

The following is a list of the contents within Bankstown Development Control Plan 2015. If further information is required please contact Council on 9707 9000.

INTRODUCTION	
PART A	**PRECINCT CONTROLS**
A1	Centres
A2	Corridors
A3	Key infill development sites
PART B	**GENERAL CONTROLS**
B1	Residential development
B2	Commercial centres
B3	Industrial precincts
B4	Sustainable development
B5	Parking
B6	Child care centres
B7	Educational establishments
B8	Places of public worship
B9	Sex services premises
B10	Telecommunications facilities
B11	Tree preservation order
B12	Flood risk management

Please note: Council may from time to time exhibit draft changes to the development control plan that may affect your land. To find out more, please contact Council on 9707 9000 or view Council's website and refer to the Development Control Plan - www.bankstown.nsw.gov.au

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Appendix 4

Land Use Table

Note. A type of development referred to in the Land Use Table is a reference to that type of development only to the extent it is not regulated by an applicable State environmental planning policy. The following State environmental planning policies in particular may be relevant to development on land to which this Plan applies:
State Environmental Planning Policy (Affordable Rental Housing) 2009 (including provision for secondary dwellings)
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
State Environmental Planning Policy (Infrastructure) 2007 (relating to public facilities such as those for air transport, correction, education, electricity generation, health services, ports, railways, roads, waste management and water supply systems)
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy (Rural Lands) 2008
State Environmental Planning Policy No 33—Hazardous and Offensive Development
State Environmental Planning Policy No 50—Canal Estate Development
State Environmental Planning Policy No 62—Sustainable Aquaculture
State Environmental Planning Policy No 64—Advertising and Signage

Zone RU4 Primary Production Small Lots
Permitted without consent Home occupations
Permitted with consent Agriculture; Animal boarding or training establishments; Building identification signs; Business identification signs; Dwelling houses; Environmental facilities; Environmental protection works; Extensive agriculture; Farm buildings; Flood mitigation works; Intensive plant agriculture; Kiosks; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Roads; Roadside stalls; Water supply systems
Prohibited Any development not specified in item 2 or 3

Zone R2 Low Density Residential
Permitted without consent Home occupations
Permitted with consent Bed and breakfast accommodation; Boarding houses; Boat sheds; Building identification signs; Business identification signs; Car parks; Child care centres; Community facilities; Dual occupancies; Dwelling houses; Emergency services facilities; Environmental facilities; Environmental protection works; Exhibition homes; Flood mitigation works; Group homes; Health consulting rooms; Home-based child care; Hospitals; Information and education facilities; Jetties; Multi dwelling housing; Places of public worship; Public administration buildings; Recreation areas; Respite day care centres; Roads; Secondary dwellings; Semi-detached dwellings; Seniors housing; Water recreation structures; Water supply systems
Prohibited Any development not specified in item 2 or 3

Zone R3 Medium Density Residential
Permitted without consent Nil
Permitted with consent Attached dwellings; Bed and breakfast accommodation; Boarding houses; Building identification signs; Business identification signs; Car parks; Child care centres; Community facilities; Dwelling houses; Emergency services facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Group homes; Information and education facilities; Multi dwelling housing; Neighbourhood shops; Places of public worship; Public administration buildings; Recreation areas; Respite day care centres; Roads; Secondary dwellings; Seniors housing; Water supply systems
Prohibited Any development not specified in item 2 or 3

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Zone R4 High Density Residential
Permitted without consent Nil
Permitted with consent Attached dwellings; Bed and breakfast accommodation; Boarding houses; Building identification signs; Business identification signs; Car parks; Child care centres; Community facilities; Dwelling houses; Emergency services facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Information and education facilities; Multi dwelling housing; Neighbourhood shops; Places of public worship; Public administration buildings; Recreation areas; Residential flat buildings; Respite day care centres; Roads; Secondary dwellings; Seniors housing; Serviced apartments; Shop top housing; Water supply systems
Prohibited Any development not specified in item 2 or 3

Zone B1 Neighbourhood Centre
Permitted without consent Nil
Permitted with consent Boarding houses; Building identification signs; Bulky goods premises; Business identification signs; Business premises; Car parks; Child care centres; Community facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Garden centres; Hardware and building supplies; Health services facilities; Information and education facilities; Kiosks; Landscaping material supplies; Markets; Medical centres; Neighbourhood shops; Office premises; Places of public worship; Plant nurseries; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Research stations; Residential flat buildings; Respite day care centres; Restaurants or cafes; Roads; Seniors housing; Service stations; Shop top housing; Shops; Take away food and drink premises; Timber yards; Tourist and visitor accommodation; Vehicle repair stations; Vehicle sales or hire premises; Veterinary hospitals; Water supply systems
Prohibited Any development not specified in item 2 or 3

Zone B2 Local Centre
Permitted without consent Nil
Permitted with consent Boarding houses; Building identification signs; Business identification signs; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Function centres; Information and education facilities; Medical centres; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Residential flat buildings; Respite day care centres; Restricted premises; Roads; Seniors housing; Service stations; Shop top housing; Tourist and visitor accommodation; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Residential accommodation; Rural industries; Sewage treatment plants; Sex services premises; Signage; Storage premises; Transport depots; Truck depots; Vehicle body repair workshops; Waste or resource management facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

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Zone B4 Mixed Use
Permitted without consent Nil
Permitted with consent Boarding houses; Building identification signs; Business identification signs; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Function centres; Hotel or motel accommodation; Information and education facilities; Medical centres; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Residential flat buildings; Respite day care centres; Restricted premises; Roads; Seniors housing; Shop top housing; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Heavy industrial storage establishments; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Residential accommodation; Resource recovery facilities; Rural industries; Sewage treatment plants; Sex services premises; Signage; Storage premises; Transport depots; Truck depots; Vehicle body repair workshops; Warehouse and distribution centres; Waste disposal facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

