



ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

EPM PROJECTS PTY LTD

ON

REMEDIATION ACTION PLAN

FOR

**PROPOSED SHORE PHYSICAL EDUCATION CENTRE
DEVELOPMENT AT SYDNEY CHURCH OF ENGLAND
GRAMMAR SCHOOL (SHORE)**

AT

**WILLIAM STREET AND HUNTER CRESCENT, NORTH
SYDNEY**

14 JULY 2016

REF: E27283KBrpt-RAP rev1



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Appendix A: Site Information – Table of Drawing Numbers and Titles of the Development Plans

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, Naphthalene	BTEXN
Cation Exchange Capacity	CEC
Contaminated Land Management	CLM
Construction Management Plan	CMP
Chain of Custody	COC
Contaminant of Primary Concern	CoPC
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
General Approvals of Immobilisation	GAI
General Solid Waste	GSW
Health Investigation Level	HILs
Hardness Modified Trigger Values	HMTV
Health Screening Level	HSLs
International Organisation of Standardisation	ISO
Lab Control Spike	LCS
Light Non-Aqueous Phase Liquid	LNAPL
Local Government Authority	LGA
Map Grid of Australia	MGA
National Association of Testing Authorities	NATA
National Environmental Protection Measure	NEPM
Organochlorine Pesticides	OCP
Organophosphate Pesticides	OPP
Polycyclic Aromatic Hydrocarbons	PAH
Potential Contaminants of Concern	PCC
Photo-ionisation Detector	PID
Practical Quantitation Limit	PQL
Preliminary Site Investigation	PSI
Quality Assurance	QA
Quality Control	QC

ABBREVIATIONS

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 Operating Practice	SOP
Standard Water Level	SWL
Standard Sampling Procedure	SSP
Trip Blank	TB
Toxicity Characteristic Leaching Procedure	TCLP
Total Recoverable Hydrocarbons	TRH
Trip Spike	TS
Upper Confidence Limit	UCL
United States Environmental Protection Agency	USEPA
Underground Storage Tank	UST
Virgin Excavated Natural Material	VENM
Volatile Organic Compounds	VOC
Volatile Organic Chlorinated Compound	VOCC
Workplace, Health and Safety	WHS

1 INTRODUCTION

EMP Projects Pty Ltd on behalf of Sydney Church of England Grammar (SHORE) School ('the client') commissioned Environmental Investigation Services (EIS)¹ to prepare a Remediation Action Plan (RAP) for the proposed SHORE Physical Education Centre development at Shore School.

The site location is shown on Figure 1 and the site extent is shown on Figure 2.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed SHORE Physical Education Centre development of the site.

1.1 Proposed Development Details

The proposed development includes:

Proposed Travers Centre Stage 2:

- The new centre will involve demolition of the existing gymnasium, outdoor swimming pools, bitumen outdoor basketball courts and three brick unit blocks along Hunter Crescent;
- The new centre will comprise construction of a two-tiered, multi-use recreational and educational facility having up to five to six levels;
- The new centre will adjoin the existing indoor basketball courts to the north and also extend beneath the basketball courts;
- The lowest levels of the centre will have Finished Floor Levels (FFLs) ranging from approximately RL55.00m along the southern-most side (carpark, gymnasium, pool tank and pool AHU Zone) to RL59.00m along the northern-most side (weights room and fitness rooms);
- Excavation to a depth of approximately 8m will be required below the existing gymnasium at the northern-most end; and
- Excavation to a depth of approximately 14m to 15m will be required for the proposed gymnasium level.

Proposed Bishops Gate Carpark Extension:

- Extension of the northern side of the existing carpark/tennis courts;
- The extension will involve excavation into the hill. Excavation to a depth of approximately 7m will be required to achieve the proposed levels;
- The lowest level, 'Lower Level', will comprise a car park;
- Finished Floor Level (FFL) for 'Lower Level' will be at RL 56.75m;
- 'Level 1' will comprise car parking, increased sports seating, toilets, cooling tower plant and possible hydraulic pump room (fire);
- Access into the proposed Bishops Gate Car Park 'Level 1' will be via a new driveway off the internal school road; and

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

- 'Roof' level will be a planted roof garden with several raised planting and seating areas.

1.2 Previous Investigations

The following documents have been previously prepared for the site:

- EIS (2015a²), '*Stage 1 Environmental Site Assessment (ESA), Proposed Travers Centre Stage 2 and Bishops Gate Carpark Extension*'. Report prepared for SHORE School, Ref: E27283KBrpt, dated 26 May 2015;
- EIS (2015b³), '*Addendum Letter to EIS Report, Proposed Travers Centre Stage 2 and Bishops Gate Carpark Extension*'. Prepared for SHORE School, Ref: E27283KBlet-ADD, dated 1 June 2015;

This RAP should be read in conjunction with the above reports.

1.3 Objectives

The objectives of the RAP are to:

- Summarise the site contamination issues;
- Identify remediation and management measures to minimise potential risk to site receptors;
- Outline the remediation and/or management procedures for the site;
- Prepare a validation plan to be implemented in conjunction with the remediation work;
- Prepare a contingency plan for the remediation works; and
- Outline site management procedures to be implemented during remediation work.

1.4 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP42851K1) of 6 July 2016 and written acceptance from the client of 7 July 2016.

The scope of work included the following:

- A review of background information;
- Identify potential remediation options;
- Outline the remediation procedures;
- Outline the validation sampling and analysis plan for the remediation work; and
- Preparation of the RAP report.

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.

² Referred to as EIS 2015 Stage 1 ESA report

³ Referred to as EIS ADD

Table 1-1: Guidelines

Guidelines/Regulations
Contaminated Land Management Act (1997 ⁴)
State Environmental Planning Policy No.55 – Remediation of Land (1998 ⁵)
Guidelines for Consultants Reporting on Contaminated Sites (2011 ⁶)
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006 ⁷)
National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013 ⁸)

⁴ NSW Government Legislation, (2008), *Contaminated Land Management Act*. (referred to as CLM Act 1997)

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

⁶ NSW Office of Environment and Heritage (OEH), (2011), *Guidelines for Consultants Reporting on Contaminated Sites*. (referred to as Reporting Guidelines 2011)

⁷ NSW DEC, (2006), *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

⁸ National Environment Protection Council (NEPC), (2013), *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)*. (referred to as NEPM 2013)

2 **SITE INFORMATION**

2.1 **Site Identification and Regional Setting**

Table 2-1: Site Identification

Current Site Owner:	SHORE School
Site Address:	22 Edward Street, North Sydney, NSW 1 Blue Street, North Sydney, NSW 4 Hunter Street, North Sydney, NSW 5 Hunter Street, North Sydney, NSW 16 William Street, North Sydney, NSW
Lot & Deposited Plan:	Part of Lot 3 DP508557 Lots 3 to 7 DP18725 Part of Lot 1 DP539853 Part of Lots B and C DP975970
Current Land Use:	Educational Facility
Proposed Land Use:	Educational Facility
Local Government Authority (LGA):	North Sydney
Current Zoning:	SP2 Infrastructure 'Educational Establishment' R4 High Density Residential
Site Area (ha):	Approximately 1.1
RL (AHD in m) (approx.):	54m to 73m
Geographical Location (MGA) (approx.):	N: 6254011 E: 333915
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Site Contamination Data:	Figures 3 and 4
Regional Geology:	Underlain by Hawkesbury Sandstone, which typically consists medium to coarse grained quartz sandstone with minor shale and laminite lenses.
Acid Sulfate Soil (ASS):	No ASS risk.

