



ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

SYDNEY CATHOLIC SCHOOLS

C/- MUNNS SLY MOORE ARCHITECTS PTY LTD

ON

DETAILED SITE INVESTIGATION – ASBESTOS

FOR

PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL DEVELOPMENT

AT

140 ELEVENTH AVENUE, AUSTRAL, NSW

31 OCTOBER 2016

REF: E27556KDrpt2



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Document Distribution Record		
Report Reference	Distribution	Report Date
E27556KDrpt2	Munns Sly Moore Architects	31 October 2016

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EXECUTIVE SUMMARY

Munns Sly Moore Architects Pty Ltd on behalf of Sydney Catholic Schools commissioned Environmental Investigation Services (EIS) to undertake a Detailed Site Investigation (DSI) for Asbestos Containing Material (ACM) for the proposed St Anthony of Padua Catholic School development at 140 Eleventh Avenue, Austral, NSW.

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

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed School development.

This report should be read in conjunction with the EIS reports identified and summarised in **Section 2.1**.

The primary aim of the assessment was to further assess the potential for Asbestos Containing Materials (ACM) at the site, required by EIS RAP (see **Section 2.1.2**).

Samples for the investigation were obtained from forty nine (49) sampling points on 11 and 12 October 2016. Four fibre cement fragments (HLF1 to HLF4) and fibre cement pipe (HLpipe) were located on the surface in the north-east section of the site. The sampling locations and the pipe location are shown on the attached Figure 2.

Asbestos fibres were detected in the four surface fibre cement fragments (HLF1 to HLF4). The fibre cement pipe fragment (HLpipe) was not sampled and is assumed to contain asbestos fibres. Asbestos fibres were also detected in a fibre cement fragment within the fill material in testpit location TP112 and in a matted material in testpit TP107.

The ACM impacted area appears to be located in the north-east section of the site. EIS have established a known ACM remediation area "Area A" as shown in Figure 4.

The ACM impacted fill material should be excavated and disposed of as to a suitably licensed NSW EPA landfill.

Friable Asbestos was detected at the site. A Class A licensed asbestos removalist should be engaged to undertake the excavation/ removal works. Air fibre monitoring is considered necessary due to the detection of friable ACM.

As detailed in the EIS 2016 RAP an Asbestos Management Plan (AMP) will need to be prepared and implemented. All other details provided within the EIS 2016 RAP should be implemented. The data gaps identified in **Section 8.5** of this report will need to be addressed during the proposed development.

EIS consider that the site can be made suitable for the proposed development provided that the recommendations provided in this report and the EIS 2016 RAP are implemented.

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

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

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ABBREVIATIONS

Ambient Background Concentrations	ABC
Added Contaminant Limits	ACL
Asbestos Containing Material	ACM
Australian Drinking Water Guidelines	ADWG
Area of Environmental Concern	AEC
Australian Height Datum	AHD
Asbestos Health Screening Levels	ASL
Acid Sulfate Soil	ASS
Above-Ground Storage Tank	AST
Below Ground Level	BGL
Bureau of Meteorology	BOM
Benzene, Toluene, Ethylbenzene, Xylene	BTEX
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	BTEXN
Cation Exchange Capacity	CEC
Contaminated Land Management	CLM
Construction Management Plan	CMP
Contaminant(s) of Potential Concern	CoPC
Chain of Custody	COC
Conceptual Site Model	CSM
Data Quality Indicator	DQI
Data Quality Objective	DQO
Detailed Site Investigation	DSI
Ecological Assessment Criteria	EAC
Ecological Investigation Levels	EILs
Ecological Screening Level	ESL
Environmental Management Plan	EMP
Excavated Natural Material	ENM
Environmental Protection Agency	EPA
Environmental Site Assessment	ESA
Ecological Screening Level	ESL
Fibre Cement Fragments	FCF
General Approvals of Immobilisation	GAI
General Solid Waste	GSW
Health Investigation Level	HILs
Hardness Modified Trigger Values	HMTV
Health Screening Level	HSLs
International Organisation of Standardisation	ISO
Lab Control Spike	LCS
Light Non-Aqueous Phase Liquid	LNAPL
Local Government Authority	LGA
Map Grid of Australia	MGA
National Association of Testing Authorities	NATA
National Environmental Protection Measure	NEPM
Organochlorine Pesticides	OCP
Organophosphate Pesticides	OPP

ABBREVIATIONS

Polycyclic Aromatic Hydrocarbons	PAH
Photo-ionisation Detector	PID
Practical Quantitation Limit	PQL
Preliminary Site Investigation	PSI
Quality Assurance	QA
Quality Control	QC
Remediation Action Plan	RAP
Relative Percentage Difference	RPD
Restricted Solid Waste	RSW
Site Assessment Criteria	SAC
Sampling, Analysis and Quality Plan	SAQP
Site Audit Statement	SAS
Site Audit Report	SAR
Specific Contamination Concentration	SCC
Standard Penetration Test	SPT
Semi-Volatile Organic Compounds	sVOC
Standard Sampling Procedure	SSP
Standard Water Level	SWL
Standard Sampling Procedure	SSP
Trip Blank	TB
Toxicity Characteristic Leaching Procedure	TCLP
Total Recoverable Hydrocarbons	TRH
Trip Spike	TS
Upper Confidence Limit	UCL
United States Environmental Protection Agency	USEPA
Underground Storage Tank	UST
Virgin Excavated Natural Material	VENM
Volatile Organic Compounds	VOC
Work Health and Safety	WHS

1 INTRODUCTION

Munns Sly Moore Architects Pty Ltd on behalf of Sydney Catholic Schools commissioned Environmental Investigation Services (EIS)¹ to undertake a Detailed Site Investigation (DSI) for Asbestos Containing Material (ACM) for the proposed St Anthony of Padua Catholic School development at 140 Eleventh Avenue, Austral, NSW. The site location is shown on Figure 1 and the assessment was confined to the site (stage 1) proposed development area as shown on Figure 2. The proposed development area is referred to as 'the site' in this report.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed School development.

This report should be read in conjunction with the EIS reports identified and summarised in **Section 2.1**.

1.1 Proposed Development Details

EIS were provided with revised proposed development plans prepared by Munns Sly Moore Architects Pty Ltd (Project Ref: 3970, Drawing No: A002-A004, A101, Revision 4, dated July 2016). A copy of the preliminary proposed development plans are attached in the appendices.

Based on the preliminary plans provided EIS understand that the proposed development is at this stage confined to the north and north-east section of the site within Lots 811 and 812 DP2475. The proposed development is referred to as the stage 1 and stage 2 area.

The proposed stage 1 development includes the demolition of a residential building in the north-west section of the site, adaptive re-use of the residential building in the north-east section of the site and the construction of a two level school building in the north-east section of the site. A hard stand car park and open play area will be constructed further to the north of the proposed school building.

No details of excavation for the proposed development have been provided to EIS at this stage. However, EIS anticipate that excavation will be required for site levelling purposes.

EIS understand that the remainder of the site will be developed at some stage in the future in line with demand.

1.2 Aim and Objectives

The primary aim of the assessment was to further assess the potential for Asbestos Containing Materials (ACM) at the site, required by EIS RAP (see **Section 2.1.2**).

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

The assessment objectives were to:

- Assess the potential for ACM in or on soil via implementation of a preliminary sampling and analysis program;
- Review the Conceptual Site Model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Review the waste classification for off-site disposal of soil from the site;
- Assess whether further intrusive investigation and/or remediation is required; and
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint).

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP43427KD) of 22 September 2016 and written acceptance from the client of 27 September 2016. The scope of work included the following:

- Review of site information, including previous EIS reports;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted site assessment criteria (SAC);
- Assessment of data quality; and
- Preparation of a report presenting the results of the assessment, including a CSM and Tier 1 risk assessment.

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

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Act (1997) ²
State Environmental Planning Policy No.55 – Remediation of Land (1998) ³
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998) ⁴
Guidelines for Consultants Reporting on Contaminated Sites (2011) ⁵

² NSW Government Legislation, (1997). *Contaminated Land Management Act 1997*. (referred to as CLM Act 1997)

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

⁴ Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

⁵ NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites*. (referred to as Reporting Guidelines 2011)

Guidelines/Regulations/Documents

Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006)⁶

National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)⁷

Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009⁸

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

⁷ National Environment Protection Council, (2013). *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 1999* (as amended 2013). (referred to as NEPM 2013)

⁸ Western Australian Department of Health (WADoH), (2009), *Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WADoH 2009).

2 SITE INFORMATION

2.1 Background

2.1.1 Stage 1 Environmental Site Assessment (April, 2016⁹)

The Catholic Education Office Sydney commissioned EIS to undertake a Stage 1 Environmental Site Assessment (ESA) for the proposed school development at 135, 135a, 145, 155, 165 Tenth Avenue and 140, 160, 170 Eleventh Avenue, Austral, NSW (referred to as the wider area).

The objectives of the ESA were to: Assess the potential risk for widespread soil contamination at the wider area; assess the potential for dam water contamination at 140 Eleventh Avenue, Austral; assess the potential risk to human health and the environment posed by the contaminants; provide a preliminary waste classification for the off-site disposal of soil that may need to be excavated for the development and comment on the suitability of the wider area for the proposed landuse.

The scope of work included: Preparation of site specific Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs); a review of site information and site history documents; a site inspection to identify areas of environmental concern (AEC); preparation of a Preliminary Conceptual Site Model (CSM) to outline the AEC, Potential Contaminants of Concern (PCC) and potential receptors; design and implementation of a field sampling and laboratory analysis program; interpretation of the analytical results against the adopted Site Assessment Criteria (SAC) and preparation of a report presenting the results of the assessment.

Samples for the investigation were obtained from sixty (60) evenly spaced sampling points (testpits). This density is approximately 55% of the minimum sampling density recommended by the NSW EPA Sampling Design Guidelines 1995 for a site of this area.

An elevated concentration of lead (460mg/kg) was encountered in the fill soil sample TP52 (0.7-1.0m) above the NEPM adopted SAC of 300mg/kg. Statistical analysis using Pro UCL (version 5.0) indicated that the fill soil lead data set obtained from testpits TP50 to TP60 passed the assessment criteria.

All remaining results were below the adopted SAC. However, ACM (fibre cement fragments) were encountered in the following samples:

- Fill soil sample TP4 (0-0.2m) located in the south-east section of the wider area adjacent and immediately to the north of the residential building at 145 Tenth Avenue;
- Fill soil sample TP29 (0.1m) located in the north-east section of the wider area immediately adjacent and to the north-east of the wider area shed at 160 Eleventh Avenue;
- Surface sample SS1 located adjacent to a small shed at 145 Tenth Avenue;
- Building sample B1, obtained from a building to the east of the residential building at 145 Tenth Avenue;

⁹ EIS, (2016), *Report to Catholic Education Office Sydney on Stage 1 Environmental Site Assessment for Proposed School Due Diligence Development at 135,135A,145,155,165 Tenth Avenue and 140,160,170 Eleventh Avenue, Austral, NSW*. (Report Ref: E27556KDrptRev3, dated 21 April 2016) (referred to as EIS 2016 Stage 1 ESA)

- Surface sample SS2 located within the northern garden bed at 155 Tenth Avenue;
- Surface sample FJS1 located in the north-east section of the wider area immediately adjacent and to the north of the site shed at 160 Eleventh Avenue;
- Fill soil sample TP57 (0.15m) located in the north-west section of the wider area identified as 135 Tenth Avenue; and
- Fill soil sample TP30 (0.2m) located in the south-west section of the wider area identified as 135 Tenth Avenue.

The asbestos containing materials identified at the site are considered to be non-friable (i.e bound within a cement matrix and unable to be crumbled by hand).

EIS note that ACM were not identified at 140 Eleventh Ave, Austral (the proposed Stage 1 development area).

Due to the discrete nature of asbestos containing materials in fill, it is likely that additional asbestos containing materials are located within the fill at the wider area, particularly in sections of the wider area where buildings may have been demolished in the past.

EIS classified the fill material at the wider area as 'Generals Solids Waste - containing asbestos' in accordance with the NSW EPA Waste Classification Guidelines 2014.

EIS provided the following options for addressing the ACM issues at the wider area:

1. Excavation and off-site disposal of all of the topsoil/fill material from across the wider area to a suitably NSW EPA Licenced facility; or
2. Undertake a detailed soil investigation (DSI) for ACM in accordance with the Western Australian Asbestos Guidelines 2009 (endorsed in NEPM 2013) to assess if ACM hot spot areas can be estimated for remediation purposes.

EIS considered that the wider area could be made suitable for the proposed landuse/development provided that the following recommendations are implemented to address the data gaps and to better characterise the risks:

- A Hazardous Materials Assessment (Hazmat) is undertaken for the existing buildings prior to the commencement of demolition works;
- The issue of ACM in the soil is resolved by either removing all of the topsoil/fill or identifying the extent of the problem and undertaking targeted remediation;
- A Remediation Action Plan (RAP) is prepared. The RAP will include remedial measures to be implemented to render the wider area suitable for the proposed landuse. EIS have subsequently prepare a RAP for the wider area (see **Section 2.1.1**);
- A Validation Assessment (VA) is prepared. The VA will document the success of the remediation works;
- An Asbestos Management Plan (AMP) is prepared for the wider area and the proposed construction works; and

- Inspections during demolition and excavation work are undertaken to assess any unexpected conditions or subsurface facilities that may be discovered between investigation locations. This should facilitate appropriate adjustment of the works programme and schedule in relation to the changed site conditions. Inspections should be undertaken by experienced environmental personnel.

2.1.2 Remediation Action Plan (May, 2016¹⁰)

Munns Sly Moore Architects Pty Ltd on behalf of Sydney Catholic Schools commissioned EIS to prepare a Remediation Action Plan (RAP) for the proposed St Anthony of Pauda Catholic School development at 135, 135a, 145, 155, 165 Tenth Avenue and 140, 160, 170 Eleventh Avenue, Austral, NSW (the wider area, including the current school and future school development areas).

A RAP was required for the wider area as a result of identified of ACM in the EIS 2016 Stage 1 ESA.

The scope of work included the following: a review of background information; identification of potential remediation options; outline the remediation procedures; outline the validation sampling and analysis plan for the remediation work.

EIS understood that the earthworks for the proposed development/s would likely include the stripping of the topsoil/fill layer (root impacted soils) to a depth of approximately 0.2mbgl to 0.3mbgl over the majority of the wider area. The majority of the fill material will be disposed off-site to a NSW Licenced landfill facility, removing the majority of the ACM encountered within the fill. Therefore, EIS considered that the most viable option for remediation in this area was excavation of the contaminated fill material and off-site disposal to an appropriate facility.

EIS indicated that further assessment of ACM hot spot areas could be undertaken by a Detailed Site Investigation (DSI) in accordance with the Western Australian Asbestos Guidelines 2009 (endorsed by NEPM 2013). This could be undertaken either across the wider area prior to development or in sections of the wider area as they are progressively developed, with remaining fills soil to be validated by the DSI for ACM.