Zone B5 Business Development
Permitted without consent Nil
Permitted with consent Building identification signs; Bulky goods premises; Business identification signs; Business premises; Child care centres; Food and drink premises; Garden centres; Hardware and building supplies; Hotel or motel accommodation; Kiosks; Landscaping material supplies; Markets; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Respite day care centres; Roads; Serviced apartments; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Heavy industrial storage establishments; Helipads; Home occupations (sex services); Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Residential accommodation; Resource recovery facilities; Restricted premises; Rural industries; Sewage treatment plants; Sex services premises; Signage; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Vehicle body repair workshops; Waste disposal facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

Zone B6 Enterprise Corridor
Permitted without consent Nil
Permitted with consent Building identification signs; Bulky goods premises; Business identification signs; Business premises; Community facilities; Food and drink premises; Garden centres; Hardware and building supplies; Hotel or motel accommodation; Kiosks; Landscaping material supplies; Light industries; Markets; Multi dwelling housing; Neighbourhood shops; Office premises; Passenger transport facilities; Plant nurseries; Residential flat buildings; Roads; Seniors housing; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Heavy industrial storage establishments; Helipads; Home occupations (sex services); Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Residential accommodation; Resource recovery facilities; Restricted premises; Rural industries; Sewage treatment plants; Sex services premises; Signage; Storage premises; Transport depots; Truck depots; Vehicle body repair workshops; Waste disposal facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

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Zone B7 Business Park
Permitted without consent Nil
Permitted with consent Building identification signs; Business identification signs; Child care centres; Light industries; Neighbourhood shops; Office premises; Passenger transport facilities; Respite day care centres; Roads; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Entertainment facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Function centres; Heavy industrial storage establishments; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Places of public worship; Port facilities; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Residential accommodation; Resource recovery facilities; Restricted premises; Rural industries; Service stations; Sewage treatment plants; Sex services premises; Signage; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Waste disposal facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

Zone IN1 General Industrial
Permitted without consent Nil
Permitted with consent Agricultural produce industries; Building identification signs; Business identification signs; Depots; Food and drink premises; Freight transport facilities; Garden centres; General industries; Hardware and building supplies; Hospitals; Industrial training facilities; Kiosks; Landscaping material supplies; Light industries; Markets; Medical centres; Neighbourhood shops; Plant nurseries; Roads; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Amusement centres; Biosolids treatment facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Commercial premises; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Heavy industrial storage establishments; Home occupations (sex services); Industries; Jetties; Marinas; Mooring pens; Moorings; Open cut mining; Port facilities; Residential accommodation; Respite day care centres; Restricted premises; Rural industries; Schools; Sewage treatment plants; Signage; Tourist and visitor accommodation; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

Zone IN2 Light Industrial
Permitted without consent Nil
Permitted with consent Agricultural produce industries; Building identification signs; Business identification signs; Depots; Food and drink premises; Garden centres; Hardware and building supplies; Hospitals; Industrial training facilities; Kiosks; Landscaping material supplies; Light industries; Markets; Medical centres; Neighbourhood shops; Plant nurseries; Roads; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4
Prohibited Agriculture; Air transport facilities; Airstrips; Amusement centres; Biosolids treatment facilities; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Child care centres; Commercial premises; Correctional centres; Crematoria; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Function centres; Health services facilities; Heavy industrial storage establishments; Helipads; Highway service centres; Home occupations (sex services); Industries; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Port facilities; Recreation facilities (major); Residential accommodation; Resource recovery facilities; Respite day care centres; Restricted premises; Rural industries; Schools; Sewage treatment plants; Signage; Tourist and visitor accommodation; Transport depots; Truck depots; Waste disposal facilities; Water recreation structures; Water recycling facilities; Wharf or boating facilities; Wholesale supplies

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Zone SP1 Special Activities
Permitted without consent Nil
Permitted with consent The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose
Prohibited Any development not specified in item 2 or 3

Zone SP2 Infrastructure
Permitted without consent Nil
Permitted with consent Roads; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose
Prohibited Any development not specified in item 2 or 3

Zone RE1 Public Recreation
Permitted without consent Nil
Permitted with consent Boat launching ramps; Boat sheds; Building identification signs; Business identification signs; Car parks; Caravan parks; Charter and tourism boating facilities; Child care centres; Community facilities; Eco-tourist facilities; Emergency services facilities; Entertainment facilities; Environmental facilities; Environmental protection works; Extensive agriculture; Flood mitigation works; Food and drink premises; Function centres; Information and education facilities; Intensive plant agriculture; Jetties; Kiosks; Marinas; Markets; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Roads; Water recreation structures; Water supply systems; Wharf or boating facilities
Prohibited Any development not specified in item 2 or 3

Zone RE2 Private Recreation
Permitted without consent Nil
Permitted with consent Building identification signs; Business identification signs; Car parks; Community facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Helipads; Kiosks; Marinas; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Roads; Water supply systems
Prohibited Any development not specified in item 2 or 3

Zone E1 National Parks and Nature Reserves
Permitted without consent Uses authorised under the National Parks and Wildlife Act 1974
Permitted with consent Nil
Prohibited Any development not specified in item 2 or 3

Zone W1 Natural Waterways
Permitted without consent Nil
Permitted with consent Boat launching ramps; Boat sheds; Charter and tourism boating facilities; Environmental facilities; Environmental protection works; Flood mitigation works; Jetties; Marinas; Mooring pens; Moorings; Water recreation structures; Wharf or boating facilities
Prohibited Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres; Any other development not specified in item 2 or 3

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APPENDIX D

Laboratory Certificates

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CERTIFICATE OF ANALYSIS 202313

Client Details

Client	Geoenviro Consultancy Pty Ltd
Attention	Solern Liew
Address	PO Box 1543, Macquarie Centre, North Ryde, NSW, 2113

Sample Details

Your Reference	**JG18129A, Proposed School Upgrade**
Number of Samples	21 Soil
Date samples received	04/10/2018
Date completed instructions received	04/10/2018