Hydrogeology:	1 groundwater bore (GW107764) located within approximately 500m radius of the site. The bore was registered for domestic purposes by SHORE School.
Receiving Water Bodies:	Berrys Bay located approximately 500m to the south-west of the site.
Local Meteorology:	The BOM data indicates that significant rainfall occurred during January to June of this year. Surface water infiltration during this period could have resulted in groundwater recharge at the site. Mobile contaminants (if present) could have migrated further down-gradient from the site.
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 Configuration:	The site and immediate surrounds generally appeared similar to the layout outlined in the EIS 2015a ESA Report.

2.2 Site Characterisation

2.2.1 Summary of Conceptual Site Model (CSM) and Areas of Environmental Concern (AEC)

The CSM outlined in the EIS 2015a ESA report identified the following AEC at the site:

- Fill Material - Entire Site:

The site appears to have been historically filled to achieve existing levels. The depth of fill varies from approximately 0.1mbgl to 1.6mbgl, the fill being the deepest at the western end of the site. The origin and source of fill is unknown and may contain CoPC.

- Use of Pesticides:

The site has been occupied since at least 1930. Pesticides could have been used at the site which could have resulted in potential localised contamination.

- Hazardous Building Material:

The buildings on the site have been constructed prior to 1990's. Hazardous building materials were used for construction purposes during this period. The material can pose a potential contamination source during demolition/development. The aerial photographs indicate that former buildings at the site were demolished prior to the construction of the existing facilities like the swimming pool, basketball courts, gymnasium etc. The use of hazardous building material in the former buildings could have resulted in potential contamination.

2.3 Summary of Site Contamination

The EIS 2015a ESA identified the following issues associated with the AEC identified at the site. The site contamination data is shown on the attached Figures 3 and 4:

2.3.1 Zinc

One fill sample (BH9 (0-0.1m)) encountered elevated concentrations of Zinc above the EIL-URPOS criterion.

The approximate location of the Zinc impact is shown on the attached Figure 4.

The source of Zinc could be associated with the ash, coal and slag inclusions encountered in the fill matrix.

The laboratory results indicate that the underlying natural soil has not been impacted by this contaminant.

The EIS 2015a ESA report stated that the proposed development will include the removal of the fill and natural soils over the majority of the site area.

EIS note that the EIS 2015a ESA also encountered some other heavy metal impacts but these were outside of the site footprint and have not been addressed in this RAP. The elevated results included copper and nickel above the EIL-URPOS criteria and one lead result above the HIL-C criterion.

2.3.2 B(a)P TEQ and B(a)P

Two fill samples; BH7 (0.3-0.5m) and BH9 (0-0.1m) encountered an elevated B(a)P TEQ concentration above the HIL-C. Five fill samples; BH1 (0.5-1.0m), BH4 (0.1-0.2m), BH5 (0.13-0.3m), BH7 (0.3-0.5m) and BH9 (0-0.1m) encountered a B(a)P concentration above the EIL criterion. These elevations are considered to be associated with the fill as no point sources for these contaminants were identified at these sample locations.

These contaminants are localised and confined to the fill, which extended to depths of approximately 0.1m in the central section to 1.4m bgl in the west section.

Fill sample BH2 (0-0.2m) also encountered concentration of B(a)P TEQ above the HIL-C and B(a)P concentration above the EIL criterion, however this sample location is considered to be outside of the site boundary.

2.4 Summary of Waste Classification for Off-Site Disposal

The waste classification presented in the EIS 2015a ESA report is summarised in the following table:

Table 2-2: Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Fill material in the investigation area	General Solid Waste (non-putrescible) (GSW)	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation. Due to the contaminants encountered in the fill, the fill material is not considered to be suitable for re-use on the subject site.
Natural silty clay/sand soil and sandstone bedrock	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 (provided Council approves the re-use of VENM). Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

2.5 Assessment of Risk to Site Receptors

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.

Table 2-3: Tier 1 Risk Assessment

AEC	CoPC	Discussion and Risk Rating
Fill Material	Zinc, B(a)P TEQ, and B(a)P	<u>Human Receptors – Site Workers</u> Site workers (construction/maintenance/future workers) will be exposed to the fill soil during development and post development work. The risk posed by the majority of the CoPC in the fill to workers is considered to be low to moderate and can be managed by appropriate PPE and dust mitigation methods.

AEC	CoPC	Discussion and Risk Rating
		<u>Human Receptors – Future Occupants</u> The development of the site includes a one level to two-tiered multi-storey multi-use recreational and educational facility, including extension of the northern end of the existing Bishop's Gate Carpark. The proposed development will include the removal of the fill and natural soils over the majority of the site area. This will reduce the risk to future receptors. In areas where the contaminated fill will remain, an environmental management plan (EMP) should be put in place to reduce the risk to receptors. <u>Environmental Receptors:</u> Following remediation there will only be a low risk to environmental receptors.
Hazardous Building Material	None Detected in Soil	Asbestos was not detected in the soil samples analysed for the investigation. A HAZMAT survey of the buildings at the site should be undertaken to further assess the potential risks to human and environmental receptors on site. All hazardous materials should be removed from buildings prior to demolition.

2.6 Fate and Transport of Contaminants

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

Table 2-4: Fate and Transport of CoPC

CoPC	Fate and Transport
Zinc, B(a)P TEQ and B(a)P	With the exception of asbestos, non-volatile contaminants are predominantly confined to the soil and groundwater medium. The mobility of these contaminants varies depending on: the nature and type of contaminant present (e.g. leachability, viscosity etc.); soil type/porosity; surface water infiltration; groundwater levels; and the rate of groundwater movement. Non-volatile contaminants associated with ash and slag waste (some heavy metals, heavy fraction PAHs, and sometimes heavy fraction TPHs) are bound within a relatively insoluble matrix. Slag and ash is usually formed as a by-product of combustion at high temperatures which 'locks in' the contaminants within the matrix.

3 **REMEDIATION EXTENT**

3.1 **Known Extent**

The extent of remediation is summarised in the table below. Reference should also be made to the attached Figures 3 & 4.

Table 3-1: Know Extent of Remediation

Remediation Area, AEC and CoPC	Extent of Contamination	Potential Remediation Strategy
Fill impacted by Zinc, B(a)P TEQ and B(a)P	The fill in the eastern section of the site has been impacted by B(a)P TEQ (see Figure 3). The Zinc elevation above the ecological criteria was confined to the south eastern corner of the site, but B(a)P elevation was across the entire site (see Figure 4). The natural soil has not been impacted by these CoPC.	The earthworks include stripping of the top fill and underlying natural soils layers to a depth of approximately 8mbgl to 15mbgl over the eastern section of the site and up to a depth of approximately 7mbgl over the south western section of the site. The majority of the fill material will be disposed off-site. This will remove the CoPC which were encountered within the shallow fill as shown on the attached Figures 3 and 4. The CoPC identified in fill which would remain on-site is not considered to pose a risk to site receptors provided there is no exposure pathway. The exposure to site workers can be managed by appropriate PPE and by dust mitigation methods. Based on the site information, the most cost effective remediation approach for fill remaining at the site would be to cap and contain the material. The CoPC can be managed by preparing an Environmental Management Plan (EMP) for the site.

3.2 **Unknown Extent**

The proposed remediation works are based on limited point source data that has been spatially interpreted between previous sampling points. Access beneath the existing building footprints was not possible during the initial investigation.

Following demolition of the existing buildings the soil beneath the existing building footprints should be sampled and analysed (see Figure 2 for approximate sampling locations).