The Western Australian Asbestos Guidelines 2009 provide criteria for guidelines concentrations of ACM depending on the site use. However, for the assessment of ACM impacted areas for remediation purposes at this site, EIS proposed that the presence/absence of ACM is adopted as the site assessment criteria (SAC). This adoption of the presence/absence of ACM as the SAC was based on information provided to EIS by the client from Sydney Catholic Schools.

¹⁰ EIS, (2016), *Report to Sydney Catholic Schools C/- Munns Sly Moore Architects on Stage 1 Remediation Action Plan for Proposed St Anthony of Pauda Catholic School Development at 135,135A,145,155,165 Tenth Avenue and 140,160,170 Eleventh Avenue, Austral, NSW.* (Report Ref: E27556KDrpt-RAP, dated 12 May 2016) (referred to as EIS 2016 RAP)

An Asbestos Management Plan (AMP) will be required should any excavation works be undertaken at the wider area. Further details regarding the remediation works are detailed in the RAP.

2.2 Site Identification and Regional Setting

Table 2-1: Site Identification and Regional Setting

Current Site Owner:	'The Trustees of the Roman Catholic Church for the Archdiocese of Sydney'.
Site Address:	Part of 140 Eleventh Avenue, Austral, NSW
Lot & Deposited Plan:	Lot 812 DP2475 and Part of Lot 811 DP2475
Current Land Use:	Rural/residential
Proposed Land Use:	School
Local Government Authority (LGA):	Liverpool City Council
Area of Proposed Development (m ²):	15,400
RL (AHD in m) (approx.):	71-74
Geographical Location (lat/long) (approx.):	S: 33°55'49.82" E: 150°48'33.43"
Regional Geology:	A review of the regional geological map of Penrith (1991 ¹¹) indicates that the site is underlain by Bringelly Shale of the Wianamatta Group, which typically consists of shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff.
Hydrogeology:	The stratigraphy of the site is expected to consist of residual clayey soils overlying relatively shallow bedrock. Based on these conditions and the results of the groundwater bore search, groundwater is not considered to be a significant resource for abstraction purposes in the immediate vicinity of the site. A perched aquifer located in the shallow subsurface is not considered to be a resource due to high salinity, poor water quality and low yield.
Receiving Water Bodies:	A dam is located in the south-east corner of the site (at No. 140 Eleventh Avenue, Austral). Surface water in the immediate vicinity of the dam would be expected to flow towards the dam. Based on the proposed

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

	development plans provided to EIS the dam appears to remaining as a site feature.
NSW EPA Records:	There were no notices for the site under Section 58 of the Act. The site is not listed on the NSW EPA register. There were no notices for the site on the POEO register.
Site Location and Regional Setting:	The site is located approximately 250m to the east of the junction of Fourth Avenue and Eleventh Avenue and on the south side of Eleventh Avenue. The site is located approximately 300m to the north-east of Kemps Creek.
Topography:	The regional topography is characterised by a hill slope that generally falls to the south and south-west towards Kemps Creek. The natural site topography has been altered to accommodate the existing residential building. The overall topography of the site falls to the south-west at slopes between 1-2°.
Site inspection:	A walkover inspection was undertaken on 11 and 12 October 2016. The site and immediate surrounds generally appeared similar to the layout outlined in the EIS 2016 Stage 1 ESA Report. However, it appeared that the building in the north-east section of the site was used for office space. EIS understand that this building will be utilised as the administration building for the proposed school. Some site disturbance/earth works appeared to have been recently undertaken in the north and north east section of the site. Potential ACM was identified on the surface in this area. Further details are provided in Section 3.1. Photographs obtained during the site inspection are attached in the appendices.
Surrounding Landuse:	The site is located in a predominantly rural/residential area of Austral.

3 **CONCEPTUAL SITE MODEL**

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

3.1 **Potential Contamination Sources/AEC and CoPC**

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 3-1: Potential Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
<u>Fill material</u> - The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.	Asbestos
<u>Hazardous Building Material</u> – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site.	Asbestos

ACM were identified as part of the EIS 2016 Stage 1 ESA on the surface and within the fill material within the wider area.

During the site inspection EIS field staff observed a number of potential ACM (Fibre cement Fragment and piping) and building rubble (bricks and concrete) in the north-east section of the site adjacent to the administration building. We note that potential ACM were not observed during the site inspection undertaken on 3 Septembers 2015 as part of the EIS 2016 Stage 1 ESA. The grass cover in this section of the site appeared to have been disturbed. EIS cannot rule out the possibility that fill material may have been imported onto the site since the EIS site inspection on 3 Septembers 2015.

3.2 **Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways**

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 3-2: CSM

Potential mechanism for contamination	Potential mechanisms for contamination include:
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	• Fill material – importation of potential ACM impacted material; and • Hazardous building materials – demolition of former building shed resulting in surficial impacts.
Affected media	Soil and potential for generation of air borne asbestos fibres.
Receptor identification	Human receptors include site occupants/users, construction workers and intrusive maintenance workers.
Potential Exposure pathways	Potential exposure pathways relevant to the human receptors include inhalation of asbestos fibres. The potential for exposure would typically be associated with the construction and excavation works, and use of unpaved areas (i.e. the gardens).

4 SAMPLING, ANALYSIS AND QUALITY PLAN

4.1 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site. The DQO process is detailed in the Site Auditor Guidelines 2006 and the USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). These steps are applicable to this assessment as summarised in the table below:

Table 4-1: DQOs – Seven Steps

Step	Input
State the Problem	The CSM (see Section 3) has identified AEC at the site which may pose a risk to the site receptors. The EIS 2016 RAP requires that a Detailed Site Investigation (DSI) is required to assess the risk and comment on the suitability of the site for the proposed development or intended landuse.
Identify the Decisions/ Goal of the Study	The data collection is project specific and has been designed based on the following information: • Review of site information including; • AEC, CoPC, receptors, pathways and medium identified in the CSM; • Development of SAC; ; and • The use of decision statements outlined below: 1. Do any of the sampled materials or soils contain asbestos? 2. Has the extent of the contamination been identified? 3. Do the contaminants pose a risk to the receptors? 4. Is further investigation required? 5. Do the results impact on the remediation details provided in the EIS 2016 RAP? 6. Is the site suitable for the proposed landuse?
Identify Information Inputs	The following information will be collected: • Soil samples based on subsurface conditions; • Fibre Cement Fragments (FCF) in the vicinity of the sampling points; • The SAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report; • The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013; and • Any additional information that may arise during the field work will also be used as data inputs.
Define the Study Boundary	The sampling will be confined to the site boundaries as shown in Figure 2. Fill has been identified as an AEC. The source of fill has not been established. Fill is considered to be heterogeneous material with the potential for CoPC occurring in random pockets or layers. The presence of CoPC in between sampling points cannot be measured.

Step	Input
	The areas excluded from the investigation are outlined in the data gaps.
Specify the performance or acceptance criteria	NEPM 2013 defines decision errors as '<i>incorrect decisions caused by using data which is not representative of site conditions</i>'. This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as '<i>total study error</i>'. The study error can be managed through the correct choice of sample design and measurement. Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. In this case, for example, the CoPC identified in the CSM is considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.
Optimise the design for obtaining data	The most resource-effective design will be used in an optimum manner to achieve the assessment objectives.

4.2 Soil Sampling Plan and Methodology

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

Table 4-2: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The NSW EPA Contaminated Sites Sampling Design Guidelines (1995¹²) recommend a sampling density for an environmental assessment based on the size of the investigation area. The guideline provides a minimum number of sampling points required for the investigation on a systematic sampling pattern. For a DSI for asbestos, the NEPM 2013 and WADoH 2009 recommends an amended sampling density of two times the minimum density specified in the EPA Sampling Design Guidelines 1995. The amended sampling density for an area of 15,400m² is fifty (50) evenly spaced sampling points. Samples for this investigation were obtained from forty nine (49) sampling points as shown on the attached Figure 2. This density is approximately 98% of the minimum sampling density recommended. However, due to the irregular shaped of the site and access limitations EIS consider the adopted sampling density to be sufficient to meet the requirements of a DSI for ACM.

¹² NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines*. (referred to as EPA Sampling Design Guidelines 1995)

Aspect	Input
Sampling Plan	The sampling locations were placed on a systematic plan with a grid spacing of approximately 15m between sampling locations. A systematic plan was considered suitable to address potential ACM associated with fill material and to assess the extent of ACM at the site.
Exclusion Areas (Data Gaps)	Sampling was not undertaken in inaccessible areas of the site such as beneath the existing administration building in the north-east section of the site and beneath the sheds in the south-west section of the site. These areas have been excluded from the investigation.
Sampling Equipment	Soil samples were obtained on 11 and 12 October 2016 in accordance with the standard sampling procedure (SSP) attached in the appendices. Sampling locations were set out using a hand held GPS unit (with an accuracy of $\pm 5\text{m}$). In-situ sampling locations were cleared for underground services by an external contractor prior to sampling as outlined in the SSP. The sample locations were excavated using the following equipment as shown on the test pit logs attached in the appendices: • Hand equipment (shovel) in hard to access areas at sampling locations TP107 and TP108; and • Excavator bucket. Samples were obtained directly from the bucket using hand equipment (i.e. trowel, rake).
Sampling Collection and Field QA/QC	Soil samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. For DSI sampling the following method was adopted: • The test pit walls, base and excavated material was visually inspected; • A 10L bulk sample was obtained from the excavated fill spoil. One sample was obtained per profile (if more than 1); • Each 10L sample was manually sieved through a 7mm sieve; • For material that could not be sieved, the material was spread out over a contrasting support, disaggregated and inspected; • Any suspected ACM encountered during sieving/spreading was sampled and recorded; and • A 500mL sample of soil fines sample was obtained from the testpit wall. Suspected ACM observed on the surface of the site during systematic site walk over inspection were sampled. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date in accordance with the SSP.

Aspect	Input
Decontamination and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water. On completion of the fieldwork, the samples were delivered to a NATA registered laboratory for analysis under standard COC procedures.

4.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 4-3: Analytical Schedule

CoPC	Surface Samples (FCF)	Suspected ACM within Fill material	Fill Soil Samples	Natural Soil Samples
Asbestos	4	3	52	2

4.3.1 Laboratory Analysis

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

Table 4-4: Laboratory Details

Samples	Laboratory	Report Reference
All samples	EnviroLab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	15278

5 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for the assessment is outlined in the table below. The SAC has been derived from the NEPM 2013, other guidelines as applicable and Sydney Catholic Schools requirements for school sites. The guideline values for individual contaminants are presented in the attached report tables.

Table 5-1: SAC Adopted for this Investigation

Guideline	Applicability
Asbestos in Soil	The Western Australian Asbestos Guidelines 2009 has been adopted for the Detailed Site Investigation (DSI). However, the 'presence/absence' of asbestos in soil has been adopted as the assessment criterion based on Sydney Catholic Schools requirements for school sites.
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014 ¹³) has been adopted to classify the material for off-site disposal.

¹³ NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste*. (referred to as Waste Classification Guidelines 2014)

6 INVESTIGATION RESULTS

6.1 Surface Inspection for potential ACM

Potential ACM were identified on the surface in the north-east section of the site as shown in Figure 2. Four fibre cement fragments (HLF1 to HLF4) were forwarded to the laboratory for asbestos analysis. A fibre cement pipe (HLpipe) was also identified on the surface in the north-east section of the site. The pipe was not sampled and is presumed to contain asbestos.

6.2 Subsurface Conditions

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

Table 6-1: Summary of Subsurface Conditions

Profile	Description (m in bgl)
Fill	Fill material was encountered at the surface or beneath the pavement in all testpits (except TP103 and TP109) and extended to depths of approximately 0.2 to 1.2. The fill typically comprised of: silty clay and silty clay topsoil. The fill contained inclusions of: ironstone gravel, ash, concrete and glass fragments. Potential ACM was identified within the fill material at the following locations: • TP107 (0-0.3m) - fibre cement fragment; • TP108 (0-0.15m) – material; and • TP112 (0-0.2m) - matted white material. The above potential ACM were forwarded to the laboratory for asbestos analysis.
Natural Soil	Natural silty clay was encountered at the surface at testpits TP103 and TP109. Silty clay was encountered beneath the fill material in the remainder of the testpits.
Groundwater	Groundwater seepage was not encountered in the excavation of the testpit. All testpits remained dry on completion of drilling and a short time after.

6.3 Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. The site contamination data is shown in Figure 3. A summary of the results assessed against the SAC is presented below.

Table 6-2: Summary of Soil Laboratory Results

Analyte	Results Compared to SAC
Asbestos	Asbestos was detected in the following samples analysed for the investigation: • HLF1; • HLF2; • HLF3; • HLF4; • ASF3/ TP107 (0-0.3m); and • ASF1/ TP112 (0-0.2). Asbestos fibres were not detected within the fill material at concentrations above the NEPM 2013 and WA 2009 SAC.

7 **DATA QUALITY ASSESSMENT**

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

Table 7-1: Assessment of DQIs

Completeness

Field Considerations:

- The investigation was designed to target the AEC identified at the site. A sampling plan was adopted based on the AEC as outlined in the report;
- Samples were obtained from various depths based on the subsurface conditions encountered at the sampling locations. All samples were recorded on the test pit logs. All sampling points are shown on the attached Figure 2;
- The investigation was undertaken by trained staff in accordance with the SSP; and
- Documentation maintained during the field work is attached in the appendices where applicable.

Laboratory Considerations:

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

Comparability

Field Considerations:

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

Laboratory Considerations:

- All samples were analysed in accordance with the analytical methods outlined in NEPM 2013; and
- Appropriate PQLs were used by the laboratory for all analysis (other than those outlined above).

Representativeness

Field Considerations:

- The investigation was designed to obtain appropriate media encountered during the field work as outlined in the SAQP. Dust sampling was outside the scope of this assessment; and
 - All media identified in the SAQP was sampled.
-

Laboratory Considerations:

All samples were analysed in accordance with the SAQP.

Precision

Field Considerations:

The investigation was undertaken in accordance with the SSP.

Accuracy

Field Considerations:

The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

The analytical quality assessment adopted by the laboratory was in accordance with the NATA and NEPM 2013 requirements as outlined in the analytical report.

8 **TIER 1 RISK ASSESSMENT AND REVIEW OF CSM**

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

8.1 **Review of ACM Results and Condition**

ACM has been identified on the surface and within the fill material at the site. A summary of the detected ACM, suspected ACM and the condition of the materials is presented in the table below:

Table 8-1: Summary of Identified ACM and Condition

Sample ID	Sample Description	Assessment of suspected ACM Condition for Management by EIS Licensed Asbestos Assessor
HLF1	Fibre cement fragment on surface.	Degraded condition and considered friable.
HLF2	Fibre cement fragment on surface.	Fair conditions and considered non friable.
HLF3	Fibre cement fragment on surface.	Degraded condition and considered friable.
HLF4	Fibre cement fragment on surface.	Fair conditions and considered non friable.
HLpipe	Pipe fibre cement fragment (presumed to contain asbestos). Not sampled or analysed.	Fair conditions and considered non friable.
ASF1/ TP107 (0-0.3m)	Fibre cement fragment identified within fill material	Fair conditions and considered non friable.
ASF3/ TP112 (0-0.2m)	Matted material identified within the fill material	Matted material and considered friable.