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	11/10/2018
Date of Issue	11/10/2018

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Jeremy Faircloth, Organics Supervisor
Leon Ow, Chemist
Lucy Zhu, Asbsestos Analyst
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018	09/10/2018	09/10/2018
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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	113	116	133	110	108

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018
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
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	105	120	128

svTRH (C10-C40) in Soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018	09/10/2018	09/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	180	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	320	<100	190	<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	400	<100	190	<100
TRH >C_{34} -C_{40}	mg/kg	<100	400	<100	220	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	800	<50	410	<50
Surrogate o-Terphenyl	%	93	96	91	90	91

svTRH (C10-C40) in Soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	370	<100	180
TRH C_{29} - C_{36}	mg/kg	460	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	710	<100	200
TRH >C_{34} -C_{40}	mg/kg	440	<100	100
Total +ve TRH (>C10-C40)	mg/kg	1,200	<50	300
Surrogate o-Terphenyl	%	99	86	87

PAHs in Soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018	09/10/2018	09/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	2.5	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	3.4	0.2	0.2	<0.1
Pyrene	mg/kg	0.2	3.2	0.2	0.2	<0.1
Benzo(a)anthracene	mg/kg	0.1	1.4	0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	1.3	0.1	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	2.1	0.3	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	1.4	0.2	0.1	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.7	<0.1	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	0.9	0.1	0.2	<0.1
Total +ve PAH's	mg/kg	1.3	18	1.1	1.1	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	2.0	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	2.0	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	2.0	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	112	112	112	110	114

PAHs in Soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.3	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	112	111	109

Organochlorine Pesticides in soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	104	102	97	95

Organochlorine Pesticides in soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	97	103	94

PCBs in Soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Aroclor 1016	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.2	<0.1	<0.1	<0.1
Surrogate TCLMX	%	102	104	102	97	95

PCBs in Soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	97	103	94

Acid Extractable metals in soil						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Arsenic	mg/kg	10	<4	11	12	14
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	18	15	13	15
Copper	mg/kg	15	39	21	31	17
Lead	mg/kg	32	22	72	64	10
Mercury	mg/kg	<0.1	<0.1	0.2	0.1	<0.1
Nickel	mg/kg	9	13	9	9	4
Zinc	mg/kg	44	44	45	110	30

Acid Extractable metals in soil				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	08/10/2018	08/10/2018	08/10/2018
Arsenic	mg/kg	<4	8	5
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	45	42	13
Copper	mg/kg	33	33	14
Lead	mg/kg	8	10	22
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	52	45	11
Zinc	mg/kg	31	49	43

Soil Aggressivity						
Our Reference		202313-1	202313-2	202313-3	202313-4	202313-5
Your Reference	UNITS	BH 1	BH 1	BH 2	BH 3	BH 3
Depth		0.4-0.5	2.4-2.5	0.2-0.3	0.2-0.3	1-1.45
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	6.8	7.8	11.5	7.9	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	79	270	840	68	800
Resistivity by calculation	ohm m	[NA]	38	[NA]	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	180	[NA]	[NA]	690
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	150	[NA]	[NA]	420

Soil Aggressivity						
Our Reference		202313-6	202313-7	202313-8	202313-9	202313-10
Your Reference	UNITS	BH 4	BH 4	BH 5	BH 5	BH 6
Depth		0.4-0.5	1.9-2	0.1-0.2	0.9-1	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	5.6	6.3	8.5	5.3	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	110	160	240	190	330
Resistivity by calculation	ohm m	[NA]	64	[NA]	[NA]	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	100	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	50	[NA]	[NA]	[NA]

Soil Aggressivity						
Our Reference		202313-11	202313-12	202313-13	202313-14	202313-15
Your Reference	UNITS	BH 6	BH 7	BH 7	BH 9	BH 9
Depth		0.9-1	0.9-1	2.9-3	0.1-0.2	0.5-0.6
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	5.4	5.6	9.8	9.5	5.7
Electrical Conductivity 1:5 soil:water	µS/cm	350	85	390	90	210
Resistivity by calculation	ohm m	28	[NA]	[NA]	[NA]	47
Chloride, Cl 1:5 soil:water	mg/kg	140	[NA]	46	[NA]	130
Sulphate, SO4 1:5 soil:water	mg/kg	310	[NA]	78	[NA]	140

Soil Aggressivity						
Our Reference		202313-16	202313-17	202313-18	202313-19	202313-20
Your Reference	UNITS	BH 10	BH 10	BH 11	BH 11	BH 12
Depth		0.1-0.2	1-1.45	0.9-1	2.5-2.95	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	8.7	5.5	5.3	7.0	5.8
Electrical Conductivity 1:5 soil:water	µS/cm	220	430	310	390	66
Resistivity by calculation	ohm m	[NA]	23	[NA]	26	[NA]
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	380	[NA]	420	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	250	[NA]	150	[NA]

Soil Aggressivity		
Our Reference		202313-21
Your Reference	UNITS	BH 12
Depth		1-1.45
Date Sampled		03/10/2018
Type of sample		Soil
pH 1:5 soil:water	pH Units	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	510

Moisture						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2018	08/10/2018	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018	09/10/2018	09/10/2018
Moisture	%	10	7.6	8.9	6.7	17

Moisture				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	08/10/2018	08/10/2018	08/10/2018
Date analysed	-	09/10/2018	09/10/2018	09/10/2018
Moisture	%	2.9	15	14