4 REMEDIATION OPTIONS

4.1 Soil Remediation

The NSW EPA follows the ANZECC/NHMRC 1992 published hierarchy for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The Site Auditor Guidelines 2006 provide the following additional requirements to be taken into consideration:

- Remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site undisturbed; and
- Where there are large quantities of soil with low levels of contamination, alternative strategies should be considered or developed.

4.2 Site Specific Remediation Options

The tables below summarise the site specific remediation options:

Table 4-1: Site Specific Remediation Options

Option	Discussion	Applicability
<u>Option 1</u> On-site treatment of contaminated soil	On-site treatment provides a mechanism to reuse the processed material and in some instances, to avoid the need for large scale earthworks. Some of the treatment options include: <u>Bio-remediation:</u> Addition of oxygen and nutrient compounds to accelerate the natural process of organic compound decay within the environment. Soils require excavation and stockpiling prior to treatment. Not suitable for all contaminants. <u>Soil Washing:</u> Soil is stripped of contaminants via a leaching process and the concentrated contaminated liquid product retained for disposal or additional treatment. <u>Air Sparging and Extraction:</u> Air is forced through the contaminated soil to volatilise organic contaminants. The air is then extracted and captured for treatment leaving reduced contaminant concentrations within the sub-strata. <u>Thermal Desorption:</u> Contaminated soils are heated within an incinerator to volatilise or combust the contaminants. Contaminants are either broken down to water and carbon dioxide or alternatively trapped within an air filtration system. Licenses are necessary for specific individual waste streams due to the potential for air pollution and the formation of harmful by-products during the incineration process.	On-site treatment options are generally very expensive and time consuming. These are applicable for large scale remediation work of sites with large areas impacted by contaminants that can be treated. The CoPC at this site include zinc, B(a)P TEQ and B(a)P. Most of these compounds are very difficult to treat as they don't breakdown easily. Considering the costs and the nature of the CoPC, this option is not considerable to be viable.

Option	Discussion	Applicability
<u>Option 2</u> Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Off-site treatment of soil is very expensive and is not considered a preferred option. Material which leaves the site as a 'waste' stream can only be taken to a facility licensed by the NSW EPA licensed to receive the waste stream. The treated material cannot be brought back onto the site as it will be classed as a waste stream.
<u>Option 3</u> Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to a NSW EPA licensed landfill. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	This is considered to be the most viable option for the following: • Disposal of any surplus fill soil excavated from the general site areas for the redevelopment works.
<u>Option 4</u> Consolidation and isolation of impacted soil by cap and containment	This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the existing ground surface to isolate the contaminated material and thereby reduce the health risk to future site users. This action may also reduce the transport of contamination via surface water movement, dust generation and potentially groundwater infiltration, however, environmental issues would need to be evaluated.	This option is considered to be a viable option for any contaminated fill material remaining on-site on completion of earthworks.

Option	Discussion	Applicability
	Such an option should only be considered where other preferred approaches from the NSW EPA hierarchy are not applicable. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing environmental management plan (EMP) would be required and site identification documentation, possibly including the S.149 council planning certificate and/or the land title, would be modified to note the presence of the contamination. This may impact upon development approval conditions and limit the future potential land value.	

5 **REMEDIATION DETAILS**

Prior to commencement of remediation work, the site management plan for remediation works (see **Section 8**) should be reviewed and implemented by the Remediation/Construction Contractor.

Prior to proceeding with the remedial works, approval must be sought from the local council for the general acceptance of the proposed remediation strategy in order to comply with Section 3.4.6 of the Site Auditor Guidelines 2006.

Geotechnical advice should be sought regarding the requirements of any backfill material used for the reinstatement of remediation areas.

5.1 **Roles and Responsibility**

The roles and responsibilities for the implementation of this RAP are outlined in the table below.

Table 5-1: Roles and Responsibilities

Role	Responsibility
Client appointed Project Manager (PM)	Epm Projects Pty Ltd. Contact: Mr Jordan Graham P: 02-9452 8300 A: PO Box 1034, North Sydney, NSW 2059 E: jgraham@epmprojects.com.au The PM is required to provide all investigation reports including this plan to the remediation/construction contractor (RC) prior to commencement of remediation work. The PM needs to ensure that the RC has understood the plan and will implement it in its totality. Further details are outlined in the sections below.
Remediation/ Construction Contractor (RC)	TBA The RC is required to review all documents prepared for the project and implement the procedures outlined in this plan and the EIS 2014c ESA/RAP reports. The RC is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further details are outlined in the sections below.
Earthworks-Sub Contractor (SC)	TBA The earthworks sub-contractor working on the project should be made aware of site contamination and this plan. The sub-contractor is required to review this document and implement the procedures outlined in this plan and the EIS 2014c ESA and 2015 WC reports.

	The sub-contractor is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further details are outlined in the sections below.
Environmental Consultant (EC)	Environmental Investigation Services (EIS) Contact: Ms. Priya Dass P: 02-9888 5000 A: PO Box 976, North Ryde BC, NSW 1670 E: pdass@jkgroup.net.au The EC provides consulting advice on the ongoing remediation work at the site. The EC is required to review any deviation to this plan or in the event of unexpected finds if and when encountered during the site work. The EC is required to liaise with the site auditor on all matters pertaining to the site contamination and remediation. Further details are outlined in the sections below.
Asbestos Consultant (AC)	TBA The AC provides consulting advice on the management of any asbestos containing material (ACM) at the site. The AC is required to review any deviation to the remediation plan in the event of an unexpected finds of asbestos. The AC is required to liaise with the RC and EC on all matters pertaining to the remediation and management of ACM. Further details are outlined in the sections below.
Other Consultants & Contractors (Health Risk, Landscaping etc.)	TBA Other consultants who may become involved in the project from time to time should be made aware of this plan. The consultant is required to review this plan and implement the procedures outlined in this plan and the EIS 2014c ESA/RAP report. The consultant is required to collect all necessary documentation and forward them onto the PM and environmental consultant as they become available. Further details are outlined in the sections below.

5.2 Remediation of Fill Material over General Site Area

5.2.1 Rationale for Selection of Remedial Strategy

The proposed development includes bulk earthworks for basements or similar which would require the removal of much of the fill material from the site. The fill material from the site surface (1.3m to 1.6m) along the western side of the existing and proposed Bishop Street carpark and (0.1m to 0.7m) in the remainder of the site will be excavated and disposed off-site as part of the earthworks plan. This will remove the majority of the CoPC encountered in the surficial fill. However, deeper fill material and fill retained in some sections of the site that may be impacted by CoPC should be managed to minimise the risk of exposure.

The proposed development includes multi-use recreational and educational facility buildings, including extension of the northern end of the existing Bishop's Gate Carpark and concrete pavements over the majority of the site as shown on the Drawing No. A-DA-0002 and other applicable drawings (refer to Table of Development Plan Drawing Numbers and Titles attached in the appendices) of the site Development Plans (to be submitted by epm Projects to the council). The buildings and pavements in built areas will limit the exposure to the underlying fill impacted by contaminants. The end landuse is for indoor recreational and educational purposes with very minimal exposure to landscaped areas.

Considering the low risk scenario, the most viable option for the contaminated fill material remaining on-site is considered to be the cap and contain approach (Option 4) and the implementation of an EMP. This is also applicable to minimal landscaped areas shown on applicable drawings (refer to Table of Development Plan Drawing Numbers and Titles attached in the appendices) of the site Development Plans (to be submitted by epm Projects to the council).