8.2 **Identified Receptors and Pathways**

The identified potential receptors include human receptors site occupants/users, construction workers and intrusive maintenance workers.

Potential exposure pathways relevant to the human receptors include inhalation of asbestos fibres. The potential for exposure would typically be associated with the construction and excavation works, and use of unpaved areas (i.e. the gardens).

EIS are of the opinion that the risk posed to human receptors is moderate to high and will require remediation.

8.3 ACM Fate and Transport of Contaminants

The potential transport of asbestos fibres is associated with the disturbance of asbestos contaminated soils and release of fibres into the atmosphere. This is likely to occur during excavation works.

A number of studies have found that soils effectively filter out asbestos fibres and retain them within the soil matrix. The studies concluded that there is no significant migration of asbestos fibres, either through soil or groundwater.

8.4 Source and Extent of Contamination

8.4.1 Sources

A review of the site information indicates that the site is located in an area which has been historically filled to achieve existing levels. The ACM is likely to have been imported onto the site along with the fill.

Additionally EIS note that potential ACM were not observed on the surface during the site inspection undertaken on 3 September 2015 as part of the EIS 2016 Stage 1 ESA. Based on site observations undertaken for the DSI the grass cover in this section of the site appeared to have been disturbed. EIS cannot rule out the possibility that fill material may have been imported onto the site since the EIS site inspection 3 September 2015.

8.4.2 Known Extent

A DSI is the most conservative investigation/ assessment approach for ACM in or on soil. Based on the results of the investigation, for remediation purposes the fill material in the north-east section of the site should be treated as containing ACM.

EIS have assessed the horizontal extent of the ACM fill impacted area to extend to the north and east boundary and to the closest testpits in which ACM was not encountered. The remediation area is identified as Area A and shown on Figure 4 attached.

The fill ranges in depth from approximately 0.2m to 1.0m below ground level in the remediation area A as shown on the attached Figure 4.

8.4.3 Unknown Extent

Sampling was not undertaken in the north-east section of the site beneath the administration building and in the south-west section of the site beneath the sheds. ACM may be located within the fill soil beneath the buildings. Further assessment is required to assess for potential ACM beneath these buildings.

The majority of the site is grassed. Due to the discrete nature of ACM in or on soils, a site inspection should be undertaken following the removal of the grass cover at the site for the visual assessment of potential ACM. The inspection should be undertaken by a NSW WorkCover licensed Asbestos Assessor and an Asbestos Clearance certificate issued.

8.4.4 Hazardous Building Materials in Existing Buildings

There is a possibility of the presence of hazardous building materials in the existing buildings at the site. This is considered to pose a relatively low risk to the receptors provided that the demolition works are undertaken in accordance with the relevant codes and standards.

8.5 Data Gaps

The assessment has identified the following data gaps:

- Areas beneath the existing buildings have not been included in the assessment; and
- The presence of hazardous building materials in the existing buildings has not been assessed.

9 WASTE CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL

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

Table 9-1: Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Remediation Area A (see Figure 4)	General Solid Waste (non-putrescible) (GSW) containing asbestos	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.
Fill material over the remainder of the proposed development area.	General Solid Waste (non-putrescible) (GSW)	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation. Alternatively, the fill material is considered to be suitable for re-use on the subject site (only) provided it meets geotechnical and earthwork requirements.
Natural silty clay soil	Virgin excavated natural material (VENM)	VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

10 **CONCLUSION**

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

Table 10-1: Decision Statements

Decision Statements	Decision Results
1. Do any of the sampled materials or soils contain asbestos?	Yes (see Section 8). Asbestos was detected in the north-west section of the site in four surface fibre cement fragments. A fibre cement pipe fragment also located on the surface in this area was assumed to contain asbestos. Asbestos was also detected in a fibre cement fragment within the fill material in testpit location TP112 and matted material in testpit TP107.
2. Has the extent of contamination been identified?	Yes. However further assessment is required for validation purposes.
3. Do the contaminants pose a risk to site receptors?	Yes.
4. Is further investigation required?	Yes. The data gaps in Section 8.5 should be addressed.
5. Do the results impact on the remediation details provided in the EIS 2016 RAP?	Yes. Friable Asbestos has been detected at the site. A Class A licensed asbestos removalist should be engaged to undertake the excavation/ removal works. Air fibre monitoring is considered necessary due to the detection of friable ACM. As detailed in the EIS 2016 RAP an Asbestos Management Plan (AMP) will need to be prepared and implemented. All other details provided within the EIS 2016 RAP should be implemented. This report should be read in conjunction with the EIS 2016 RAP.
6. Is the site suitable for the proposed landuse?	EIS consider that the site can be made suitable for the proposed development provided that the recommendations provided in this report and the EIS 2016 RAP are implemented.

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

10.1 Regulatory Requirement

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

Table 10-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2015 ¹⁴	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. After successful implementation of the RAP, the site contamination is unlikely to meet the Notification Triggers.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.
POEO (waste) Regulation 2014	Clause 79 of the Protection of the Environment Operations (waste) Regulation 2014 requires waste transporters to provide information to the NSW EPA regarding the movement of any load in NSW of more than 10 square meters of asbestos sheeting, or 100 kilograms of asbestos waste. To fulfil these legal obligations, asbestos waste transporters must use WasteLocate.
Dewatering Approval	In the event groundwater is intercepted during excavation works, dewatering will be required. Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system.
WHS Code of Practice 2011 ¹⁵	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.
WHS Code of Practice 2011 ¹⁶	Section 3.6 indicates a licensed asbestos removalist must notify the regulator (SafeWork NSW) in writing at least 5 days before the licensed asbestos removal works commence.

¹⁴ NSW Department of Environment and Climate Change, (2015), *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. (referred to as Duty to Report Contamination 2015)

¹⁵ WHS Regulation, (2011), *Code of Practice – How to Manage and Control Asbestos in the Workplace*.

¹⁶ WHS Regulation, (2011), *Code of Practice – How to Safely Remove Asbestos*.

11 **LIMITATIONS**

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

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IMPORTANT INFORMATION ABOUT THIS REPORT

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

The Report is based on a Unique Set of Project Specific Factors

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

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

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

Changes in Subsurface Conditions

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

This Report is based on Professional Interpretations of Factual Data

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

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

Assessment Limitations

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

Misinterpretation of Site Assessments by Design Professionals

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

Logs Should not be Separated from the Assessment Report

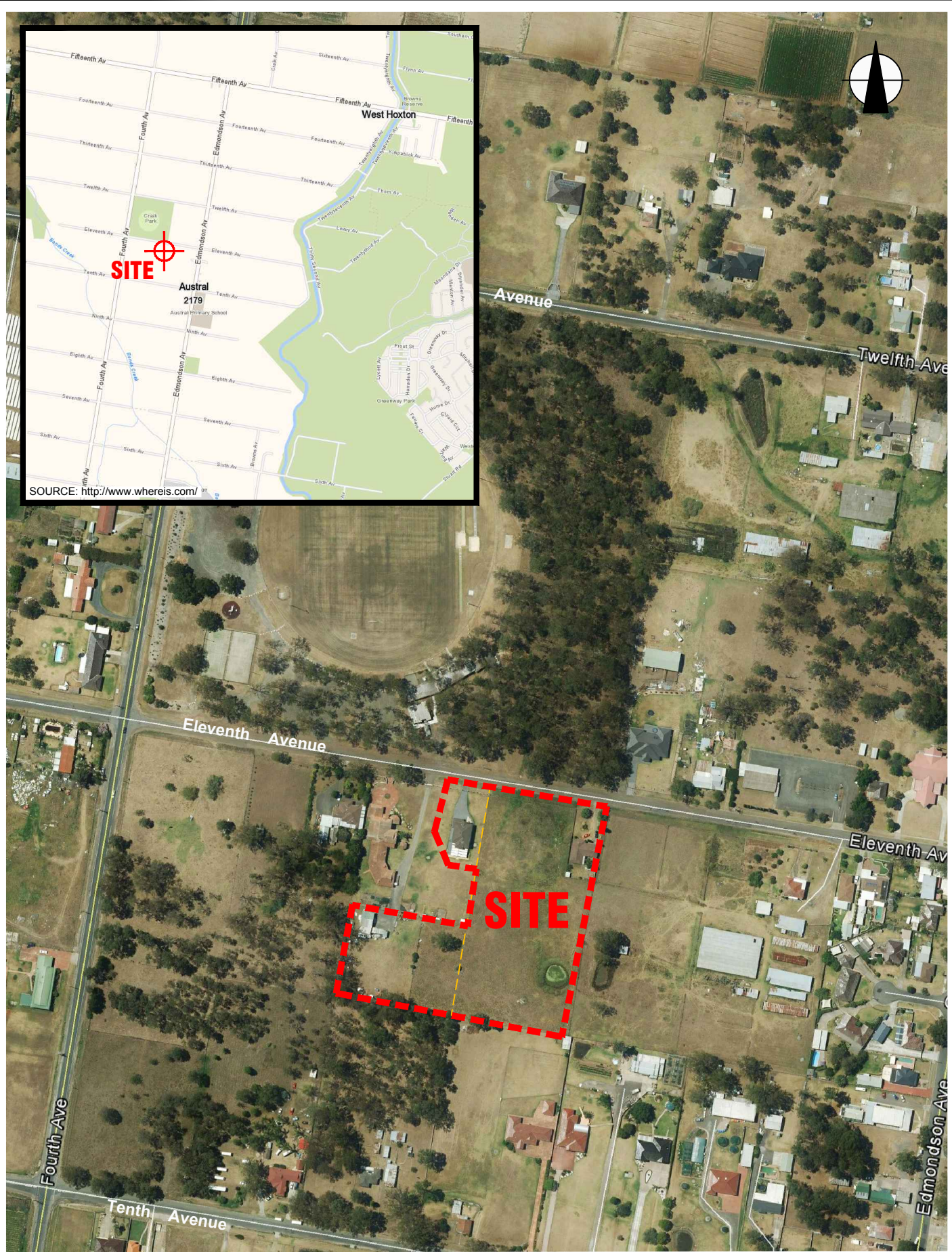
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

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

Read Responsibility Clauses Closely

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

REPORT FIGURES



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

Title:		SITE LOCATION PLAN	
Location:		140 ELEVENTH AVENUE AUSTRAL, NSW	
Report No:		E27556KD rpt2	Figure No: 1
ENVIRONMENTAL INVESTIGATION SERVICES			



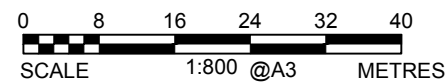
This plan should be read in conjunction with the EIS report.

PLOT DATE: 31/10/2016 9:35:07 AM DWG FILE: S:\5 EIS\5C EIS JOBS\27000\5\27556K AUSTRAL\CAD\27556KDRPT2.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- TP(Fill Depth) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)



This plan should be read in conjunction with the EIS report.

Title: SAMPLE LOCATION PLAN	
Location: 140 ELEVENTH AVENUE AUSTRAL, NSW	
Report No: E27556KDrpt2	Figure No: 2
ENVIRONMENTAL INVESTIGATION SERVICES	



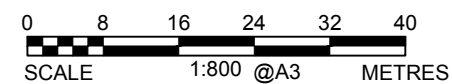
PLOT DATE: 31/10/2016 9:38:19 AM DWG FILE: S:\5 EIS\5C EIS JOBS\27556K AUSTRAL\CAD\E27556KDRPT2.DWG



LEGEND

- - - APPROXIMATE SITE BOUNDARY
- TP(Fill Depth) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
- x HLF SURFACE SAMPLE LOCATION

- ASBESTOS DETECTED OR PRESUMED TO CONTAIN ASBESTOS



This plan should be read in conjunction with the EIS report.

Title: CONTAMINATION DATA PLAN	
Location: 140 ELEVENTH AVENUE AUSTRAL, NSW	
Report No: E27556KDrpt2	Figure No: 3
ENVIRONMENTAL INVESTIGATION SERVICES	



PLOT DATE: 31/10/2016 9:46:17 AM DWG FILE: S:\5 EIS\5C EIS JOBS\27000\05\27556K AUSTRAL\CAD\E27556KDRPT2.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- + TP(Fill Depth) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
- x HLF SURFACE SAMPLE LOCATION

 REMEDIATION "AREA A"

0 8 16 24 32 40
SCALE 1:800 @A3 METRES

This plan should be read in conjunction with the EIS report.

Title: REMEDIATION AREA PLAN	
Location: 140 ELEVENTH AVENUE AUSTRAL, NSW	
Report No: E27556KDrpt2	Figure No: 4
ENVIRONMENTAL INVESTIGATION SERVICES	



LABORATORY SUMMARY TABLES

TABLE A SUMMARY OF PRESENCE/ABSENCE OF ASBESTOS				
			ASBESTOS	
			Asbestos ¹	Asbestos (NEPM 2013) ²
PQL - Envirolab Services			100	100
Sample Reference	Sample Depth	Sample Description		
TP101	0-0.3	Fill: silty clay	NA	Not detected
TP102	0-0.4	Fill: silty clay	NA	Not detected
TP103	0-1.1	Silty clay	NA	Not detected
TP104	0-0.3	Fill: silty clay	NA	Not detected
TP105	0-0.7	Fill: silty clay	NA	Not detected
TP106	0-0.2	Fill: silty clay	NA	Not detected
TP107	0-0.3	Fill: silty clay	NA	Not detected
TP108	0-0.15	Fill: silty clay	NA	Not detected
TP109	0-0.9	Silty clay	NA	Not detected
TP110	0-0.5	Fill: silty clay	NA	Not detected
TP110	0.5-0.9	Fill: silty clay	NA	Not detected
TP111	0-0.5	Fill: silty clay	NA	Not detected
TP112	0-0.2	Fill: silty clay	NA	Not detected
TP113	0-0.2	Fill: silty clay	NA	Not detected
TP114	0-0.2	Fill: silty clay	NA	Not detected
TP115	0-0.2	Fill: silty clay	NA	Not detected
TP116	0-0.2	Fill: silty clay	NA	Not detected
TP117	0-04	Fill: silty clay	NA	Not detected
TP118	0-0.4	Fill: silty clay	NA	Not detected
TP119	0-0.2	Fill: silty clay	NA	Not detected
TP120	0-0.2	Fill: silty clay	NA	Not detected
TP121	0-0.3	Fill: silty clay	NA	Not detected
TP122	0-0.2	Fill: silty clay	NA	Not detected
TP122	0.5-0.9	Fill: silty clay	NA	Not detected
TP123	0-0.2	Fill: silty clay	NA	Not detected
TP124	0-0.7	Fill: silty clay	NA	Not detected
TP124	0.7-0.8	Fill: silty clay	NA	Not detected
TP125	0-0.5	Fill: silty clay	NA	Not detected
TP125	0.5-1.0	Fill: silty clay	NA	Not detected
TP126	0-0.3	Fill: silty clay	NA	Not detected
TP126	0.3-08	Fill: silty clay	NA	Not detected
TP127	0-0.2	Fill: silty clay	NA	Not detected
TP128	0-0.2	Fill: silty clay	NA	Not detected
TP129	0-0.2	Fill: silty clay	NA	Not detected
TP130	0-0.3	Fill: silty clay	NA	Not detected
TP131	0-0.3	Fill: silty clay	NA	Not detected
TP132	0-0.3	Fill: silty clay	NA	Not detected
TP133	0-0.2	Fill: silty clay	NA	Not detected
TP134	0-0.3	Fill: silty clay	NA	Not detected
TP135	0-0.2	Fill: silty clay	NA	Not detected
TP136	0-0.4	Fill: silty clay	NA	Not detected
TP137	0-0.2	Fill: silty clay	NA	Not detected
TP138	0-0.2	Fill: silty clay	NA	Not detected
TP139	0-0.1	Fill: silty clay	NA	Not detected