Asbestos ID - soils						
Our Reference		202313-1	202313-3	202313-4	202313-8	202313-10
Your Reference	UNITS	BH 1	BH 2	BH 3	BH 5	BH 6
Depth		0.4-0.5	0.2-0.3	0.2-0.3	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	09/10/2018	09/10/2018	09/10/2018	09/10/2018	09/10/2018
Sample mass tested	g	Approx. 30g	Approx. 40g	Approx. 35g	Approx. 40g	Approx. 35g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown clayey 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	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	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		202313-14	202313-16	202313-20
Your Reference	UNITS	BH 9	BH 10	BH 12
Depth		0.1-0.2	0.1-0.2	0.2-0.3
Date Sampled		03/10/2018	03/10/2018	03/10/2018
Type of sample		Soil	Soil	Soil
Date analysed	-	09/10/2018	09/10/2018	09/10/2018
Sample mass tested	g	Approx. 40g	Approx. 35g	Approx. 35g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained 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

Method ID	Methodology Summary
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-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.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Org-012	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. 'EQ 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. 'EQ 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. 'EQ 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-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
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-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. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date extracted	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			09/10/2018	1	09/10/2018	09/10/2018		09/10/2018	09/10/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	107	104
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	107	104
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	112	94
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	101	103
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	108	107
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	107	108
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	109	110
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	112	1	113	112	1	138	117

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date extracted	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			09/10/2018	1	09/10/2018	09/10/2018		09/10/2018	09/10/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	104	102
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	91	89
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	97	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	104	102
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	91	89
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	97	#
Surrogate o-Terphenyl	%		Org-003	128	1	93	89	4	104	96

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date extracted	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			09/10/2018	1	09/10/2018	09/10/2018		09/10/2018	09/10/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	114	120
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	120	114
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	121	104
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	119	110
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	115	103
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.1	67	116	109
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.3	0.3	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.1	0.1	0	121	108
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.1	0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	114	1	112	113	1	112	119

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date extracted	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	91
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	86	82
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	96
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	89
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	92
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	87
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	100	97
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	103	104
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	84	81
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	74	82
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	101	1	102	103	1	117	112

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date extracted	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	130	133
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	101	1	102	103	1	102	110

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	202313-3
Date prepared	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Date analysed	-			08/10/2018	1	08/10/2018	08/10/2018		08/10/2018	08/10/2018
Arsenic	mg/kg	4	Metals-020	<4	1	10	8	22	104	93
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	96	81
Chromium	mg/kg	1	Metals-020	<1	1	15	12	22	100	98
Copper	mg/kg	1	Metals-020	<1	1	15	15	0	107	102
Lead	mg/kg	1	Metals-020	<1	1	32	30	6	100	79
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	98	102
Nickel	mg/kg	1	Metals-020	<1	1	9	9	0	101	82
Zinc	mg/kg	1	Metals-020	<1	1	44	41	7	96	70

QUALITY CONTROL: Soil Aggressivity					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	6.8	6.9	1	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	79	84	6	107	[NT]
Resistivity by calculation	ohm m	0.1	Inorg-002	<0.1	11	28	29	4	[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	11	140	140	0	94	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	11	310	300	3	107	[NT]

QUALITY CONTROL: Soil Aggressivity					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	11	5.4	5.3	2	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	11	350	350	0	105	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: Soil Aggressivity					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	21	5.3	5.4	2	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	21	510	420	19	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

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.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

PCBs in Soil - PQL has been raised due to interference from analytes(other than those being tested) in the sample 3.

Asbestos: A portion of the supplied samples were sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying
40-50g of sample in its own container.
Note: Samples requested for asbestos testing were sub-sampled from jars provided by the client.

TRH Soil C10-C40 NEPM - (3MS)# Percent recovery is not possible to report as the high concentration of analytes in the sample/s have caused interference.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Geoenviro Consultancy Pty Ltd
Attention	Solern Liew

Sample Login Details

Your reference	JG18129A, Proposed School Upgrade
Envirolab Reference	202313
Date Sample Received	04/10/2018
Date Instructions Received	04/10/2018
Date Results Expected to be Reported	11/10/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	21 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

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@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the 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
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	PCBsin Soil	Acid Extractable metalsin soil	Soil Aggressivity	Asbestos ID - soils
BH 1 -0.4-0.	✓	✓	✓	✓	✓	✓	✓	✓
BH 1-2.4-2.5							✓	
BH 2-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH 3-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH 3-1-1.45							✓	
BH 4-0.4-0.5							✓	
BH 4-1.9-2							✓	
BH 5-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓
BH 5-0.9-1							✓	
BH 6-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH 6-0.9-1							✓	
BH 7-0.9-1							✓	
BH 7-2.9-3							✓	
BH 9-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓
BH 9-0.5-0.6							✓	
BH 10 -0.1-0.	✓	✓	✓	✓	✓	✓	✓	✓
BH 10-1-1.45							✓	
BH 11-0.9-1							✓	
BH 11-2.5-2.95							✓	
BH 12-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓
BH 12-1-1.45							✓	

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Laboratory Test Request/Chain of Custody Record

Job Details
Job Number: JG18129A
Client:
Project: Proposed School Upgrade
Location: 322 Hume Highway Bankstown

Sample Date: 03/10/2018
Sampled By: SG
Project Manager: SL
Store Location:

External Laboratory Details:
Laboratory name: Envirolab Services Pty Ltd
Address: 12 Ashley Street
Chatswood
Contact: Tania Notaris

Sampling Details				Sample Type		Test Required (\)												Test Performed(X)								
Location		Depth (m)		Soil	Water	Metals (As Cd Cr Cu Pb Zn Ni Hg)	OCP / PCB	Combination 12a	Combination 5a	Combination 5			pH	EC	CEC/ESP	Cl / SO4	Resistivity									Keep Sample
		From	To																							
1	BH 1	0.40	0.50	DG					/				/	/												
2	BH 1	2.40	2.50	DG									/	/		/	/									
3	BH 2	0.20	0.30	DG					/				/	/												
4	BH 3	0.20	0.30	DG					/				/	/												
5	BH 3	1.00	1.45	DG									/	/		/										
6	BH 4	0.40	0.50	DG									/	/												
7	BH 4	1.90	2.00	DG									/	/		/	/									
8	BH 5	0.10	0.20	DG					/				/	/												
9	BH 5	0.90	1.00	DG									/	/												
10	BH 6	0.20	0.30	DG					/				/	/												
11	BH 6	0.90	1.00	DG									/	/		/	/									
12	BH 7	0.90	1.00	DG									/	/												
13	BH 7	2.90	3.00	DG									/	/		/										
14	BH 9	0.10	0.20	DG					/				/	/												
15	BH 9	0.50	0.60	DG									/	/		/	/									