This remediation strategy is considered most appropriate due to the following:

- The various on-site treatment technologies are generally considered unsuitable for the CoPC;
- The proposed development will involve significant excavation and off-site disposal;
- The risk to future occupants is by direct exposure. The cap and containment will minimise this risk due to the lack of an exposure pathway; and
- The risk to site workers can be managed by wearing appropriate PPE.

5.2.2 Remediation Details

The specific remediation details for this area are described in the table below:

Table 5-2: Remediation of Fill over General Site Area

Step	Procedure	Responsibility
1.	<u>PPE and WHS:</u> Check PPE and WHS requirements prior to commencement of remediation works. This should be done daily. The minimum PPE required for the remediation includes the following: • Disposable gloves; • P2 dust mask (if dusty); • Eye protection; and • Hard hat, covered clothing and steel toed boots.	All personnel who have access to the site
2.	<u>Site Preparation:</u> Clear the site of all pavements, compact bricks, cobbles, boulders and other large objects.	RC
3.	<u>Excavation of fill material from general site surface:</u> The fill material excavated from the surface of the general site area is contaminated and should be stockpiled separately on builders plastic (or	RC

Step	Procedure	Responsibility
	similar). The fill has been classed as 'General Solid Waste (GSW)' (see Section 2.4) for off-site disposal. The stockpiled fill material should only be disposed of at a NSW EPA licensed landfill facility which can accept the waste stream. Approvals should be obtained from the landfill facility prior to disposal. The fill material should be loaded directly onto trucks with tracking systems for transport to the landfill. Landfill disposal dockets should be retained and forwarded to the EC. Any fill material that remains on the site after the completion of excavation should be sampled and analysed so that the contamination status can be assessed.	
4.	<u>Capping of Fill remaining in Built Areas:</u> The fill material remaining in built areas may be contaminated. If the material is contaminated, it should be capped to limit exposure. The building floor slab and concrete pavements can act as a suitable capping layer over the contaminated fill in built/hardstand areas. A visual marker layer (geo-fabric/bidim) should be placed beneath the slab/pavement. Service trenches that run through contaminated fill should be placed in trenches lined with geofabric. Service trenches through contaminated fill should be backfilled with VENM. The RC should arrange for a survey of the area prior to placement of the visual marker layer. A final survey should be undertaken of the area after the placement of the building floor slabs and concrete pavements. The survey data should be issued to the EC for inclusions in the validation report.	RC to arrange for the survey and provide plans to EC EC to inspect the site on regular basis during remediation and capping
5.	<u>Capping of Fill remaining in Landscaped Areas:</u> If any contaminated fill material remains in any landscaped areas it should be capped to limit exposure. Fill material from the majority of the site surface (1.3m to 1.6m) along the western side of the existing and proposed Bishop Street carpark and (0.1m to 0.7m) in the remainder of the site will be removed as part of the bulk earthworks. In landscaped areas, a geo-grid such as TriAx (TX150 or TX160) or similar should be placed over the underlying contaminated fill material. A visual marker layer (geo-fabric/bidim) should be placed over the geo-grid. The geo-grid will act as a physical barrier which will limit exposure to the underlying fill.	RC to arrange for the placement of the barriers and importation of clean topsoil (see Section 6.3.1). RC also to arrange for survey of the area. EC to inspect the site on regular basis

Step	Procedure	Responsibility
	The topsoil imported for landscaping should be placed over the geo-grid and visual marker layer. This material will act as a capping layer and should meet the importation criteria outlined in Section 6.3.1. The material should be checked prior to importation onto the site. EIS anticipate that approximately 0.3m to 0.5m of topsoil will be required to achieve the final finished levels in the landscaped areas. Services in this area should be placed above the visual marker. The RC should arrange for a survey of the area prior to placement of the visual marker layer and geo-grid. A final survey should be undertaken of the area after the placement of the topsoil which will form the capping layer. The survey data should be issued to the EC for inclusions in the validation report.	during remediation and capping
6.	<u>Excavation and Disposal of Natural Soil:</u> Following removal of the fill soil, the exposed surface of the natural soil should be sampled and analysed to validate the removal of the contaminated fill (refer to Section 6). If the validation is successful, the natural soil can be disposed of as Virgin Excavated Natural Material (VENM)	EC to carry out validation. RC to arrange for disposal of material (if applicable)
7.	<u>Contingency Plan:</u> The contingency measures outlined in Section 7 should be implemented in the event of unexpected finds.	RC
8.	<u>Validation Report:</u> A validation report will be prepared documenting the remediation works undertaken. The validation report will include documentation of additional sampling and assessment undertaken at the former building footprints and areas where data gaps have been identified, waste tracking, results of the validation testing and other information as applicable.	EC
9.	<u>Post Construction Environmental Management Plan (EMP):</u> An EMP should be prepared for the long term management of the containment area (the site).	EC
10.	<u>Public Notification of EMP:</u> The EMP (if required) will require notification as a condition on the Site Audit Statement and appropriate public notification established under Section 149(2) of the EP&AA Act 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act.	PM to take legal advice Council to amend S149

5.2.3 Validation Sampling

As a minimum the following validation samples should be obtained from the remediation area:

Table 5-7: Validation Sampling in Fill Impacted Areas

Sampling Frequency	Sampling Method	Laboratory Analytical Schedule
Validation samples should be undertaken as outlined below: <u>Excavation Base:</u> Twenty two samples (NSW EPA Sampling Design Guidelines) 1995. <u>Excavation Walls:</u> 1 sample per 15 lineal meters of wall. Samples should be obtained from fill exposed along the walls.	Samples will be obtained using hand equipment or directly from the excavator bucket (based on the depth of excavation). Samples should be obtained approximately 200mm into the exposed profile where possible. Appropriate field QA/QC samples should be obtained as outlined in the validation plan.	Samples will be analysed for: heavy metals and PAHs. The results will be assessed against the Validation Assessment Criteria (VAC) outlined in Section 6.2.

5.3 Identification of Environmental Values and Potential Impacts

The following environmental values have been assessed as part of this remediation:

- **Aquatic ecosystems** – The closest receiving water body in the vicinity of the site is Berrys Bay. This water body predominantly sustains a marine ecosystem. Following remediation, the potential impact of the site on this ecosystem will be minimal.
- **Human Uses** – Groundwater is unlikely to be used as a drinking water source or for recreation uses at the site. Such activities will use potable water or town water supplied to the site. The potential for exposure to contaminants in landscaped areas will be minimised by excavation and off-site disposal of the surficial material and reinstatement with clean topsoil for plant growth.
- **Buildings and Structures** – the contaminants are not considered to be aggressive to buildings and/or built structures.

5.4 Inspection Requirements

An environmental consultant who is a member of the Australian Contaminated Land Consultants Association (ACLCA⁹) should be present during the remediation works to assess the excavation and provide advice on the removal of any impacted soil.

During excavation of the fill material, environmental personnel should be available to make site visits as required to inspect unexpected conditions and manage any issues associated with removal of the fill material. Following remediation, validation inspections will be undertaken and samples obtained as described in this plan.

The site should be inspected by a qualified environmental consultant prior to and after the installation of geo-grid and marker membrane in the areas to be capped.

5.5 Documentation

The RC must retain all documentation associated with the remediation (e.g. landfill dockets, photographs, UST disposal dockets, letters from suppliers of products, reports issued by other consultants etc.). Copies of these documents must be forwarded to EC on completion of the remediation for inclusion in the final validation report.

Photographs obtained prior to and after the installation of geo-grid and marker membrane should be retained and forwarded to EIS for inclusion in the final validation report.