TABLE A SUMMARY OF PRESENCE/ABSENCE OF ASBESTOS				
			ASBESTOS	
			Asbestos ¹	Asbestos (NEPM 2013) ²
PQL - Envirolab Services			100	100
Sample Reference	Sample Depth	Sample Description		
TP140	0-0.2	Fill: silty clay	NA	Not detected
TP141	0-0.15	Fill: silty clay	NA	Not detected
TP142	0-0.2	Fill: silty clay	NA	Not detected
TP143	0-0.15	Fill: silty clay	NA	Not detected
TP144	0-0.2	Fill: silty clay	NA	Not detected
TP145	0-0.3	Fill: silty clay	NA	Not detected
TP146	0-0.4	Fill: silty clay	NA	Not detected
TP147	0-0.4	Fill: silty clay	NA	Not detected
TP148	0-0.2	Fill: silty clay	NA	Not detected
TP149	0-0.3	Fill: silty clay	NA	Not detected
ASF1/ TP112	0-0.2	Material	Asbestos detected	NA
ASF2/ TP108	0-0.15	Material	Not detected	NA
ASF3/ TP107	0-0.3	Material	Asbestos detected	NA
HLF1	surface	Material	Asbestos detected	NA
HLF2	surface	Material	Asbestos detected	NA
HLF3	surface	Material	Asbestos detected	NA
HLF4	surface	Material	Asbestos detected	NA
Total Number of samples			26	54
Explanation: 1 - Qualitative asbestos identification AS4964-2004 2 - 500mL soil samples, NEPM 2013 and WA 2009 ^ Asbestos fibres detected below the reporting limit				
Asbestos Detected		VALUE		
Abbreviations: NA: Not Analysed				

TABLE B
SOIL LABORATORY RESULTS COMPARED TO ASBESTOS GUIDELINES (ACM - FRIABLE)
All data in % w/w unless stated otherwise

			Weight of ACM (kg)	ASBESTOS FIBRES (% w/w)
Site Assessment Criteria (SAC) ¹				0.001%
Sample Reference	Sample Depth	Sample Description		
ASF1/ TP112	0-0.2	Material	0.000146	0.000121667
Total Number of Samples			1	1
Maximum Value			0.000146	0.000121667

1 - Site Assessment Criteria (SAC): "AF and FA - All land use situations" NEPM 2013 and WA 2009

Concentration above the SAC

VALUE

ASSUMPTIONS

Asbestos Content 15 %
 Soil density = 1.8

TABLE C
SOIL LABORATORY RESULTS COMPARED TO ASBESTOS GUIDELINES (ACM-NON FRIABLE)
 All data in % w/w unless stated otherwise

			Weight of	ASBESTOS FIBRES (% w/w)
			ACM (kg)	
Site Assessment Criteria (SAC) ¹			100	0.01%
Sample Reference	Sample Depth	Sample Description		
ASF3/ TP107	0-0.3	Material	0.008945	0.007454167
Total Number of Samples			1	1
Maximum Value			0.008945	0.007454167

1 - Site Assessment Criteria (SAC): 'Residential with use, day care centres, preschools etc.' NEPM 2013 and WA 2009

Concentration above the SAC

VALUE

ASSUMPTIONS

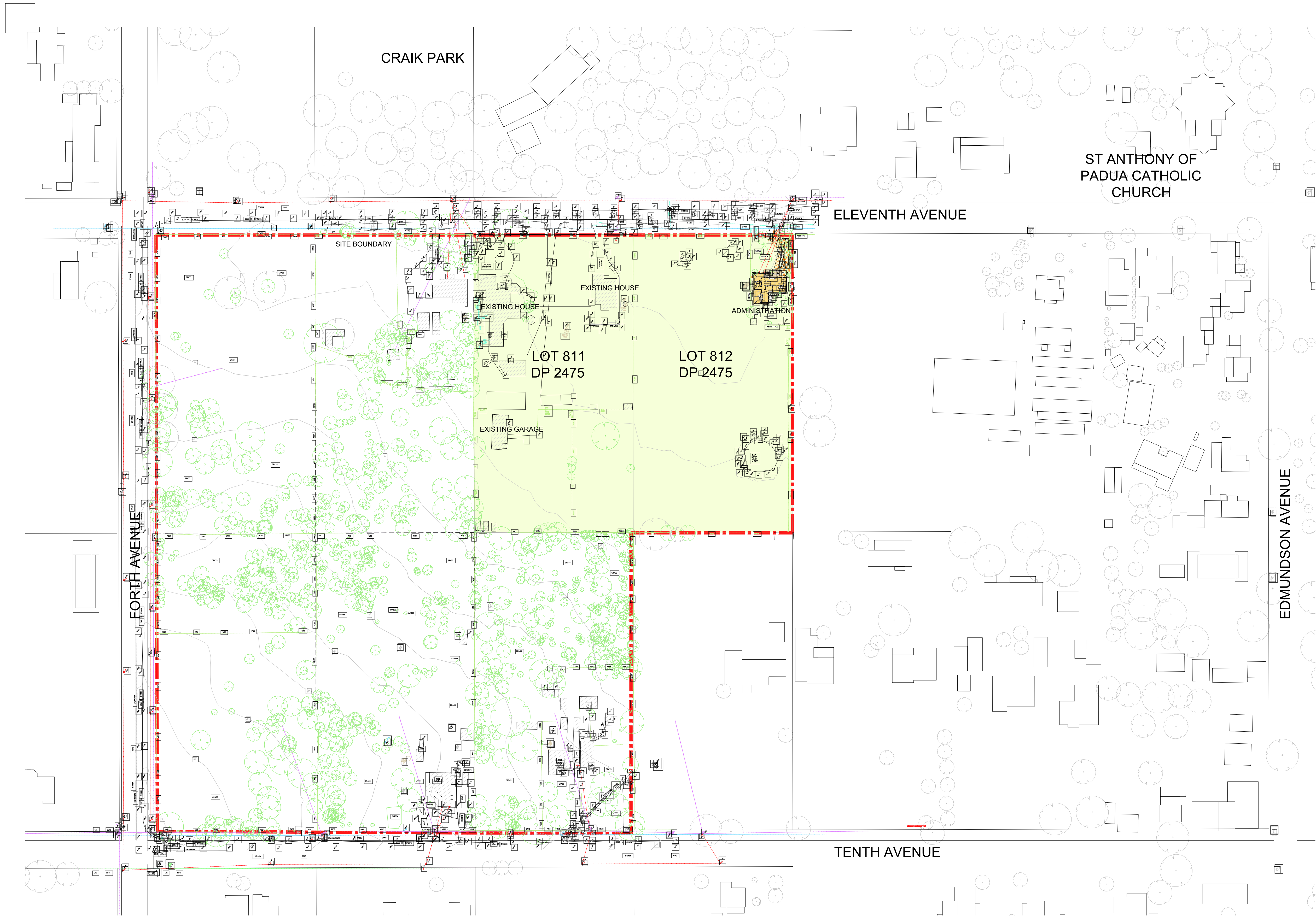
Asbestos Content 15 %

Soil density = 1.8

REPORT APPENDICES

Appendix A: Site Information

Proposed Development Plans



SITE LEGEND

STAGE 1 - EXTENT OF PROPOSED BUILDING WORKS.

STAGE 1 - BOUNDARY FENCE FOR SCHOOL GROUNDS.

STAGE 1 -SITE, BUILDING AND LANDSCAPING WORK.

REFER TO HYDRAULIC DRAWINGS FOR DRAINAGE DETAILS.

REFER TO CIVIL DRAWINGS FOR DRIVEWAY + PAVEMENT DETAILS.

REFER TO STRUCTURAL DRAWINGS FOR STRUCTURAL DETAILS.

REFER TO ELECTRICAL DRAWINGS FOR LIGHTING AND POWER DETAILS.

TOPSOIL TO EXTENT OF STAGE 1 WORKS + DISPOSED IN ACCORDANCE WITH REMEDIATION ACTION PLAN. REFER TO REMEDIATION ACTION PLAN + CIVIL ENGINEERS DOCUMENTATION.

NOTES

1. Use figured dimensions. Do not scale from drawings.

2. All dimensions are in millimetres, except levels and drawings to scale of 1:500 and smaller which are given in metres.

3. Drawings to be read in conjunction with specifications and/or schedules.

4. Contractor to verify all dimensions and levels on site prior to commencing any work or making of shop drawings, and seek instructions if any discrepancies are found.

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DRAWING
SITE PLAN - EXISTING

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DATE	FILE
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DRAWN	EI	CHECKED	EI	VERIFIED	EI
LOT 811-812		DP 2475		SUBURB	AUSTRAL

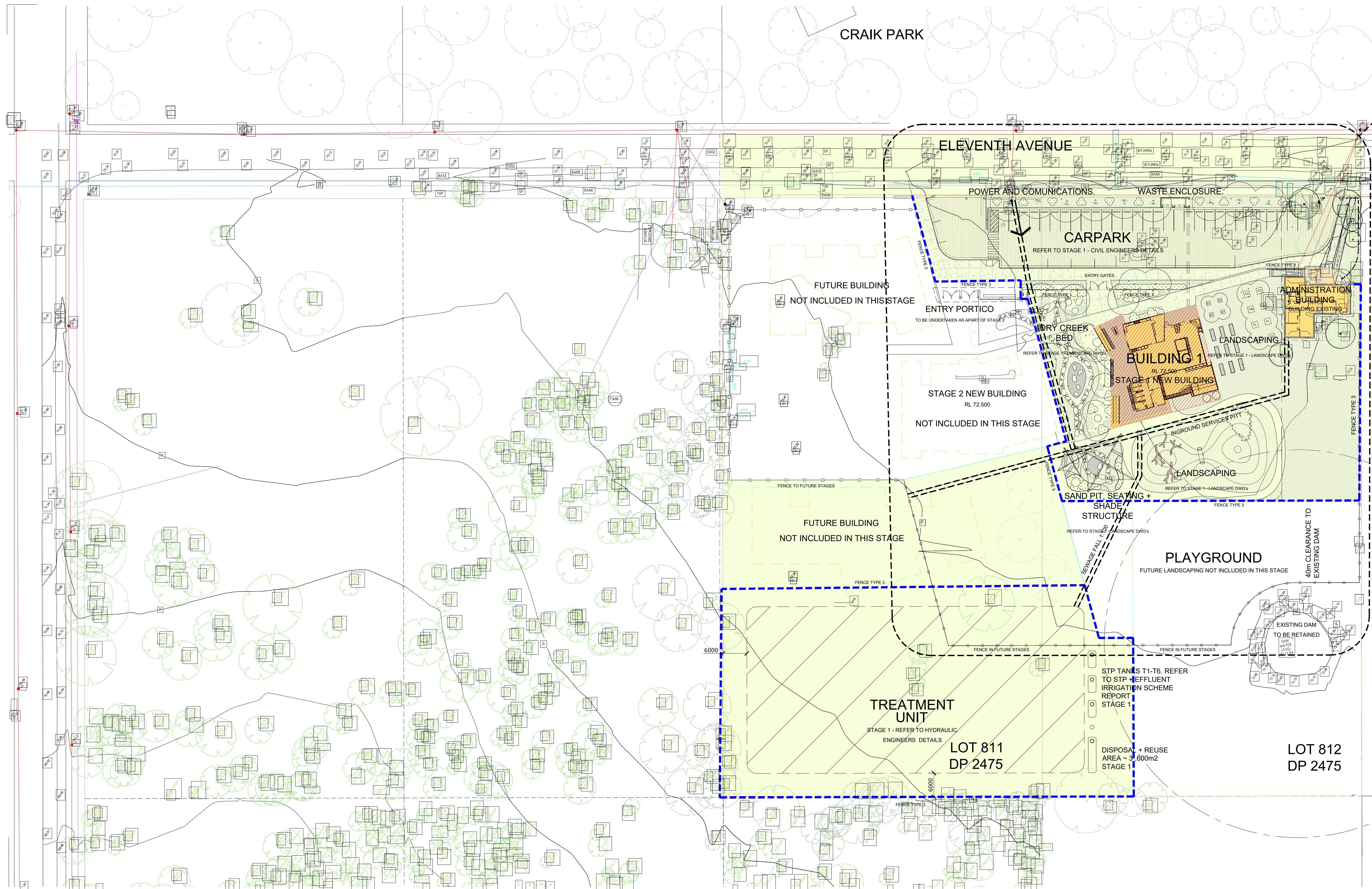
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SCALE 1:1000 @ A1 / 1:2000 @ A3

PROJECT NO. 3970 **DRAWING NO.** A002 **REVISION** 03

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01
004

SITE LEGEND

STAGE 1 - EXTENT OF PROPOSED BUILDING WORKS.

STAGE 1 - BOUNDARY FENCE FOR SCHOOL GROUNDS.

STAGE 1 - SITE, BUILDING AND LANDSCAPING WORK.

REFER TO HYDRAULIC DRAWINGS FOR DRAINAGE DETAILS.

REFER TO CIVIL DRAWINGS FOR DRIVEWAY + PAVEMENT DETAILS.

REFER TO STRUCTURAL DRAWINGS FOR STRUCTURAL DETAILS.

REFER TO ELECTRICAL DRAWINGS FOR LIGHTING AND POWER DETAILS.

TOPSOIL TO EXTENT OF STAGE 1 WORKS TO BE STRIPPED + DISPOSED IN ACCORDANCE WITH REMEDIATION ACTION PLAN. REFER TO REMEDIATION ACTION PLAN + CIVIL ENGINEERS DOCUMENTATION.