ENVIROLAB

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

Job No: 202313
Date Received: 4/10/2018
Time Received: 18.00
Received By: M
Temp: Cool/Ambient: 11.2
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by				Received By			
Laboratory	Name	Signature	Date	Laboratory	Name	Signature	Date
GeoEnviro Consultancy	Steven Goss	SMGoss	27/09/2018	EJS	May		4/10/2018

Legend

DB Disturbed Sample (Bulk, Plastic bag)
DS Disturbed Sample (Small, Plastic bag)
DG Disturbed Sample (Glass Jar)
STP Standard Penetration Test Sample
U50 Undisturbed Sample, 50mm Tube
U75 Undisturbed Sample, 75mm Tube
WG Water Sample, Amber Glass Jar
WP Water Sample, Plastic Bottle
Y Keep Sample
N Discard Sample

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown NSW 2148, Australia
Tel: (02) 96798733 Fax: (02) 96798744

Laboratory Test Request/Chain of Custody Record

Job Details
Job Number: JG18129A
Client:
Project: Proposed School Upgrade
Location: 322 Hume Highway Bankstown

Sample Date: 03/10/2018
Sampled By: SG
Project Manager: SL
Store Location:

External Laboratory Details:
Laboratory name: Envirolab Services Pty Ltd
Address: 12 Ashley Street
Chatswood
Contact: Tania Notaris

Sampling Details				Sample Type		Test Required (\)											Test Performed(X)									
Location		Depth (m)		Soil	Water	Metals (As Cd Cr Cu Pb Zn Ni Hg)	OCP / PCB	Combination 12a	Combination 5a	Combination 5			pH	EC	CEC/ESP	Cl / SO4	Resistivity									Keep Sample
		From	To																							
16	BH 10	0.10	0.20	DG					/				/	/												
17	BH 10	1.00	1.45	DG									/	/		/	/							-		
18	BH 11	0.90	1.00	DG									/	/												
19	BH 11	2.50	2.95	DG									/	/		/	/									
20	BH 12	0.20	0.30	DG					/				/	/												
21	BH 12	1.00	1.45	DG									/	/												

Relinquished by				Received By			
Laboratory	Name	Signature	Date	Laboratory	Name	Signature	Date
GeoEnviro Consultancy	Steven Goss	SMGoss	27/09/2018	EAS	May		4/10/2018

Legend
DB Disturbed Sample (Bulk, Plastic bag)
DS Disturbed Sample (Small, Plastic bag)
DG Disturbed Sample (Glass Jar)
STP Standard Penetration Test Sample
U50 Undisturbed Sample, 50mm Tube
U75 Undisturbed Sample, 75mm Tube
WG Water Sample, Amber Glass Jar
WP Water Sample, Plastic Bottle
Y Keep Sample
N Discard Sample

202313

APPENDIX E

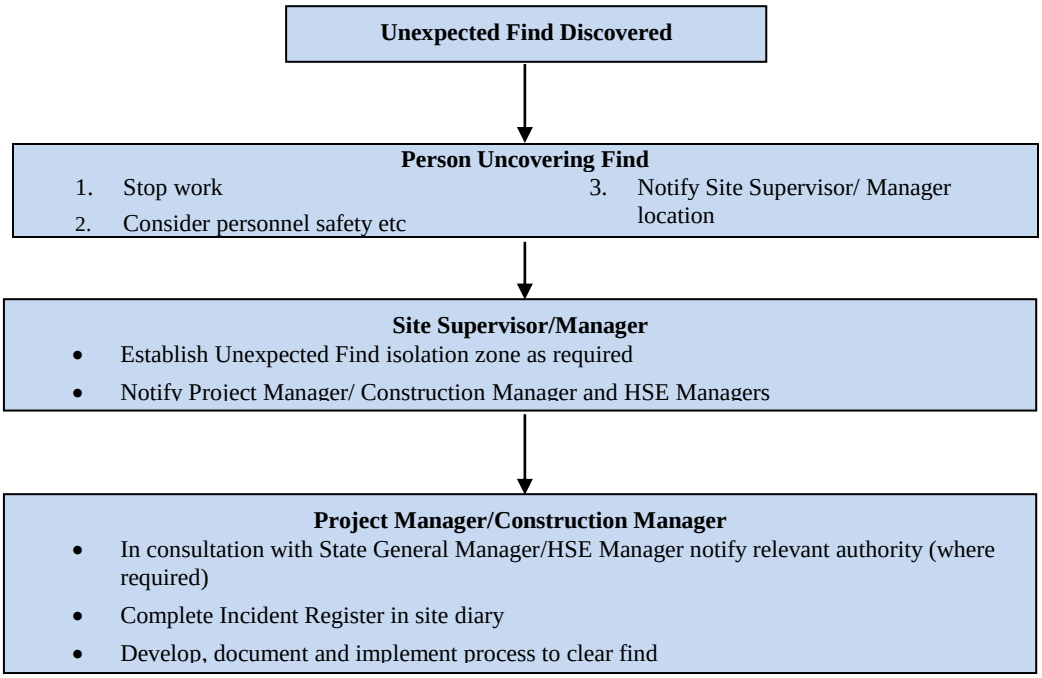
Unexpected Finds Protocol

GeoEnviro Consultancy Pty Ltd
Unit 5, 39-41 Fourth Avenue, Blacktown, NSW 2148, Australia
PO Box 1543, Macquarie Centre. North Ryde, NSW 2113