Adequate documentation of waste tracking (excavation, stockpiling, classification, transport and disposal) should be retained by the RC and forwarded to EIS for inclusion in the final validation report.

5.6 Fill Volume Analysis

A fill volume analysis should be included as part of the final validation assessment report based on the final remediation areas and depths. The analysis should be compared to landfill dockets.

EIS will estimate the approximate fill volume when the additional data from beneath the existing building footprints is available.

5.7 Environmental Management Plan (EMP)

Part of the site validation process may include the preparation of the EMP (if any contaminated material remains on-site, which will be completed following the site remediation works. An appropriate public notification of the EMP will be established under Section 149(2) of the

⁹ <http://www.aclca.org.au/>

Environmental Planning and Assessment Act (1979¹⁰) or a covenant registered on the title to land under Section 88B of the Conveyancing Act (1919)¹¹.

¹⁰ NSW Government, (1979), *Environmental Planning and Assessment Act*. (referred to as EPAA 1979)

¹¹ NSW Government, (1919), *Conveyancing Act*. (referred to as Conveyancing Act)

6 **VALIDATION PLAN**

Validation is necessary to demonstrate that remedial measures described in this RAP have been successful and that the site is suitable for the intended land use. The validation will be staged to facilitate the remediation works.

6.1 **Sampling Program**

The sampling program for the validation is outlined in **Section 5**. This is the minimum requirement based on conditions known to exist at the site. Additional validation sampling may be required based on site observations made during remediation.

Site observations will also be used as a validation tool to assess the extent of site contamination. In particular visual indicators such as the presence of ash/slag material or odours will be used to assist the validation process.

Where validation sampling indicates that contamination is likely to extend beneath adjacent properties or further into the school, validation should be completed to the extent practical and the client advised of findings. If contamination is thought to extend beneath neighbouring properties the site owner should inform adjacent property owners that contamination may be present.

6.2 **Validation Assessment Criteria (VAC)**

The site specific VAC to be adopted for the validation assessment is outlined in the table below. The VAC has been derived from NEPM 2013 and other guidelines as outlined in **Section 1.4**.

Table 6-1: VAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs) (NEPM 2013)	The HIL-C criteria for 'secondary schools' will be adopted for the assessment.
Ecological Assessment Criteria (EAC) (NEPM 2013)	The EAC criteria for 'urban residential and public open space (URPOS)' exposure setting will be adopted for the assessment for any landscaped areas (if any)
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014 ¹²) will be adopted to classify the material for off-site disposal

¹² NSW EPA, (2014), 'Waste Classification Guidelines, Part 1: Classifying Waste. (referred to as Waste Classification Guidelines 2014)

6.3 Material Importation Requirements

The importation criteria outlined in this section of the report should be used as a guide for an initial assessment. Marginal elevations of individual compounds should be assessed on a case by case basis in consultation with the regulatory authorities.

6.3.1 Material for Landscaping

The proposed development may require suitable material (topsoil, nutrient rich soil, etc.) to be imported onto the site for landscaping purposes. In our experience, this type of material generally does not meet the definition of virgin excavated natural material (VENM) as outlined in the Waste Classification Guidelines 2014.

In order to minimise the risk of importing potentially contaminated material onto the site, the following measures should be adopted:

- A reputable supplier of landscaped material such as Australian Native Landscapes (ANL) should be contacted to identify suitable material for importation;
- Prior to the importation of the topsoil, the following documentation should be obtained from the supplier:
 - Documentation from the source site indicating that the topsoil is VENM or natural soil;
 - Regular laboratory testing data indicating that the material is not contaminated. The laboratory testing results should be reviewed by the EC and as a minimum should meet the EAC outlined in the VAC;
 - Product details and other documents;
- In the event the material is not for a reputed/licensed supplier, an inspection of the source material should be undertaken prior to importation onto the site. As a minimum, the stockpiled material should be sampled at a ratio of 3 samples per 75m³ (as outlined in NEPM 2013) of material to be imported. The samples should be analysed for: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); TRH/BTEXN, PAHs, OCP/OPP/PCBs; and asbestos. A suitable field QA/QC procedure should be adopted;
- The analytical data should be assessed against the site specific VAC;
- Provided that the analysis results do not exceed the VAC, the material can be imported onto the site and stockpiled away from the remediation area or any other stockpiles located on site; and
- Upon importation, the material should be inspected to confirm that the material is the same as what was initially sampled/supplied and is 'free from evidence of contamination'.

6.3.2 Importation of Recycled Material (RM)

Recycled material such as crushed concrete, bricks, AC, road base, gravel etc. may be required for the master plan development. Such materials should only be sourced from licensed suppliers who can demonstrate that adequate testing is undertaken on a regular basis to meet the waste exemption requirements set out by the NSW EPA.

Recycled material should be accompanied by appropriate documentation verifying that the material meet the waste exemption requirements set out by the NSW EPA. The material should be inspected by the EC on arrival to confirm that the material is consistent with the documentation reviewed from the source site and is free from evidence of contamination. The material should be sampled and analysed for the CoPC as a QA measure.

Recycled material can only be used as engineered fill in areas specified in the exemption guidelines provided it is geotechnically suitable.

All material importation documents should be issued to the client/PM and the EC for inclusion in the validation report.

6.4 Validation Report

As part of the validation process, a site validation report will be prepared by the environmental consultant. The report will outline the remediation work undertaken at the site and any deviations to the remediation strategy. The report will summarise the results of the validation assessment and will be prepared in accordance with the Guidelines for Consultants Reporting on Contaminated Sites 2011. The report will include:

- Summary of the additional environmental assessment works undertaken at the site;
- Summary of the remediation works undertaken at the site;
- Sampling, analysis and quality plan (SAQP) adopted for the validation assessment;
- Summary of the validation results including the analytical results assessed against the VAC;
- Summary of fill disposal analysis and review of contractor documentation;
- Data Quality Assessment; and
- Discussion and conclusion.

7 **CONTINGENCY PLAN**

A review of the proposed remediation works has indicated that the greatest risk that may affect the success of the remediation is an unexpected find during earthworks.

7.1 **Unexpected Finds**

There is a possibility that additional hazards exist at the site. The extent of the contamination has been interpreted from point source data and a documented process of reviewing historical site activities. However, ground conditions may vary between sampling locations and additional hazards may arise as result.

Residual hazards that may exist at the site would generally be expected to be detectable through visual or olfactory means. At this site, these types of hazards may include: unknown underground storage tank(s) (UST(s)), friable asbestos, odorous or stained hydrocarbon impacted soils, demolition waste or ash and slag contaminated soils.

The procedure to be followed in the event of an unexpected find is presented below:

- In the event of an unexpected find, all work in the immediate vicinity should cease and the client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and works;
- In the event potential friable asbestos material is encountered, a qualified occupational hygienist and/or asbestos consultant should be contacted;
- The client should engage a qualified environmental consultant to attend the site and assess the extent of remediation that may be required and/or adequately characterise the contamination in order to allow for cap and containment of the material;
- In the event remediation is required, the procedures outlined within this report should be adopted where appropriate, alternatively an additional remediation action plan (RAP) should be prepared;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

7.2 **Continual Validation Failure**

Where validation sampling indicates that the contaminated material extends further than anticipated, there are two options:

- Re-excavate and re-sample until the validation sample results meet the VAC; or
- Revise the remedial strategy to include the cap and contain approach (if possible).

7.3 Importation Failure for VENM, Landscaping Soil Materials or Recycled Materials

Where material to be imported onto the site does not meet the importation acceptance criteria detailed in **Section 6.3**, the only option is to not accept the material. Alternative material must be sourced that meets the importation requirements.