01
- SITE PLAN
1:500 @ A1

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DRAWING
SITE PLAN
STAGE 1 - BUILDING 1

STATUS
FOR TENDER

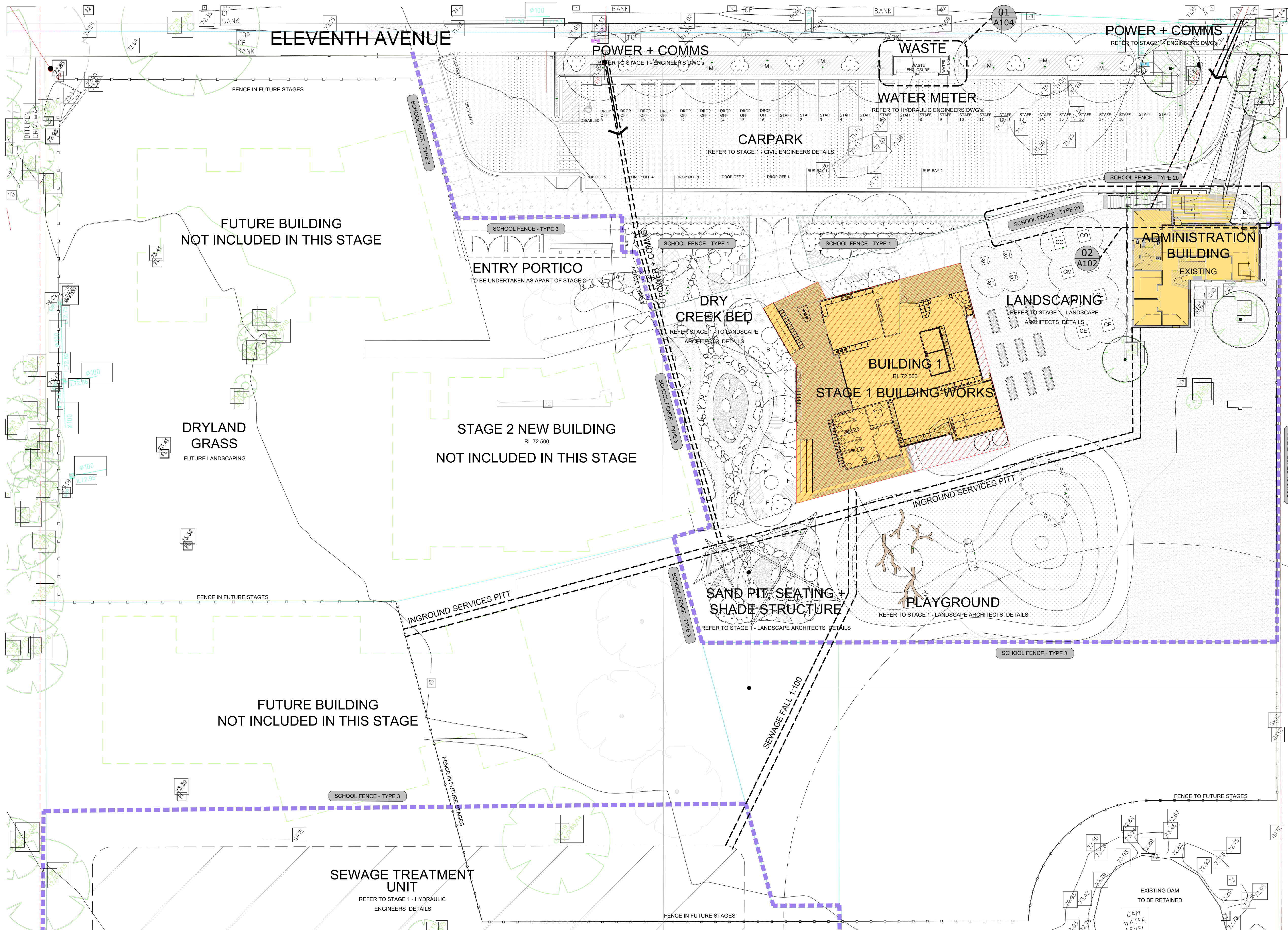
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SCALE 1:500 @ A1 / 1:1000 @ A3

PROJECT NO.	DRAWING NO.	REVISION
3970	A003	08



- SITE LEGEND**
- STAGE 1 - EXTENT OF PROPOSED BUILDING WORKS.
 - STAGE 1 - BOUNDARY FENCE FOR SCHOOL GROUNDS.
 - STAGE 1 - SITE, BUILDING AND LANDSCAPING WORK.
- REFER TO HYDRAULIC DRAWINGS FOR DRAINAGE DETAILS.
- REFER TO CIVIL DRAWINGS FOR DRIVEWAY + PAVEMENT DETAILS.
- REFER TO STRUCTURAL DRAWINGS FOR STRUCTURAL DETAILS.
- REFER TO ELECTRICAL DRAWINGS FOR LIGHTING AND POWER DETAILS.
- TOPSOIL TO EXTENT OF STAGE 1 WORKS TO BE STRIPPED+ DISPOSED IN ACCORDANCE WITH REMEDIATION ACTION PLAN. REFER TO REMEDIATION ACTION PLAN + CIVIL ENGINEERS DOCUMENTATION.

- FENCING LEGEND:**
- TYPE 1 - 1800H POWDERCOATED PALISADE FENCE WITH 100 x 100 POST INSTALLED IN ACCORDANCE WITH MANUFACTURES.
 - TYPE 2a - BRICK WALL 2100mm HIGH WITH SCHOOL SIGN
 - TYPE 2b - BRICK WALL 900mm HIGH WITH 1200mm PALISADE FENCE.
 - TYPE 3 - 1800H STEEL CYCLONE FENCE.
 - TYPE 4 - 1800 H TEMPORARY CONSTRUCTION FENCE. STAR PICKET & CHAIN MESH FENCE.

SHADE STRUCTURES UMB-1 + UMB-2 TO BE INSTALLED TO SANDPIT + SEATING AREA. REFER TO FINISHES, FITTINGS + EQUIPMENT SCHEDULES FOR DETAILS.

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PROJECT
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DRAWING
**SITE PLAN
STAGE 1 - BUILDING 1**

STATUS **FOR TENDER**

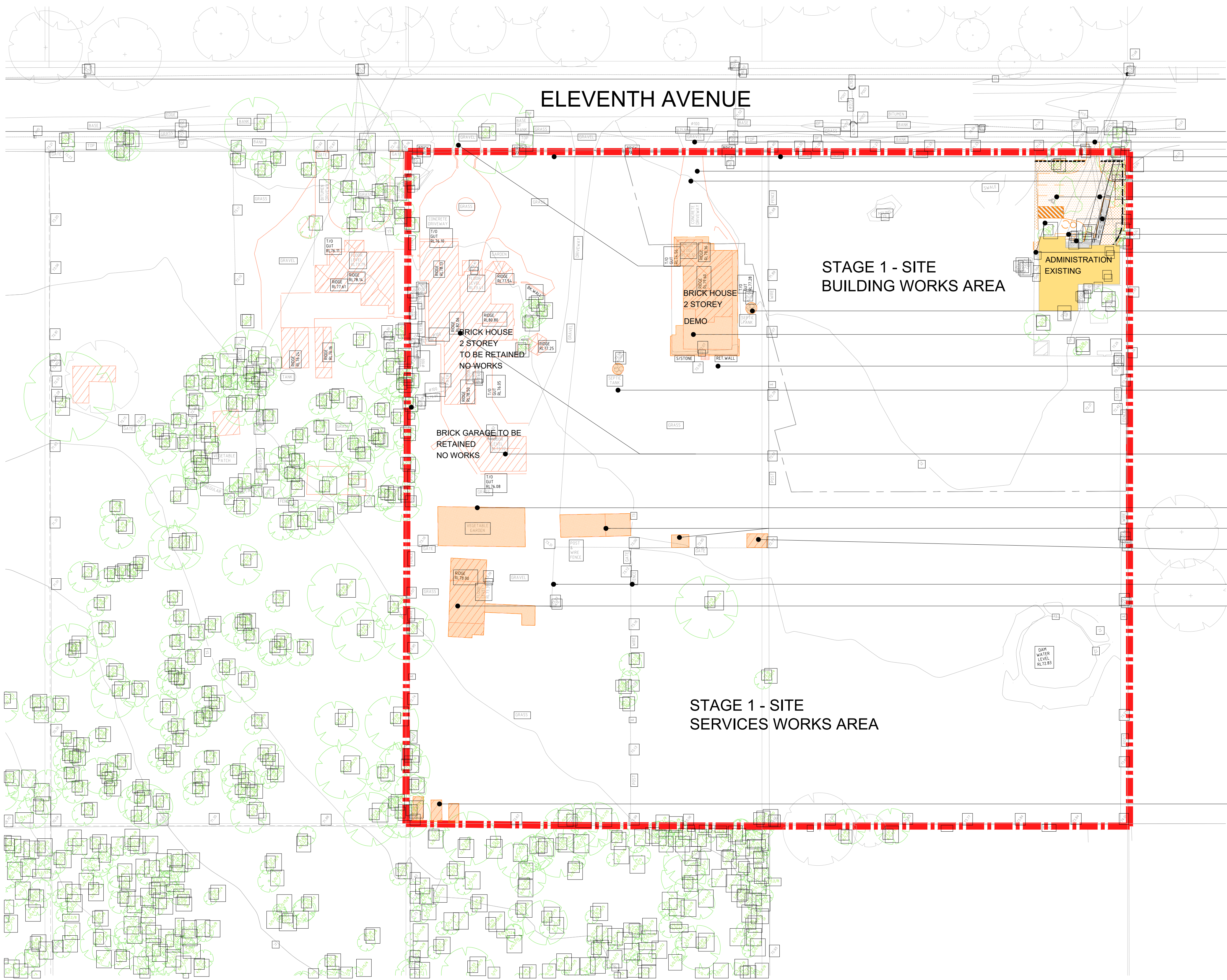
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PROJECT NO. **3970** DRAWING NO. **A004** REVISION **07**



DEMOLITION NOTES:

GENERAL NOTES:

1. MASONRY WALLS TO BE DEMOLISHED COMPLETELY, INCLUDING FOOTINGS & WALLS BELOW FINISHED SLAB OR GROUND LEVEL. REFER TO STRUCTURAL ENGINEERS DETAILS FOR FILL REQUIREMENTS AT FOUNDATIONS AND SEPTIC TANK LOCATIONS
2. DEMOLISH EXTERNAL CONCRETE/BITUMEN SURFACES /SEGMENTAL PAVERS. TAKE CARE NOT TO DAMAGE ADJACENT SURFACES/ PROPERTIES AND PROTECT FOR REMAINDER OF WORKS.
3. RETAIN AND PROTECT ALL EXISTING TREES UNLESS NOTED OTHERWISE.
4. PROVIDE TEMPORARY ACCESS TO ENROLMENT SUITE ADMINISTRATION AT ALL TIMES DURING THE WORKS.

SERVICES NOTES:

5. ALL REDUNDANT SERVICES TO BE CAPPED OFF. REFER TO ELECTRICAL AND HYDRAULIC ENGINEER'S SPECIFICATION AND DRAWINGS.
6. WHERE HYDRAULIC FIXTURES ARE TO BE REMOVED, ALL REDUNDANT SERVICES TO BE CAPPED OFF. REFER TO HYDRAULIC ENGINEER'S SPECIFICATION AND DRAWINGS.
7. REFER TO ELECTRICAL ENGINEERS SPECIFICATION AND DRAWINGS FOR SCOPE OF ELECTRICAL DEMOLITION.

- STAGE 1 - SITE BOUNDARY
- STAGE 1 - TEMPORARY 1800mm CYCLONE HIGH FENCE FOR STAGE 1 AREA AND TO PROVIDE A BOUNDARY FENCE FOR THE SCHOOL AT THE COMPLETION OF STAGE 1.

REMOVE EXISTING GRAVEL AND CONCRETE PATH
REMOVE EXISTING BRICK LANDSCAPE WALLS
REMOVE GRAVEL DRIVEWAY
REMOVE EXISTING CONCRETE DRIVEWAYS
REMOVE EXISTING PART CONCRETE DRIVEWAY AND CAR PARKS. RETAIN CONCRETE PEDESTRIAN PATHWAY. RETAIN TIMBER DECKING RAMP, STEPS AND DECKING
REMOVE 3 STEPS IN FRONT OF DECKING.
REMOVE ARTIFICIAL GRASS + FENCE

REMOVE EXISTING SEPTIC TANK; CAP OFF SERVICES AND INFILL TO STRUCTURAL ENGINEER'S REQUIREMENTS
REMOVE EXISTING 2 STOREY BRICK AND TILED ROOF HOUSE; CAP OFF ALL SERVICES IN ACCORDANCE WITH ELECTRICAL AND HYDRAULIC ENGINEER'S DOCUMENTATION.
REMOVE EXISTING METAL AWNING ROOF; TERRACE PAVING AND ASSOCIATED RETAINING WALL AND STEPS
REMOVE EXISTING SEPTIC TANK; CAP OFF SERVICES AND INFILL TO STRUCTURAL ENGINEER'S REQUIREMENTS

RETAIN EXISTING BUILDINGS. FUTURE DEVELOPMENT TO THIS SITE - STAGE 2

REMOVE EXISTING CAGED GARDEN BED AND VEGETATION AS REQUIRED TO FACILITATE NEW WORKS.
REMOVE EXISTING DOG KENNEL

REMOVE EXISTING SHED

REMOVE EXISTING FENCE AND GATE

REMOVE EXISTING METAL GARAGE, SHED AND BIRD COOP.

REMOVE EXISTING 3 STORAGE CONTAINERS

BUILDINGS ON THIS SITE ARE KNOWN TO CONTAIN ASBESTOS. PLEASE REFER TO THE HAZARDOUS MATERIALS SURVEY AND MANAGEMENT PLAN FOR THIS SITE.

ALL ASBESTOS REMOVAL IS TO BE UNDERTAKEN BY A LICENSED ASBESTOS REMOVAL CONTRACTOR IN ACCORDANCE WITH THE BUILDING ACT 2004, DANGEROUS SUBSTANCES ACT 2004, CONSTRUCTIONS OCCUPATIONS (LICENSING) ACT 2004 AND WITH THE NATIONAL CODE OF PRACTICE FOR THE SAFE REMOVAL OF ASBESTOS.

FAILURE TO HANDLE AND DISPOSE OF ASBESTOS IN AN APPROPRIATE AND RESPONSIBLE MANNER COULD RESULT IN PROSECUTION UNDER THE DANGEROUS SUBSTANCES ACT 2004.