ABN 62 084 294 762
Tel : (02) 9679 8733
Fax : (02) 9679 8744

UNEXPECTED FINDS PROTOCOL

<table>
<tr><th>ITEM</th><th colspan="2">REQUIREMENTS</th></tr>
<tr><td>DEFINITION</td><td colspan="2">An unexpected find may be identified as a result of site activity, for example through earthworks and movement of plant on site including preparatory site works.</td></tr>
<tr><td>SITE SUPERVISOR</td><td colspan="2">On being notified of an Unexpected Find, the Principal Contractor must:
Stop work & notify the site manager/HSE coordinator as soon as practically possible.
Ensure the find is not further disturbed.
Ensure all personnel are removed from the area with the exception of personnel required to isolate or make safe the area.
Establish an “unexpected find” isolation zone as required to prevent or minimise exposure risks for site personnel, members of the public, fauna or flora. Note: Persons are not to expose themselves to further risk whilst establishing isolation zone.
Assess the requirement to evacuate areas or the entire site.
Co-ordinate site or area evacuation as assessed. Note: It is preferable to evacuate the whole site if there is any doubt as to the safety of personnel or the environment.
As soon as the safety of personnel, environment & the site is secured the Site Manager/Supervisor should notify their relevant HSE Manager, Project Manager & Construction Manager.
As soon as practically possible record the events associated with the unexpected find.</td></tr>
<tr><td rowspan="2">PROJECT MANAGER</td><td colspan="2">The Project Manager and/or HSE Manager in consultation with the relevant General Manager notify regulatory authorities as required.
Establish a risk based process for managing clearance of the unexpected find & establishing incident investigation.</td></tr>
<tr><td colspan="2">The Project Manager or HSE Manager must also ensure that the find is reported to the Principal.
This may be by verbal communication.</td></tr>
<tr><td>UNEXPLODED ORDNANCE</td><td colspan="2">Do not touch or disturb.
Contact Police immediately.</td></tr>
<tr><td>UNEXPECTED SERVICES
(LIVE OR DISUSED)</td><td colspan="2">This may include power, gas or fuel.
Do not touch or further disturb.
The area must be immediately designated a non-smoking and “no naked flames” area.
All nearby machinery should be turned off.
Contact relevant governing authority.
Contact appropriate trade supervisor.</td></tr>
<tr><td rowspan="2">ASBESTOS OR OTHER CONTAMINANTS</td><td colspan="2">Products made from asbestos cement not only include fibro sheeting (flat and corrugated), but items such as water, drainage and flue pipes, roofing shingles and gutters.
Do not touch or further disturb.
Isolate area (10 metre isolation zone required for asbestos).
Contact hygienist.
Implement hygienist’s recommendations.
If persons have been exposed arrange medical advice/consultation i.e. possible asbestos fibre exposure will require lung function test & chest x-ray. Note: This applies more specifically to friable type asbestos rather than non friable asbestos containing material however if any doubt exists treat as friable.
Obtain clearance from hygienist prior to re-entering area.</td></tr>
<tr><td>Non-Friable Asbestos
Over 97% of the products in Australia were non-friable material in which the Asbestos fibres were bonded by cement, vinyl, resin or other similar material.</td><td>Friable Asbestos
The hazardous friable asbestos is material which can be crumbled, pulverised, or reduced to powder by hand pressure. This may also include previously non-friable material which becomes broken or damaged by mechanical force.</td></tr>
</table>

ITEM	REQUIREMENTS
HUMAN REMAINS	• Do not touch or disturb. • Contact Police immediately. Please note that aboriginal burial objects (such as bark coffins) are defined by legislation as human remains.
HERITAGE ITEMS	• Do not touch or disturb. • Contact Heritage Office or relevant State or Local Government Authority.
OBJECTS OF POSSIBLE CULTURAL SIGNIFICANCE	• Do not touch or disturb. Contact Department of Indigenous Affairs or relevant State or Local Government Authority.
UNEXPECTED FIND PROCESS	

APPENDIX F

Important Information about your Environmental Site Assessment
Explanatory Notes

GeoEnviro Consultancy Pty Ltd
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Fax: (02) 9679 8744
Email: geoenviro@exemail.com.au

IMPORTANT INFORMATION REGARDING YOUR ENVIRONMENTAL SITE ASSESSMENT

This Environmental Assessment Report was performed in general conformance with our understanding of the guidelines by the Australian and New Zealand Conservation Council (ANZECC), the Office of Environment and Heritage (OEH) and the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (amended 2013).

These accompanying notes have been prepared by GeoEnviro Consultancy Pty Ltd, using guidelines prepared by ASFE; The Association of Engineering Firms Practising in the Geosciences. The notes are offered as an aid in the interpretation of your environmental site assessment report.

REASONS FOR AN ENVIRONMENTAL SITE ASSESSMENT

Environmental site assessments are typically, though not exclusively, performed in the following circumstances:

- As a pre- acquisition assessment on behalf of either a purchaser or a vendor, when a property is to be sold
- As a pre-development assessment, when a property or area of land is to be redeveloped, or the land use has change, eg from a factory to a residential subdivision
- As a pre-development assessment of greenfield sites, to establish baseline conditions and assess environmental, geological and hydrological constraints to the development of, eg, a landfill
- As an audit of the environmental effects of previous and present site usage

Each circumstance requires a specific approach to the assessment of soil and groundwater contamination. In all cases the objective is to identify and if possible, quantify the risks which unrecognised contamination poses to the ongoing or proposed activity. Such risk may be both financial (clean-up costs or limitations in site use) and physical (health risks to site users or the public).

ENVIRONMENTAL SITE ASSESSMENT LIMITATIONS

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

AN ENVIRONMANTAL SITE ASSESSMENT REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

Your environmental assessment report should not be used;

- When the nature of the proposed development is changed, eg, if a residential development is proposed, rather than a commercial development
- When the size or configuration of the proposed development is altered, eg, if a basement is added
- When the location or orientation of the proposed structure is modified
- When there is a change of land ownership, or
- For application to an adjacent site

In order to avoid costly problems, you should ask your consultant to assess any changes in the project since the assessment and the implications, if any, to recommendations made in the assessment.

ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientist and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on any proposed development and appropriate remediation measures. Actual conditions may differ from those inferred, because no professional, no matter how qualified and no sub-surface 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, however, steps can be taken to help minimise the impact. For this reason, site owner should retain the services of their consultants throughout the development stage of the project in order to identify variances, conduct additional tests which may be necessary and to recommend solutions to problems encountered on site.

Soil and groundwater contamination is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by GeoEnviro Consultancy Pty Ltd to be familiar with current policy, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, that approval should be directly sought.

STABILITY OF SUB-SURFACE CONDITIONS

Sub-surface conditions can change by natural processes and site activities. As an environmental site assessment is based on conditions existing at the time of the investigation, project decisions should not be based on environmental site assessment data which may have been affected by time. The consultant should be requested to advise if additional tests are required.

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

Environmental site assessments are prepared in response to a specific scope of work required to meet the specific needs or specific individuals. An assessment prepared for a consulting civil engineer may not be adequate to a construction contractor or another civil engineer.

An assessment should not be used by other persons for any purpose, or by the client for a different purposes. No individual, other than the client, should apply an assessment, even for its intended purposes, without first conferring with the consultant. No person should apply an assessment for any purposes other than that originally contemplated, without first conferring with the consultant.

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

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

LOGS SHOULD NOT BE SEPARATED FORM THE REPORT

Borehole and test pit logs are prepared by environmental scientists, engineers or geologist, based upon interpretation of field conditions and laboratory evaluation of field samples. Field logs normally provided in our reports and these should not be redrawn 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 test of the assessment. Should this occur, delays and disputes , or unanticipated costs may result.

To reduce the likelihood of boreholes and test pit logs 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 sub-surface 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

An environmental site assessment is based extensively on judgement and opinion, therefore, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claim being lodged against consultants. In order to aid in prevention of 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 happy to give full and frank answers to any questions you may have.

EXPLANATORY NOTES

Introduction

These notes have been provided to amplify the geotechnical report with regard to investigation procedures, classification methods and certain matters relating to the Discussion and Comments sections. Not all notes are necessarily relevant to all reports.

Geotechnical reports are based on information gained from finite sub-surface probing, excavation, boring, sampling or other means of investigation, supplemented by experience and knowledge of local geology. For this reason they must be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods
The methods the description and classification of soils and rocks used in this report are based on Australian standard 1726, the SSA Site investigation Code, in general descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions. Identification and classification of soil and rock involves to a large extent, judgement within the acceptable level commonly adopted by current geotechnical practices.

Soil types are described according to the predominating particle size, qualified by the grading or other particles present (eg sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	Less than 0.002mm
Silt	0.002 to 0.6mm
Sand	0.6 to 2.00mm
Gravel	2.00m to 60.00mm

Soil Classification	Particle size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2.00mm
Gravel	2.00mm to 60.00mm

Cohesive soils are classified on the basis of strength, either by laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Undrained Shear Strength kPa
Very Soft	Less than 12
Soft	12 - 25
Firm	25 - 50
Stiff	50 - 100
Very Stiff	100 - 200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer test (CPT), as below:

Relative Dense	SPT 'N' Value (blows/300mm)	CPT Cone Value (q_c-Mpa)
Very Loose	Less than 5	Less than 2
Loose	5 - 10	2 - 5
Medium Dense	10 - 30	5 - 15
Dense	30 - 50	15 - 25
Very Dense	> 50	> 25

Rock types are classified by their geological names, together with descriptive terms on degrees of weathering strength, defects and other minor components. Where relevant, further information regarding rock classification, is given on the following sheet.

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

Disturbed samples taken during drilling provided information on plasticity, grained size, colour, type, moisture content, inclusions and depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin walled sample tube (normally know as U_{50}) into the soil and withdrawing a sample of the soil in a relatively undisturbed state. Such Samples yield information on structure and strength and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Details of the type and method of sampling are given in the report.

Field Investigation Methods
The following is a brief summary of investigation methods currently carried out by this company and comments on their use and application.

Hand Auger Drilling
The borehole is advanced by manually operated equipment. The diameter of the borehole ranges from 50mm to 100mm. Penetration depth of hand augered boreholes may be limited by premature refusal on a variety of materials, such as hard clay, gravels or ironstone.

Test Pits
These are excavated with a tractor-mounted backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3.0m for a backhoe and up to 6.0m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Care must be taken if construction is to be carried out near, or within the test pit locations, to either adequately recompact the backfill during construction, or to design the structure or accommodate the poorly compacted backfill.

Large Diameter Auger (eg Pengo)
The hole is advanced by a rotating plate or short spiral auger generally 300mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 05m) and are disturbed, but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers and is usually supplemented by occasional undisturbed tube sampling.

Continuous Spiral Flight Augers
The hole is advanced by using 90mm - 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the augers flights, but they are very disturbed and may be highly mixed with soil of other stratum.

Information from the drilling (as distinct from specific sampling by SPT or undisturbed samples) is of relatively low reliability due to remoulding, mixing or softening of samples by ground water, resulting in uncertainties of the original sample depth.

Continuous Spiral Flight Augers (continued)
The spiral augers are usually advanced by using a V - bit through the soil profile refusal, followed by Tungsten Carbide (TC) bit, to penetrate into bedrock. The quality and continuity of the bedrock may be assessed by examination of the recovered rock fragments and through observation of the drilling penetration resistance.

Non - core Rotary Drilling (Wash Boring)
The hole is advanced by a rotary bit, with water being pumped down the drill rod and returned up the annulus, carrying the cuttings, together with some information from the "feel" and rate of penetration.

Rotary Mud Stabilised Drilling
This is similar to rotary drilling, but uses drilling mud as a circulating fluid, which may consist of a range of products, from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg SPT and U_{50} samples).