7.4 Disposal of Hazardous Waste

Material classed as 'Hazardous Waste' (HW) may require further assessment and stabilisation prior to off-site disposal. Disposal approval may also be required from the NSW EPA and EPA licensed landfill facility. The presence of 'Hazardous Waste' may result in significant delays and additional cost to the project.

7.5 Groundwater Seepage and Dewatering

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. Contaminated groundwater will require treatment prior to disposal.

8 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only. The client should contact the local consent authority (council or certifier) for specific site management requirements for the overall development of the site.

8.1 Interim Site Management

An AMP should be prepared and implemented prior to the commencement of site works. The following interim measures should be adopted immediately:

- Maintain fences to prevent access to the remediation area/site;
- Construct new fences following demolition of the existing buildings where necessary;
- Entrances to the site should be locked to prevent unauthorised access, tipping or dumping on the site; and
- Appropriate warning signage should be erected as required.

8.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The contacts will also facilitate registration of complaint acceptance points. The primary point for complaint acceptance will be the Project Manager (PM). The contact details of key project personnel are summarised below.

Table 8-1: Project Contacts

Task	Company	Contact Details
Project Manager (PM)	Epm Projects Pty Ltd.	9452 8300
Remediation Contractor (RC)	TBA	TBA
Environmental Consultant (EC)	Environmental Investigation Services	9888 5000
NSW EPA Site Auditor	TBA	TBA
Asbestos Consultant (AC)	TBA	TBA
Certifier	TBA	TBA
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

8.3 Security

Prior to the commencement of site works, fencing should be installed as required to secure the remediation areas. Warning signs should be erected, which outline the PPE required for remediation work. All excavations should be clearly marked with coloured tape to reduce the risk to site personnel from injury by falling into open excavations.

8.4 Timing and Sequencing of Remediation Works

In general, all remedial works should be completed prior to the commencement of site construction and excavation works for the proposed development. In the event that remedial works are undertaken in conjunction with the development, all remediation areas should be clearly marked and covered with builder's plastic (or similar) in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

In the event of unexpected delays, builder's plastic (or similar) should be used to cover the remediation areas in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

8.5 Site Soil and Water Management Plan

The earthworks contractor should prepare a detailed soil and water management plan prior to the commencement of site works. Silt fences should be used to control the surface water runoff at all appropriate locations of the site. Reference should be made to the consent conditions for more details.

All stockpiled materials should be placed within an erosion containment boundary with silt fences and sandbags employed to limit sediment movement. The containment area should be located away from drainage lines, gutters, stormwater pits and inlets and the site boundary. No liquid waste or runoff should be discharged to the stormwater or sewerage system without the approval of the appropriate authorities.

8.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in Australian Standard AS-2460 (2002¹³) should be adopted. Other measures specified in the consent conditions should also be complied with.

Noise producing machinery and equipment should only be operated between the hours approved by Council (refer to DA consent documents).

All practicable measures should be taken to reduce the generation of noise and vibration to within acceptable limits. In the event that short-term noisy operations are necessary, and where these are

¹³ Australian Standard, (2002), AS2460: *Acoustics - Measurement of the Reverberation Time in Rooms*.

likely to affect residences, notifications should be provided to the relevant authorities and the residents by the PM/Site Foreman/RC, specifying the expected duration of the noisy works.

8.7 Dust Control Plan

All practicable measures should be taken to reduce dust emanating from the site. Factors that contribute to dust production are:

- Wind over a cleared surface;
- Wind over stockpiled material; and
- Movement of machinery in unpaved areas.

Visible dust should not be present at the site boundary. Measures to minimise the potential for dust generation include:

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- Concrete surfaces brushed or washed to remove dust;
- Stopping work during strong winds;
- Loading or unloading of dry soil as close as possible to stockpiles to prevent spreading of loose material around the site; and
- The expanse of cleared land should be kept to a minimum to achieve a clean and economical working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than 3 days, dust monitoring should be undertaken at the site. If excessive dust is generated all site activities should cease until either wind conditions are more acceptable or a revised method of excavation/remediation is developed.

Dust is also produced during the transfer of material to and from the site. All material should be covered during transport and should be properly disposed of on delivery. No material is to be left in an exposed, un-monitored condition.

All equipment and machinery should be brushed or washed down before leaving the site to limit dust and sediment movement off-site. In the event of prolonged rain and lack of paved areas all vehicles should be washed down prior to exit from the site, and any soil or dirt on the wheels of the vehicles removed. Water used to clean the vehicles should be collected and tested prior to appropriate disposal under the Waste Classification Guidelines 2014.

8.8 Air Monitoring

At this stage, EIS has assessed that asbestos was not detected in the soil samples that had been analysed during the ESA in 2015. Air monitoring is not considered necessary at the site. In the event friable or severely damaged FCF is encountered during excavation/constriction works, air monitoring should be undertaken in accordance with the NSW WorkCover requirements.

A qualified occupational hygienist or asbestos consultant should be appointed to assess the extent of monitoring required at the site. Appropriate NSW WorkCover permits should be obtained for asbestos removal works.

8.9 Odour Control Plan

All activities undertaken at the site should be completed in a manner that minimises emissions of smoke, fumes and vapour into the atmosphere and any odours arising from the works or stockpiled material should be controlled. Control measures may include:

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the POEO Act 1997¹⁴;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a solution of Biosolve™ or other appropriate product if required to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. HDPE).

All practicable measures should be taken to reduce fugitive emissions emanating from the site so that associated odours do not constitute a nuisance and that the ambient air quality is not adversely impacted.

If disturbance of contaminated soils result in odorous conditions, the following odour management plan should be implemented to limit the exposure of site personnel and surrounding residents to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- Biosolve or a similar product should be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM 2013:
 - reduce the exposed surface of the odorous materials;
 - time excavation activities to reduce off-site nuisance (particularly during strong winds);
 - and

¹⁴ NSW Government, (1997), *Protection of Environment Operations Act*. (referred to as POEO Act 1997)

- cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

8.10 Health and Safety Plan

A site specific work, health and safety (WHS) plan should be prepared by the contractor for all work to be undertaken at the site. The WHS plan should meet all the requirements outlined in NSW WorkCover WHS regulations. The WHS plan also should make reference to the AMP prepared by AC for specific WHS requirements when working with ACM in soil.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Gloves and dust masks should be worn when working on remediation activities. Reference should be made to the AMP for additional personal protective equipment (PPE) requirements for working with ACM in soil.

Washroom and lunchroom facilities should also be provided to allow workers to remove potential contamination from their hands and clothing prior to eating or drinking.

8.11 Waste Management

Prior to commencement of remedial works and excavation for the proposed development, the contractor should develop a waste management or recycling plan to minimise the amount of waste produced by the site. This should, as a minimum, include measures to recycle and re-use excavated material wherever possible.

8.12 Incident Management Contingency

The environmental consultant engaged to undertake the VA should be contacted if any unexpected conditions are encountered at the site. This should enable the scope of remedial/validation works to be adjusted as required. Similarly if any incident occurs on site, the EC should be advised to assess potential impacts on site contamination conditions and the remediation/validation timetable.

8.13 Hours of Operation

Hours of operation should be between those approved by Council under the development approval process. Reference should also be made to any specific conditions imposed by other consent authority/regulatory bodies.

9 **CONCLUSION**

EIS are of the opinion that the site can be made suitable for the proposed development provided the recommendations in this RAP are successfully implemented, including a validation assessment and preparation of an EMP.