01 SITE PLAN
1:500 @ A1

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PROJECT NO. **3970** DRAWING NO. **A101** NORTH
REVISION **04**

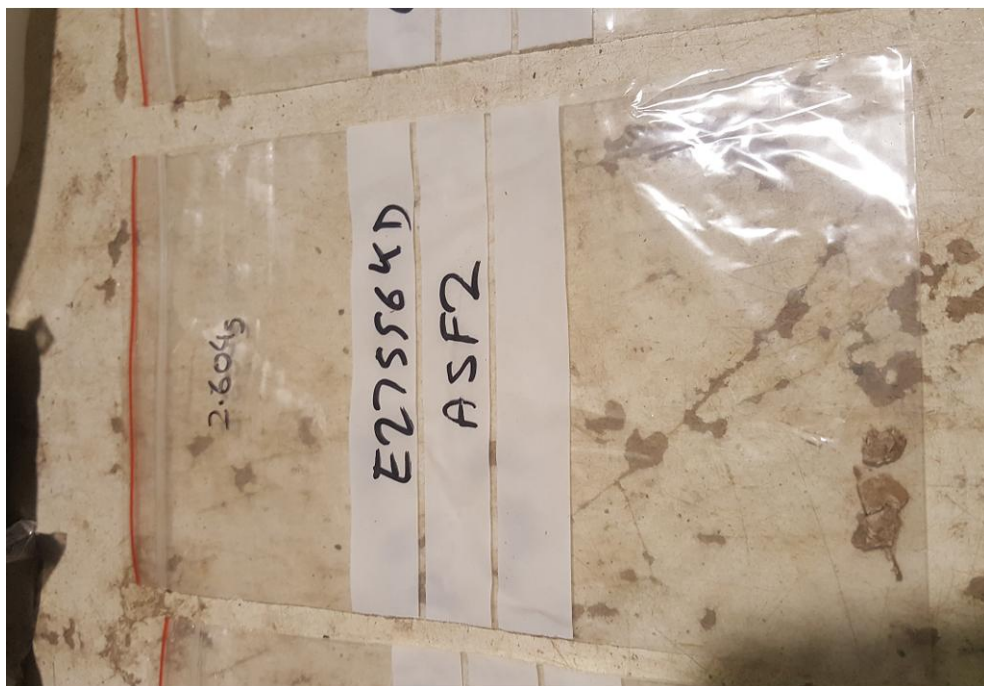
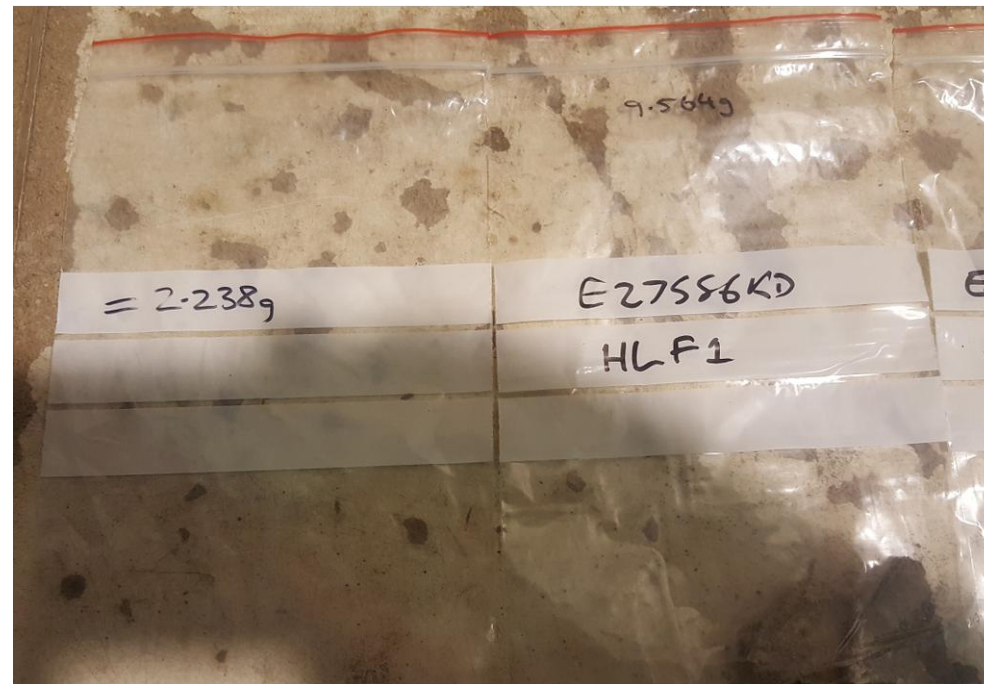
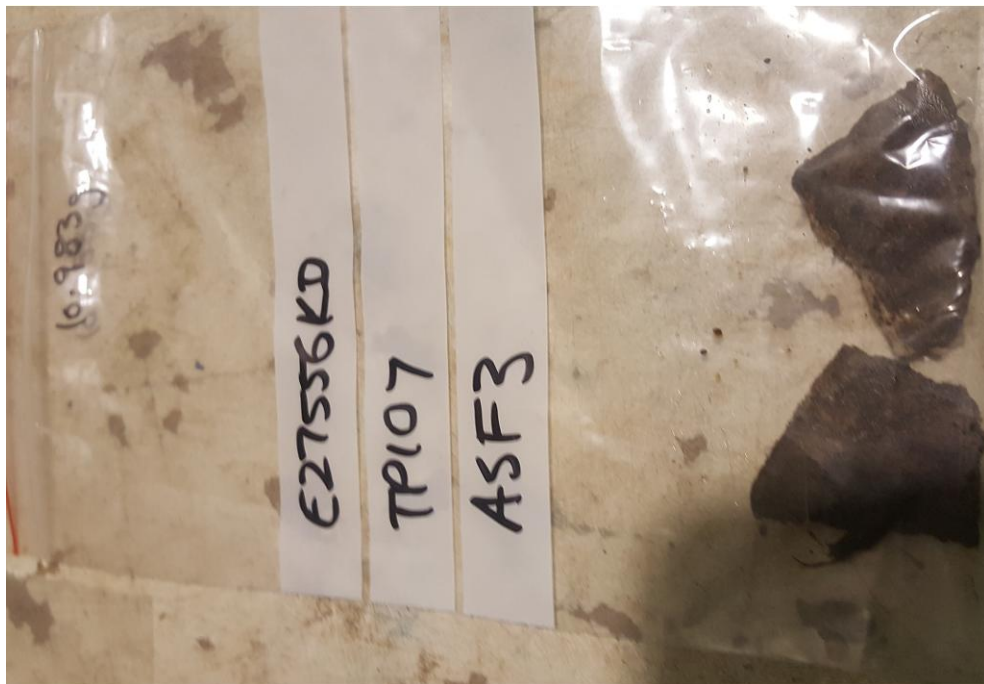
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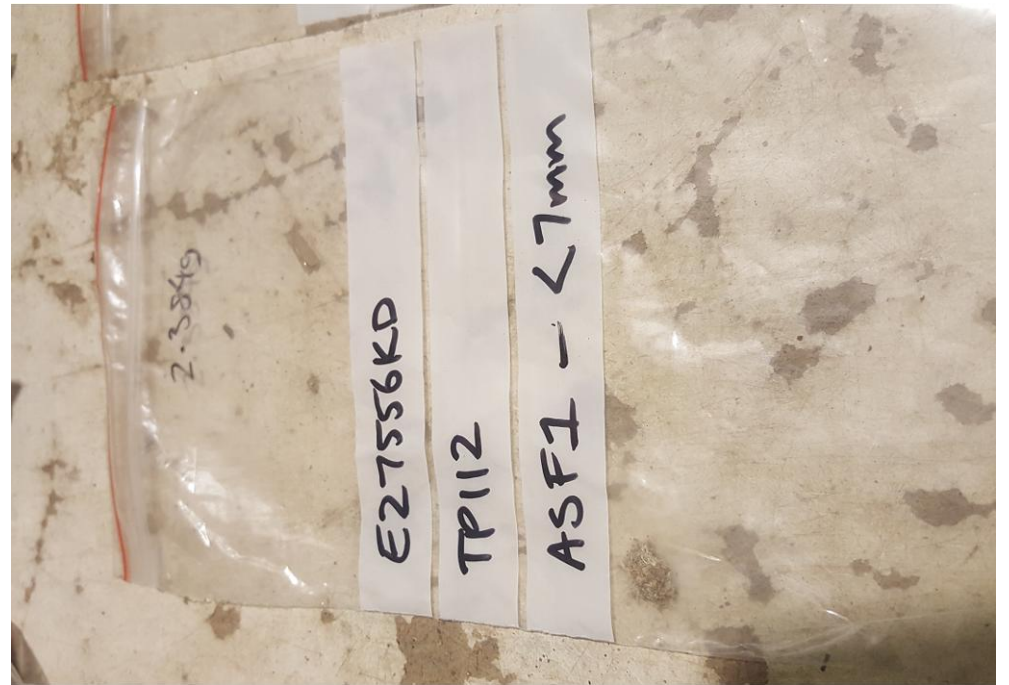
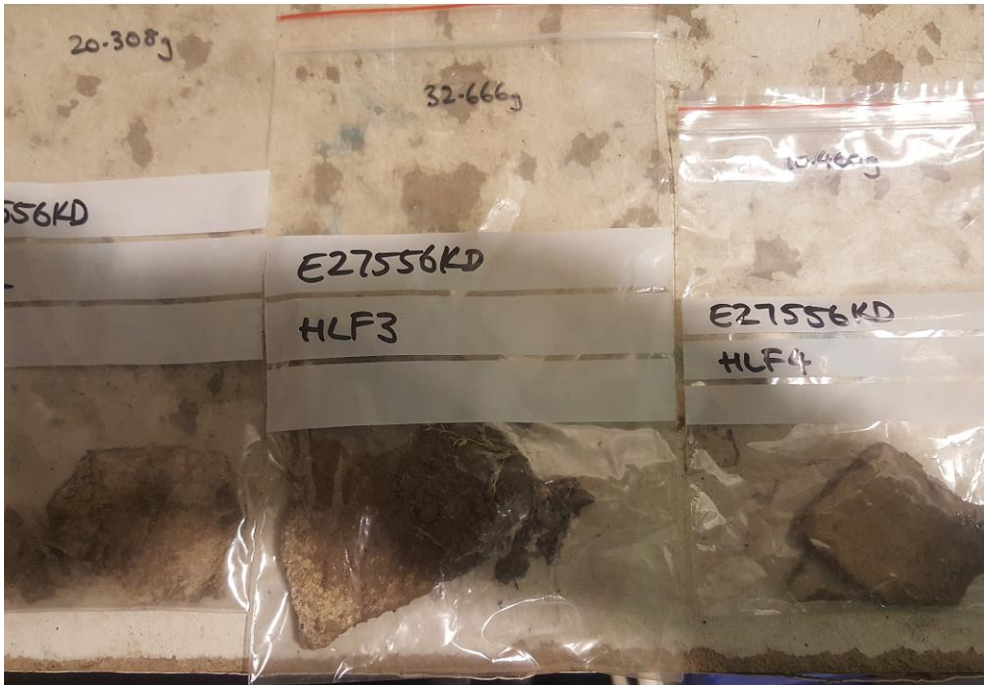
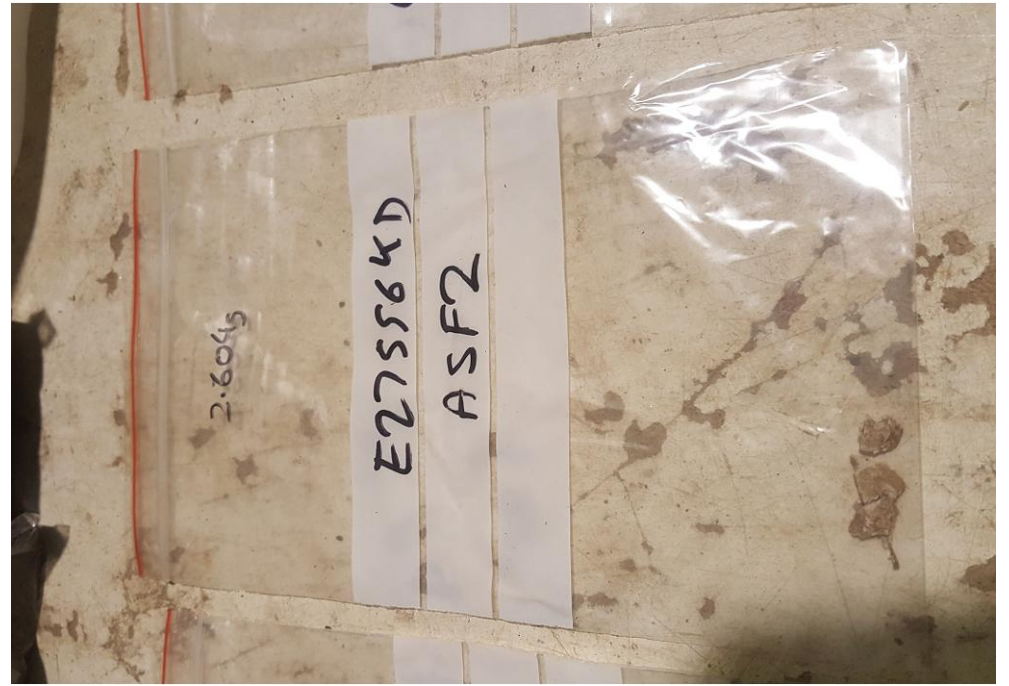
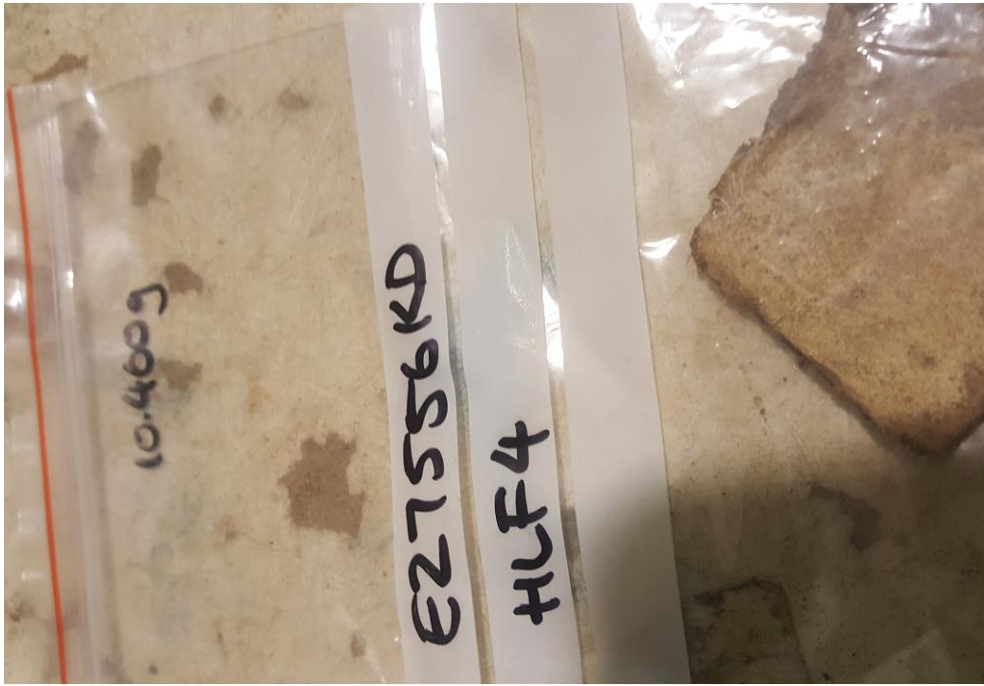












Appendix B: Test pit Logs

ENVIRONMENTAL LOG

Test Pit No.
101
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of root fibres, ash and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, red brown.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
102
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 11-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of root fibres, ash and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, red brown.	MC>PL			
					1			END OF TEST PIT AT 0.6m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.