Continuous Core Drilling
A continuous core sample is obtained using a diamond tipped core barrel. Providing full core recovery is achieved (which is not always possible in very weak rock 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.

Portable Proline Drilling
This is manually operated equipment and is only used in sites which require bedrock core sampling and there is restricted site access to truck mounted drill rigs. The boreholes are usually advanced initially using a tricone roller bit and water circulation to penetrate the upper soil profile. In some instances a hand auger may be used to penetrate the soil profile. Subsequent drilling into bedrock involves the use of NMLC triple tube equipment, using water as a lubricant.

Standard Penetration Tests
Standard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils, as a means of determining density or strength and of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289 "Methods of testing Soils for Engineering Purpose"- Test F31.

The test is carried out in a borehole by driving a 50mm diameter split sample tube under the impact of a 63Kg hammer with a free fall of 769mm. 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 rocks, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

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

  as 4, 6, 7
  N = 13

- 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 15,30/40mm

The results of the tests can be related empirically to the engineering properties of the soil. Occasionally the test methods is used to obtain samples in 50mm diameter thin walled samples tubes in clays. In these circumstances, the best results are shown on the bore logs in brackets.

Dynamic Cone Penetration Test
A modification to the SPT test is where the same driving system is used with a solid 60^0 tipped steel cone of the same diameter as the SPT hollow sampler. The cone can be continuously driven into the borehole and is normally used in areas with thick layers of soft clays or loose sand. The results of this test are shown as 'N_c' on the bore logs, together with the number of blows per 150mm penetration.

Cone Penetrometer Testing and Interpretation
Cone penetrometer testing (sometimes referred to as Dutch Cone-CPT) described in this report, has been carried out using an electrical friction cone penetrometer and the test is described in Australian Standard 1289 test F5.1.

In the test, a 35mm diameter rod with cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig, which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130mm long sleeve, immediately behind the cone. Transducer in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output on continuous chart recorders. The plotted results in this report have been traced from the original records. The information provided on the charts comprises:

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

There are two scales available for measurement of cone resistance. The lower "A" scale (0-5Mpa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main "B" scale (0-50Mpa) is less sensitive and is shown as a full line.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative frictions in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and very soft clays, rising to 4% to 10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:

$$q_c \text{ (Mpa)} = (0.4 \text{ to } 0.6)\ N \text{ (blows per 300mm)}$$

In clays the relationship between undrained shear strength and cone resistance is commonly in the range:

$$q_c = (12 \text{ to} 18)\ C_u$$

Interpretation of CPT values can also be made to allow estimate of modulus or compressibility values to allow calculation of foundation settlements. Inferred stratification, as shown on the attached report, is assessed from the cone and friction traces, from experience and information from nearby boreholes etc.

Cone Penetrometer Testing and Interpretation continued
This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties and where precise information or soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometer (AS1289)
Portable dynamic cone penetrometer tests are carried out by driving a rod in to the ground with a falling weight hammer and measuring the blows per successive 100mm increments of penetration.

There are two similar tests, Cone Penetrometer (commonly known as Scala Penetrometer) and the Perth Sand Penetrometer. Scala Penetrometer is commonly adopted by this company and consists of a 16mm rod with a 20mm diameter cone end, driven with a 9kg hammer, dropping 510mm (AS 1289 Test F3.2).

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

Engineering Logs
The engineering logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, however, this is not always practicable or possible to justify economically. As it is, the boreholes represent only a small sample of the total sub-surface profile. Interpretation of the information and its application to design and construction should take into account the spacing of boreholes, frequency of sampling and the possibility of other than "straight line" variations between the boreholes.

Ground water
Where ground water levels are measured in boreholes, there are several potential problems:
- In low permeability soils, ground water although present, may enter the hole slowly, or perhaps not at all, during the investigation period.
- A localised perched water table may lead to a erroneous indication of the true water table.
- Water table levels will vary from time to time, due to the seasons or recent weather changes. They may not be the same at the time of construction as indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole if any water observations are to be made.

More reliable measurements can be made by installing stand pipes, which are read at intervals over several days, or weeks for low permeability soils. Piezometers sealed in a particular stratum may be interference from a perched water table or surface water.

Engineering Reports
Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal is changed, say to a twenty storey building. If this occurs, the company will be pleased to review the report and sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of sub-surface conditions, discussions of geotechnical aspects and recommendations or suggestions for design and construction. However, the company cannot always anticipate or assume responsibility for:
- Unexpected variations in ground conditions. The potential for this will depend partly on bore spacing and sampling frequency.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of contractors responding to commercial pressures.

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

Site Anomalies
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company request immediate notification. Most problems are much more readily resolved when conditions are exposed than at some later stage, well after the event.

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

Site Inspection

The Company will always be pleased to provide engineering inspection services for geotechnical aspect of work to which this report is related. This could range from a site visit to confirm that the conditions exposed are as expected, to full time engineering presence on site

Review of Design
Where major civil or structural developments are proposed, or where only a limited investigation has been completed, or where the geotechnical conditions are complex, it is prudent to have the design reviewed by a Senior Geotechnical Engineer.

Graphic Symbols For Soil and Rock

SOIL


Fill


Topsoil


Gravel (GW , GP)


Sand (SP, SW)


Silt (ML, MH)


Clay (CL, CH)


Clayey Gravel (GC)


Silty Sand (SM)


Clayey Sand (SC)


Sandy Silt (ML)


Gravelly Clay (CL, CH)


Silty Clay (CL, CH)


Sandy Clay (CL, CH)


Peat or Organic Soil

ROCK


Shale


Sandstone


Siltstone,Mudstone,Claystone


Granite, Gabbro


Dolerite, Diorite


Basalt, Andesite

Other Materials


Concrete


Bitumen, Asphaltic Concrete, Coal


Ironstone Gravel


Organic Material