103

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Logged/Checked by: H.L./M.D. Datum:												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	SILTY CLAY: medium to high plasticity, dark brown mottled red, trace of root fibres and ash.	MC>PL			GRASS COVER
					0.5							
					1							
					1.5			END OF TEST PIT AT 1.1m				
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
104
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ABS									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
					1			END OF TEST PIT AT 0.7m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
105
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
					1			END OF TEST PIT AT 0.9m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
106
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS													
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL													
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW													
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A													
Date: 11-10-16 Datum:													
Logged/Checked by: H.L./M.D.													
Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ABS	SAL									
DRY ON COMPLET- ION						0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
						0.5		CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
									END OF TEST PIT AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL LOG

Test Pit No.
107
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, low to medium plasticity, brown, trace of root fibres, ash, concrete and glass fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER ASF3 FCF, ACM > 7mm
							CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
108
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, low to medium plasticity, brown, trace of root fibres, ash, concrete and glass fragments and fine to coarse grained ironstone gravel.	MC>PL			
							CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
109
1/1

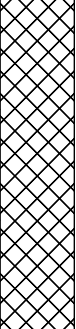
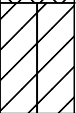
Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled grey red, trace of ash.	MC>PL			
					0.5			SILTY CLAY: medium to high plasticity, brown mottled grey.				
					1			END OF TEST PIT AT 1.2m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
110
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash.	MC>PL			
				0.5			FILL: Silty clay, medium to high plasticity, brown.	MC>PL				
					1		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled grey.	MC>PL			
					1.5			END OF TEST PIT AT 1.2m				
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
111
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown, trace of root fibres.	MC>PL			
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red.	MC>PL			
					1			END OF TEST PIT AT 0.7m				
					1.5							
					2							
					2.5							
					3							
					3.5							

Test Pit No.
112

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER ASF1 MATTED ACM <7mm
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
113
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

Test Pit No.
114

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, orange brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
115
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
116
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of root fibres, ash and glass fragments.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
117
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
								END OF TEST PIT AT 0.6m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
118
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
								END OF TEST PIT AT 0.6m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

Test Pit No.
120
1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
					0.5			END OF TEST PIT AT 0.5m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
121
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 11-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay topsoil, medium to high plasticity, dark brown, trace of root fibres and ash.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, dark red brown.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
122
1/1

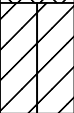
Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS													
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL													
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW													
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A													
Date: 11-10-16 Datum:													
Logged/Checked by: H.L./													
Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ABS	SAL									
DRY ON COMPLET- ION						0			FILL: Silty clay, medium plasticity, brown mottled orange grey.	MC~PL			
						0.5			FILL: Silty clay, medium to high plasticity, brown.	MC>PL			
						1		CL-CH	SILTY CLAY: medium to high plasticity, red brown.	MC>PL			
						1.5			END OF TEST PIT AT 1.2m				
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL LOG

Test Pit No.
123
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 11-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash.	MC>PL			
				0.5	FILL: Silty clay, medium to high plasticity, brown.							
					1		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled grey.	MC>PL			
					1.5			END OF TEST PIT AT 1.2m				
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
124
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 11-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash and fine to coarse grained ironstone gravel.	MC>PL			
					0.5			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash.	MC>PL			
					1		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled grey. END OF TEST PIT AT 1.0m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
125
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 11-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash and fine to coarse grained ironstone gravel.	MC>PL			
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, brown.	MC>PL			
					1			END OF TEST PIT AT 1.0m				
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
126
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 11-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ABS									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown mottled red grey, trace of ash.	MC>PL			GRASS COVER
					0.5			FILL: Silty clay, medium to high plasticity, brown.	MC>PL			
						1		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled grey.	MC>PL		
					1.5			END OF TEST PIT AT 1.1m				
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
127
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS													
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL													
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW													
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A													
Date: 12-10-16 Datum:													
Logged/Checked by: H.L./M.D.													
Groundwater Record	SAMPLES				Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ABS	SAL									
DRY ON COMPLET- ION						0			FILL: Silty clay, medium to high plasticity, red brown mottled grey, trace of igneous gravel.	MC>PL			GRASS COVER
						0.5			FILL: Silty clay, medium to high plasticity, brown.				
						1							
								CL-CH	SILTY CLAY: medium to high plasticity, red brown.	MC>PL			
						1.5			END OF TEST PIT AT 1.4m				
						2							
						2.5							
						3							
						3.5							

Test Pit No.
128

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
129
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
130
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.5m	MC>PL			
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

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Environmental logs are not to be used for geotechnical purposes

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1/1

Client: MUNNS SLY MOORE ARCHITECTS
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW

Job No. E27556KD **Method:** EXCAVATOR **R.L. Surface:** N/A
Date: 12-10-16 **Datum:**
Logged/Checked by: H.L./M.D.

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLETION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
133
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
134
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
135
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
136
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					1							
					1.5							
					2							
					2.5							
					3							
					3.5			END OF TEST PIT AT 0.6m				

ENVIRONMENTAL LOG

Test Pit No.
137
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
138
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

Test Pit No.
139

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
									SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.3m	MC>PL		
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
140
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.5m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
141
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
								SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.5m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
142
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A Date: 12-10-16 Datum: Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.4m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
143
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel. END OF TEST PIT AT 0.3m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
144
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	FILL: Silty clay, medium to high plasticity, dark brown, trace of ash, fine to coarse grained ironstone gravel and root fibres.	MC>PL			GRASS COVER
								SILTY CLAY: medium to high plasticity, orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			
					0.5			END OF TEST PIT AT 0.5m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
145
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown, trace of root fibres, ash, concrete fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash.	MC>PL			
								END OF TEST PIT AT 0.6m				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
146
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown, trace of root fibres, ash, concrete fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.6m	MC>PL			
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
147
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown, trace of root fibres, ash, concrete fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
					0.5		CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.5m	MC>PL			
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
148
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0		CL-CH	FILL: Silty clay, medium to high plasticity, brown, trace of root fibres, ash, concrete fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
								SILTY CLAY: medium to high plasticity,brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

ENVIRONMENTAL LOG

Test Pit No.
149
1/1

Environmental logs are not to be used for geotechnical purposes

Client: MUNNS SLY MOORE ARCHITECTS												
Project: PROPOSED ST ANTHONY OF PADUA CATHOLIC SCHOOL												
Location: 140 ELEVENTH AVENUE, AUSTRAL, NSW												
Job No. E27556KD Method: EXCAVATOR R.L. Surface: N/A												
Date: 12-10-16 Datum:												
Logged/Checked by: H.L./M.D.												
Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	SAL									
DRY ON COMPLET- ION					0			FILL: Silty clay, medium to high plasticity, brown, trace of root fibres, ash, concrete fragments and fine to coarse grained ironstone gravel.	MC>PL			GRASS COVER
							CL-CH	SILTY CLAY: medium to high plasticity, brown mottled red, trace of fine to medium grained ironstone gravel and ash. END OF TEST PIT AT 0.4m	MC>PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							

EXPLANATORY NOTES – ENVIRONMENTAL LOGS

INTRODUCTION

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

The ground is a product of continuing natural and manmade processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies involve gathering and assimilating limited facts about these characteristics and properties in order to understand the ground on a particular site under certain conditions. These conditions are directly relevant only to the ground at the place where, and time when, the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

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

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below (note that unless stated in the report, the soil classification is based on a qualitative field assessment, not laboratory testing):

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

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

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

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

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

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

DRILLING OR EXCAVATION METHODS

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

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

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

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

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

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

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

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

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

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

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as: $N = 13 (4, 6, 7)$
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as: $N > 30 (15, 30/40\text{mm})$

The results of the test can be related empirically to the engineering properties of the soil. Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

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

LOGS

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

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

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than “straight line”

variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

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

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

FILL

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

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

LABORATORY TESTING

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

SITE ANOMALIES

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

GRAPHIC LOG SYMBOLS FOR SOIL AND ROCKS

SOIL	ROCK	DEFECTS AND INCLUSIONS
 FILL	 CONGLOMERATE	 CLAY SEAM
 TOPSOIL	 SANDSTONE	 SHEARED OR CRUSHED SEAM
 CLAY (CL, CH)	 SHALE	 BRECCIATED OR SHATTERED SEAM/ZONE
 SILT (ML, MH)	 SILTSTONE, MUDSTONE, CLAYSTONE	 IRONSTONE GRAVEL
 SAND (SP, SW)	 LIMESTONE	 ORGANIC MATERIAL
 GRAVEL (GP, GW)	 PHYLLITE, SCHIST	
 SANDY CLAY (CL, CH)	 TUFF	
 SILTY CLAY (CL, CH)	 GRANITE, GABBRO	
 CLAYEY SAND (SC)	 DOLERITE, DIORITE	
 SILTY SAND (SM)	 BASALT, ANDESITE	
 GRAVELLY CLAY (CL, CH)	 QUARTZITE	
 CLAYEY GRAVEL (GC)		
 SANDY SILT (ML)		
 PEAT AND ORGANIC SOILS		
		OTHER MATERIALS
		 CONCRETE
		 BITUMINOUS CONCRETE, COAL
		 COLLUVIUM

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

Determine percentages of gravel and sand from grain size curve

Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows:

Less than 5% GW, GP, SW, SP
More than 5% GM, GC, SM, SC
Borderline cases requiring use of dual symbols

Use grain size curve in identifying the fractions as given under field identification

Plasticity index

Comparing soils at equal liquid limit

Toughness and dry strength increase with increasing plasticity index

A line

CH

CL

OL

OH

MH

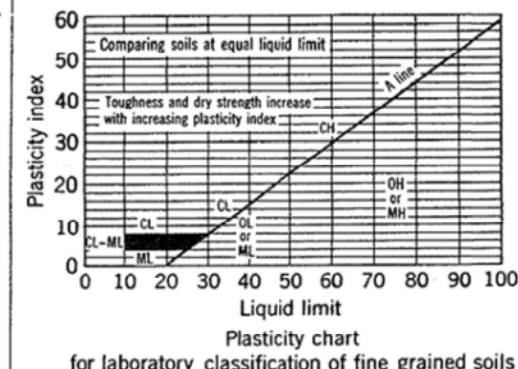
ML

Liquid limit

Plasticity chart for laboratory classification of fine grained soils

Determine percentages of gravel and sand from grain size curve
 Depending on percentage of fines (fraction smaller than 75 µm sieve size) coarse grained soils are classified as follows:
 Less than 5% GW, GP, SW, SP
 More than 5% GM, GC, SM, SC
 Borderline cases requiring use of dual symbols

Use grain size curve in identifying the fractions as given under field identification



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

LOG SYMBOLS

LOG COLUMN	SYMBOL		DEFINITION																		
Groundwater Record			Standing water level. Time delay following completion of drilling may be shown.																		
			Extent of borehole collapse shortly after drilling.																		
			Groundwater seepage into borehole or excavation noted during drilling or excavation.																		
Samples	ES		Soil sample taken over depth indicated, for environmental analysis.																		
	U50		Undisturbed 50mm diameter tube sample taken over depth indicated.																		
	DB		Bulk disturbed sample taken over depth indicated.																		
	DS		Small disturbed bag sample taken over depth indicated.																		
	ASB		Soil sample taken over depth indicated, for asbestos screening.																		
	ASS		Soil sample taken over depth indicated, for acid sulfate soil analysis.																		
	SAL		Soil sample taken over depth indicated, for salinity analysis.																		
Field Tests	N = 17 4, 7, 10		Standard Penetration Test (SPT) performed between depths indicated by lines. Individual show blows per 150mm penetration. 'R' as noted below.																		
	N _c =	5	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.																		
		7																			
		3 R																			
	VNS = 25 PID = 100		Vane shear reading in kPa of Undrained Shear Strength. Photoionisation detector reading in ppm (Soil sample heads pace test).																		
Moisture (Cohesive Soils) (Cohesionless)	MC>PL MC≈PL MC<PL D M W	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. DRY – Runs freely through fingers. MOIST – Does not run freely but no free water visible on soil surface. WET – Free water visible on soil surface.																			
Strength (Consistency) Cohesive Soils	VS S F St VSt H ()	VERY SOFT – Unconfined compressive strength less than 25kPa SOFT – Unconfined compressive strength 25-50kPa FIRM – Unconfined compressive strength 50-100kPa STIFF – Unconfined compressive strength 100- 200kPa VERY STIFF – Unconfined compressive strength 200- 400kPa HARD – Unconfined compressive strength greater than 400kPa Bracketed symbol indicates estimated consistency based on tactile examination or other tests.																			
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ()	<table><thead><tr><th colspan="2">Density Index (ID) Range (%)</th><th>SPT 'N' Value Range (Blows/300mm)</th></tr></thead><tbody><tr><td>Very Loose</td><td>< 15</td><td>0-4</td></tr><tr><td>Loose</td><td>15-35</td><td>4-10</td></tr><tr><td>Medium Dense</td><td>35-65</td><td>10-30</td></tr><tr><td>Dense</td><td>65-85</td><td>30-50</td></tr><tr><td>Very Dense</td><td>> 85</td><td>> 50</td></tr></tbody></table> Bracketed symbol indicates estimated density based on ease of drilling or other tests.		Density Index (ID) Range (%)		SPT 'N' Value Range (Blows/300mm)	Very Loose	< 15	0-4	Loose	15-35	4-10	Medium Dense	35-65	10-30	Dense	65-85	30-50	Very Dense	> 85	> 50
Density Index (ID) Range (%)		SPT 'N' Value Range (Blows/300mm)																			
Very Loose	< 15	0-4																			
Loose	15-35	4-10																			
Medium Dense	35-65	10-30																			
Dense	65-85	30-50																			
Very Dense	> 85	> 50																			
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise																			
Remarks	'V' bit 'TC' bit T ₆₀	Hardened steel 'V' shaped bit. Tungsten carbide wing bit. Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.																			

LOG SYMBOLS CONTINUED

ROCK STRENGTH

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

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

ROCK STRENGTH

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

Appendix C: Laboratory Reports & COC Documents



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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS

155278

Client:

Environmental Investigation Services

PO Box 976

North Ryde BC

NSW 1670

Attention: Mitchell Delaney

Sample log in details:

Your Reference:

E27556KD, Austral

No. of samples:

7 materials 54 soils

Date samples received / completed instructions received

13/10/2016 / 13/10/2016

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:

20/10/16 / 20/10/16

Date of Preliminary Report:

Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing

Tests not covered by NATA are denoted with *.

Results Approved By:

David Springer
General Manager



Envirolab Reference: 155278

Revision No: R 00

Asbestos ID - soils NEPM - ASB-001						
Our Reference:	UNITS	155278-1	155278-2	155278-3	155278-4	155278-5
Your Reference	-----	TP101	TP102	TP103	TP104	TP105
Depth	-					
Date Sampled	-----	0-0.3	0-0.4	0-1.1	0-0.3	0-0.7
Type of sample		11-12/10/16 Soil	11-12/10/16 Soil	11-12/10/16 Soil	11-12/10/16 Soil	11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	634.00	598.79	555.11	620.11	615.79
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{**2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-6 TP106 0-0.2 11-12/10/16 Soil	155278-7 TP107 0-0.3 11-12/10/16 Soil	155278-8 TP108 0-0.15 11-12/10/16 Soil	155278-9 TP109 0-0.9 11-12/10/16 Soil	155278-10 TP110 0-0.5 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	726.23	489.29	695.94	467.27	440.92
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-11 TP110 0.5-0.9 11-12/10/16 Soil	155278-12 TP111 0-0.5 11-12/10/16 Soil	155278-13 TP112 0-0.2 11-12/10/16 Soil	155278-14 TP113 0-0.2 11-12/10/16 Soil	155278-15 TP114 0-0.2 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	545.78	545.03	410.49	546.09	463.31
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Red clayey soil
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-16 TP115 0-0.2 11-12/10/16 Soil	155278-17 TP116 0-0.2 11-12/10/16 Soil	155278-18 TP117 0-0.4 11-12/10/16 Soil	155278-19 TP118 0-0.4 11-12/10/16 Soil	155278-20 TP119 0-0.2 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	572.74	627.55	705.64	690.97	782.51
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-21 TP120 0-0.2 11-12/10/16 Soil	155278-22 TP121 0-0.3 11-12/10/16 Soil	155278-23 TP122 0-0.2 11-12/10/16 Soil	155278-24 TP123 0-0.2 11-12/10/16 Soil	155278-25 TP124 0-0.7 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	563.51	673	508.57	523.72	597.1
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-26 TP124 0.7-0.8 11-12/10/16 Soil	155278-27 TP125 0-0.5 11-12/10/16 Soil	155278-28 TP125 0.5-1.0 11-12/10/16 Soil	155278-29 TP126 0-0.3 11-12/10/16 Soil	155278-30 TP126 0.3-0.8 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	373.62	454.17	547.56	538.67	549.38
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-31 TP127 0-0.2 11-12/10/16 Soil	155278-32 TP128 0-0.2 11-12/10/16 Soil	155278-33 TP129 0-0.2 11-12/10/16 Soil	155278-34 TP130 0-0.3 11-12/10/16 Soil	155278-35 TP131 0-0.3 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	587.48	558.33	771.2	643.61	652.93
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-36 TP132 0-0.3 11-12/10/16 Soil	155278-37 TP133 0-0.2 11-12/10/16 Soil	155278-38 TP134 0-0.3 11-12/10/16 Soil	155278-39 TP135 0-0.2 11-12/10/16 Soil	155278-40 TP136 0-0.4 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	748.11	627.23	594.1	625.99	444.44
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-41 TP137 0-0.2 11-12/10/16 Soil	155278-42 TP138 0-0.2 11-12/10/16 Soil	155278-43 TP139 0-0.1 11-12/10/16 Soil	155278-44 TP140 0-0.2 11-12/10/16 Soil	155278-45 TP141 0-0.15 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	539.59	689.98	667.81	720.32	622.16
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-46 TP142 0-0.2 11-12/10/16 Soil	155278-47 TP143 0-0.15 11-12/10/16 Soil	155278-48 TP144 0-0.2 11-12/10/16 Soil	155278-49 TP145 0-0.3 11-12/10/16 Soil	155278-50 TP146 0-0.4 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	608.03	645.4	587.07	827.18	716.43
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-	-
FA and AF Estimation*	g	-	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001 Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- - -----	155278-51 TP147 0-0.4 11-12/10/16 Soil	155278-52 TP148 0-0.2 11-12/10/16 Soil	155278-53 TP149 0-0.3 11-12/10/16 Soil	155278-61 TP122 0.5-0.9 11-12/10/16 Soil
Date analysed	-	18-20/10/2016	18-20/10/2016	18-20/10/2016	18-20/10/2016
Sample mass tested	g	752.21	524.06	595.56	652.93
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	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
Total Asbestos ^{#1}	g/kg	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Not applicable	Not applicable	Not applicable	Not applicable
ACM >7mm Estimation*	g	-	-	-	-
FA and AF Estimation*	g	-	-	-	-
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation ^{#2}	%(w/w)	<0.001	<0.001	<0.001	<0.001

Asbestos ID - materials Our Reference: Your Reference	UNITS ----- -	155278-54 ASF1	155278-55 ASF2	155278-56 ASF3	155278-57 HLF1	155278-58 HLF2
Depth Date Sampled Type of sample	----- ----- -----	0-0.2 11-12/10/16 Material	0-0.15 11-12/10/16 Material	0-0.3 11-12/10/16 Material	surface 11-12/10/16 Material	surface 11-12/10/16 Material
Date analysed	-	18/10/2016	18/10/2016	18/10/2016	18/10/2016	18/10/2016
Mass / Dimension of Sample	-	20x10x2mm	20x15x3mm	60x30x5mm	80x40x4mm	80x45x6mm
Sample Description	-	Brown fibrous matted material	Beige fibre cement material	Beige compressed fibre cement material	Beige fibrous cement material	Beige compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected	No asbestos detected Organic fibres detected	Chrysotile asbestos detected	Chrysotile asbestos detected Amosite asbestos detected	Chrysotile asbestos detected

Asbestos ID - materials Our Reference: Your Reference	UNITS ----- -	155278-59 HLF3	155278-60 HLF4
Depth Date Sampled Type of sample	----- ----- -----	surface 11-12/10/16 Material	surface 11-12/10/16 Material
Date analysed	-	18/10/2016	18/10/2016
Mass / Dimension of Sample	-	95x90x5mm	45x40x5mm
Sample Description	-	Beige compressed fibre cement material	Grey compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. NOTE ^{#1} Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) NOTE ^{#2} The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
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.

Report Comments:

Asbestos-ID in soil: NEPM

This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

This is reported outside our scope of NATA accreditation.

Note: All samples analysed as received. However, samples 155278-7, 9, 10, 13, 15, 26, 27 & 40 are below the minimum 500mL sample volume as per National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

Asbestos ID was analysed by Approved Identifier: Paul Ching

Asbestos ID was authorised by Approved Signatory: Paul Ching

INS: Insufficient sample for this test

NR: Test not required

<: Less than

PQL: Practical Quantitation Limit

RPD: Relative Percent Difference

>: Greater than

NT: Not tested

NA: Test not required

LCS: Laboratory Control Sample

Quality Control Definitions

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

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

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

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

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

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-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.

SAMPLE RECEIPT ADVICE

Client Details	
Client	Environmental Investigation Services
Attention	Mitchell Delaney

Sample Login Details	
Your Reference	E27556KD, Austral
Envirolab Reference	155278
Date Sample Received	13/10/2016
Date Instructions Received	13/10/2016
Date Results Expected to be Reported	20/10/2016

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	7 materials 54 soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	15.3
Cooling Method	None
Sampling Date Provided	YES

Comments
Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples

Please direct any queries to:

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

Sample and Testing Details on following page

<i>Sample Id</i>	<i>Asbestos ID - soils NEPM - ASB-001</i>	<i>Asbestos ID - materials</i>
TP101-0-0.3	✓	
TP102-0-0.4	✓	
TP103-0-1.1	✓	
TP104-0-0.3	✓	
TP105-0-0.7	✓	
TP106-0-0.2	✓	
TP107-0-0.3	✓	
TP108-0-0.15	✓	
TP109-0-0.9	✓	
TP110-0-0.5	✓	
TP110-0.5-0.9	✓	
TP111-0-0.5	✓	
TP112-0-0.2	✓	
TP113-0-0.2	✓	
TP114-0-0.2	✓	
TP115-0-0.2	✓	
TP116-0-0.2	✓	
TP117-0-0.4	✓	
TP118-0-0.4	✓	
TP119-0-0.2	✓	
TP120-0-0.2	✓	
TP121-0-0.3	✓	
TP122-0-0.2	✓	
TP123-0-0.2	✓	
TP124-0-0.7	✓	
TP124-0.7-0.8	✓	
TP125-0-0.5	✓	
TP125-0.5-1.0	✓	
TP126-0-0.3	✓	
TP126-0.3-0.8	✓	
TP127-0-0.2	✓	
TP128-0-0.2	✓	
TP129-0-0.2	✓	
TP130-0-0.3	✓	
TP131-0-0.3	✓	
TP132-0-0.3	✓	
TP133-0-0.2	✓	
TP134-0-0.3	✓	
TP135-0-0.2	✓	
TP136-0-0.4	✓	
TP137-0-0.2	✓	

<i>Sample Id</i>	<i>Asbestos ID - soils NEPM - ASB-001</i>	<i>Asbestos ID - materials</i>
TP138-0-0.2	✓	
TP139-0-0.1	✓	
TP140-0-0.2	✓	
TP141-0-0.15	✓	
TP142-0-0.2	✓	
TP143-0-0.15	✓	
TP144-0-0.2	✓	
TP145-0-0.3	✓	
TP146-0-0.4	✓	
TP147-0-0.4	✓	
TP148-0-0.2	✓	
TP149-0-0.3	✓	
ASF1-0-0.2		✓
ASF2-0-0.15		✓
ASF3-0-0.3		✓
HLF1-surface		✓
HLF2-surface		✓
HLF3-surface		✓
HLF4-surface		✓
TP122-0.5-0.9	✓	

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	EIS Job Number: Date Results Required: Page:	E27556KD STANDARD 1 of 3	FROM: ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention:	 Mitchell Delaney
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Location: Austral							Sample Preserved in Esky on Ice																
Sampler: HL/AS							Tests Required																
Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	WA Asbestos	Asbestos (detection)															
11-12/10/16	1	TP101	0-0.3	A	-	Soil	X																
	2	TP102	0-0.4	A	-	Soil	X																
	3	TP103	0-1.1	A	-	Soil	X																
	4	TP104	0-0.3	A	-	Soil	X																
	5	TP105	0-0.7	A	-	soil	X																
	6	TP106	0-0.2	A	-	soil	X																
	7	TP107	0-0.3	A	-	soil	X																
	8	TP108	0-0.15	A	-	soil	X																
	9	TP109	0-0.9	A	-	soil	X																
	10	TP110	0-0.5	A	-	soil	X																
	11	TP110	0.5-0.9	A	-	soil	X																
	12	TP111	0-0.5	A	-	soil	X																
	13	TP112	0-0.2	A	-	soil	X																
	14	TP113	0-0.2	A	-	soil	X																
	15	TP114	0-0.2	A	-	soil	X																
	16	TP115	0-0.2	A	-	soil	X																
	17	TP116	0-0.2	A	-	soil	X																
	18	TP117	0-0.4	A	-	soil	X																
	19	TP118	0-0.4	A	-	soil	X																
	20	TP119	0-0.2	A	-	soil	X																
	21	TP120	0-0.2	A	-	soil	X																
	22	TP121	0-0.3	A	-	soil	X																
	23	TP122	0-0.2	A	-	soil	X																
	NR	TP122	0.5-0.9	A	-	soil	X																
	24	TP123	0-0.2	A	-	soil	X																

Envirolab
12 A
Chatswood NSW
Ph: (02) 9

Job No: 1552746

Date Received: 13/10/16

Time Received: 16.00

Received by: James

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/No

Remarks (comments/detection limits required):

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

Relinquished By: [Signature]	Date: 13/10/16	Time: 16.00	Received By: James	Date: 13.10
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TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	EIS Job Number: Date Results Required: Page:	E27556KD STANDARD 2 of 3	FROM: ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention:	 Mitchell Delaney
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Location:		Austral					Sample Preserved in Esky on Ice													
Sampler:		HL/AS					Tests Required													
Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	WA Asbestos	Asbestos (detection)												
1552746																				
11-12/10/16	25	TP124	0-0.7	A	—	soil	X													
	26	TP124	0.7-0.8	A	—	soil	X													
	27	TP125	0-0.5	A	—	soil	X													
	28	TP125	0.5-1.0	A	—	soil	X													
	29	TP126	0-0.3	A	—	soil	X													
	30	TP126	0.3-0.8	A	—	soil	X													
	31	TP127	0-0.2	A	—	soil	X													
	32	TP128	0-0.2	A	—	soil	X													
	33	TP129	0-0.2	A	—	soil	X													
	34	TP130	0-0.3	A	—	soil	X													
	35	TP131	0-0.3	A	—	soil	X													
	36	TP132	0-0.3	A	—	soil	X													
	37	TP133	0-0.2	A	—	soil	X													
	38	TP134	0-0.3	A	—	soil	X													
	39	TP135	0-0.2	A	—	soil	X													
	40	TP136	0-0.4	A	—	soil	X													
	41	TP137	0-0.2	A	—	soil	X													
	42	TP138	0-0.2	A	—	soil	X													
	43	TP139	0-0.1	A	—	soil	X													
	44	TP140	0-0.2	A	—	soil	X													
	45	TP141	0-0.15	A	—	soil	X													
	46	TP142	0-0.2	A	—	soil	X													
	47	TP143	0-0.15	A	—	soil	X													
	48	TP144	0-0.2	A	—	soil	X													
	49	TP145	0-0.3	A	—	soil	X													
Remarks (comments/detection limits required):							Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag													
Relinquished By:			Date:		Time:		Received By:			Date:										
[Signature]			13/10/16		15:00		James			13.10										

SAMPLE AND CHAIN OF CUSTODY FORM

TO: ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen		EIS Job E27556KD Number: Date Results STANDARD Required: Page: 3 of 3		FROM: ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Mitchell Delaney	
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Location:		Austral						Sample Preserved in Esky on Ice													
Sampler:		HL/AS						Tests Required													
Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	WA Asbestos	Asbestos (detection)													
15/12/16	50	TP146	0-0.4	A	—	soil	X														
	51	TP147	0-0.4	A	—	soil	X														
	52	TP148	0-0.2	A	—	soil	X														
	53	TP149	0-0.3	A	—	soil	X														
	54	ASF1	0-0.2	A	—	material		X													
	55	ASF2	0-0.15	A	—	material		X													
	56	ASF3	0-0.3	A	—	material		X													
	57	HLF1	surface	A	—	material		X													
	58	HLF2	surface	A	—	material		X													
	59	HLF3	surface	A	—	material		X													
↓	60	HLF4	surface	A	—	material		X													
Extra (JRM)	61	TP23	0-0.09	A		soil															

Remarks (comments/detection limits required):		Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag	
Relinquished By: <i>LL</i>	Date: 13/10/16	Time: 16.00	Received By: <i>James</i>
			Date: 13.10

Appendix D: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE (SSP)

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS.

The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993¹⁷.
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Further details reading the DSI field procedures are provided in **Section 4.2** above.

Decontamination Procedures for Soil Sampling Equipment

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

¹⁷ Standards Australia, (1993), *Geotechnical Site Investigations*. (AS1726-1993)

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

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

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994¹⁸) methods and those described in *Environmental Sampling and Analysis, A Practical Guide*, (H. Keith 1991¹⁹).

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

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

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.

“The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit” Keith 1991.

Precision

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

Accuracy

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

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

Representativeness

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

Completeness

¹⁸ US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. (US EPA SW-846)

¹⁹ Keith., H, (1991), *Environmental Sampling and Analysis, A Practical Guide*.

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

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

Comparability

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

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

Blanks

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

Matrix Spikes

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

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

Surrogate Spikes

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

Duplicates

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

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