9.1 **Remediation Category**

Site remediation can fall under the following two categories outlined in SEPP55:

Table 9-1: Remediation Category

Category	Details	Applicability
Category 1	Category 1 remediation works are those undertaken in the following areas specified under Clause 9 of SEPP55: A designated development; - Carried out on land declared to be a critical habitat; - Development for which another SEPP or REP requires a development consent; or - Carried out in an area or zone classified as: ➤ Coastal Protection ➤ Conservation or heritage conservation ➤ Habitat protection, or habitat or wildlife corridor ➤ Environmental protection; ➤ Escarpment, escarpment protection or preservation; ➤ Floodway or wetland; ➤ Nature reserve, scenic area or scenic protection; etc. - Work that is not carried out in accordance with the site management provisions contained in the consent authority Development Control Plan (DCP)/Local Environmental Plan (LEP) etc. Approval is required from the consent authority for Category 1 remediation work. The RAP needs to be assessed and determined either as part of the existing DA or as a new and separate DA. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development (Part 6 of EPAA Regulation 1994).	The PM should contact council and obtain the required approvals for the remediation works.
Category 2	Remediation works which do not fall under the above category are classed as Category 2. Development consent is not required for Category 2 remediation works, however the consent authority should be given 30 days' notice prior to commencement of works.	See above

9.2 Regulatory Requirements

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

Table 9-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2008 ¹⁵	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 and validation assessment, the site contamination is unlikely to meet the Notification Triggers.
Public Notification of EMP	The EMP will require public notification under Section 149(2) of the EPAA 1979 or a covenant registered on the title to land under Section 88B of the Conveyancing Act 1919.
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.
Water Management Act 2000 ¹⁶	The remediation of contaminated groundwater may require treatment. Relevant approval should be obtained from NSW EPA and NSW Office of Water (NOW) prior to the commencement of pumping and treatment.
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 ¹⁷	Sites contaminated with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan.

¹⁵ NSW Government Legislation, (2008), *Guidelines on the Duty to Report Contamination*. (referred to as Duty to Report Contamination 2008)

¹⁶ NSW Government Water Management Act 2000

¹⁷ WHS Regulation, (2011), *Code of Practice – How to Manage and Control Asbestos in the Workplace*.

10 LIMITATIONS

The report limitations are outlined below:

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

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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:

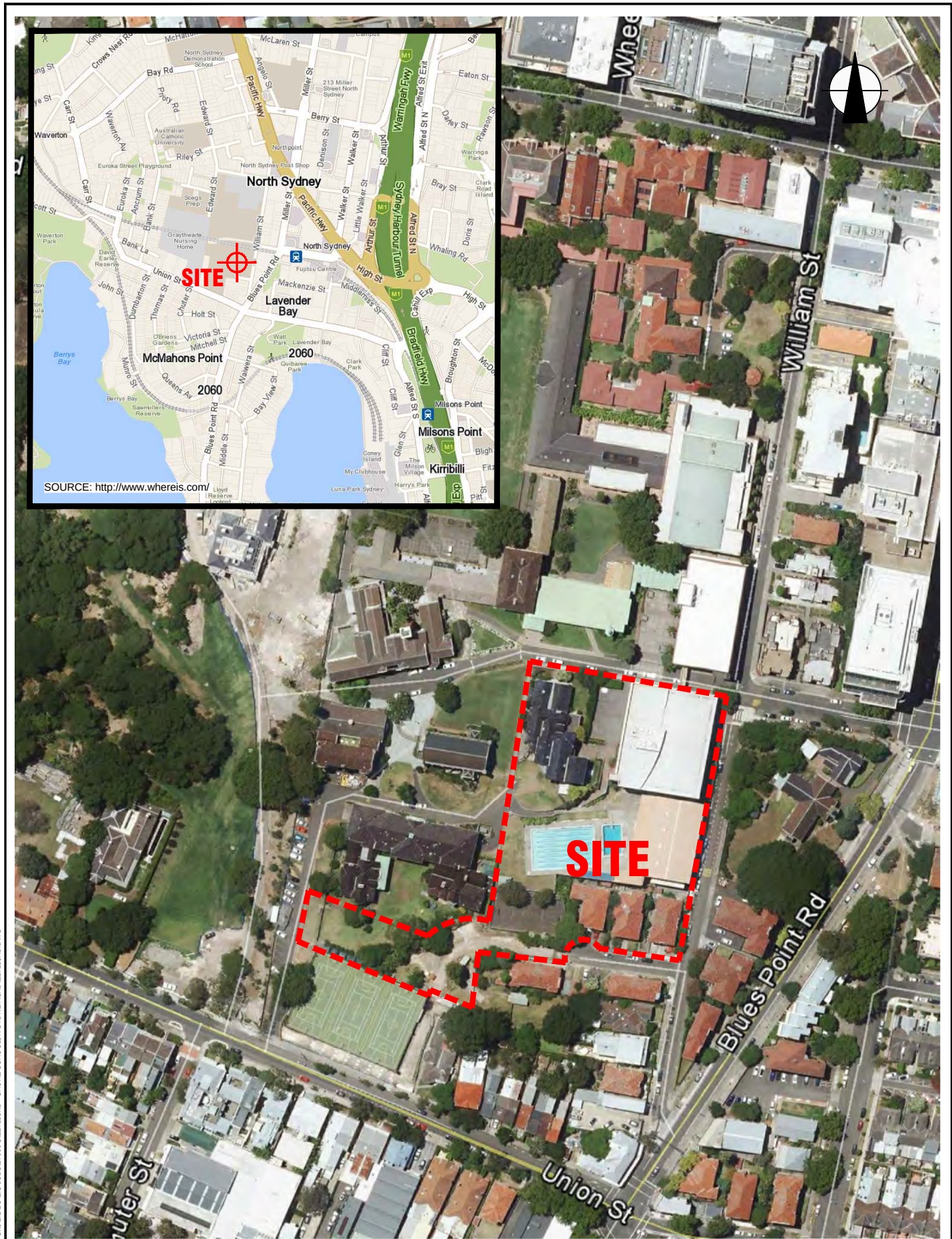
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

Project:

SHORE SCHOOL, OFF WILLIAM STREET
NORTH SYDNEY, NSW

Report No:

E27283KB

Figure No:

1

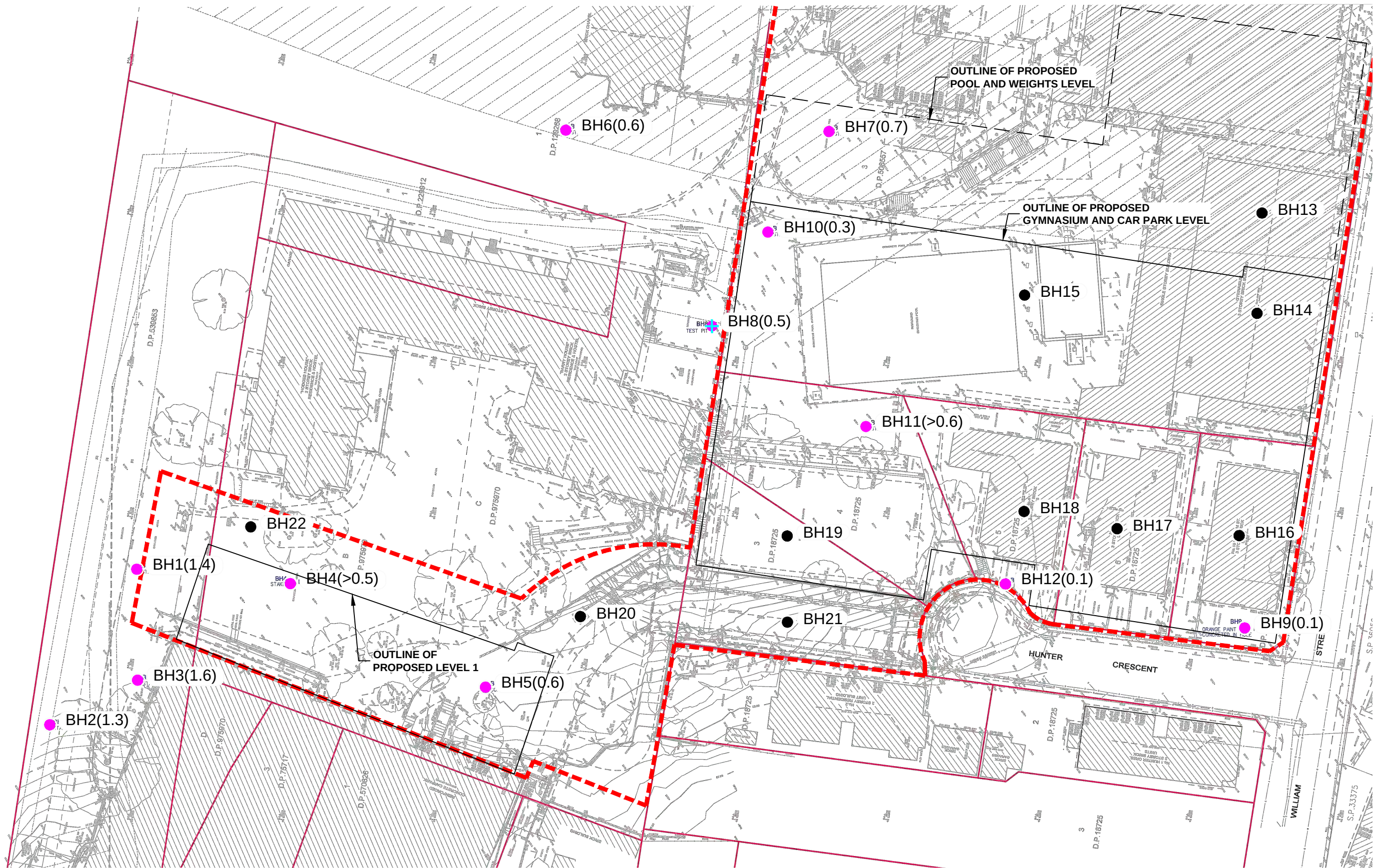
ENVIRONMENTAL INVESTIGATION SERVICES



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

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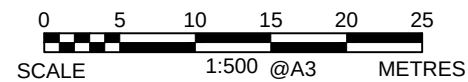
© EIS



LEGEND

--- APPROXIMATE SITE BOUNDARY

- BH (Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JK-EIS 2015)
- BH PROPOSED ADDITIONAL BOREHOLE LOCATIONS
- + GROUNDWATER MONITORING WELL LOCATION

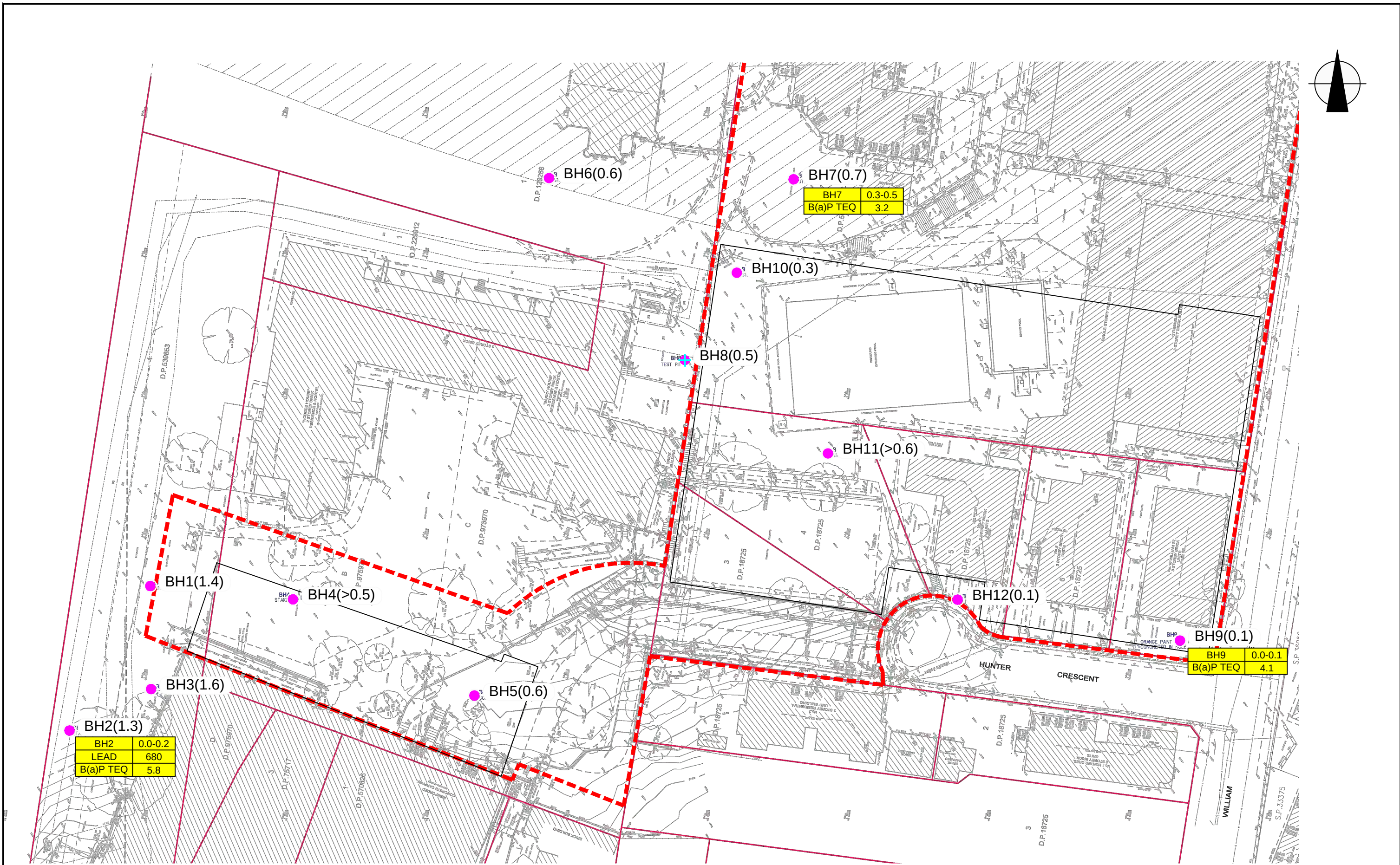


This plan should be read in conjunction with the JK Geotechnics report.

Title: SAMPLE LOCATION PLAN	
Project: SHORE SCHOOL, OFF WILLIAM STREET NORTH SYDNEY, NSW	
Report No: E27283KB	Figure No: 2
ENVIRONMENTAL INVESTIGATION SERVICES	



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LEGEND

- APPROXIMATE SITE BOUNDARY
- BH (Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JK-EIS 2015)
- GROUNDWATER MONITORING WELL LOCATION

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION (mg/kg)

SOIL CONTAMINATION ABOVE SAC FOR HUMAN HEALTH RISK (EIS 2015)

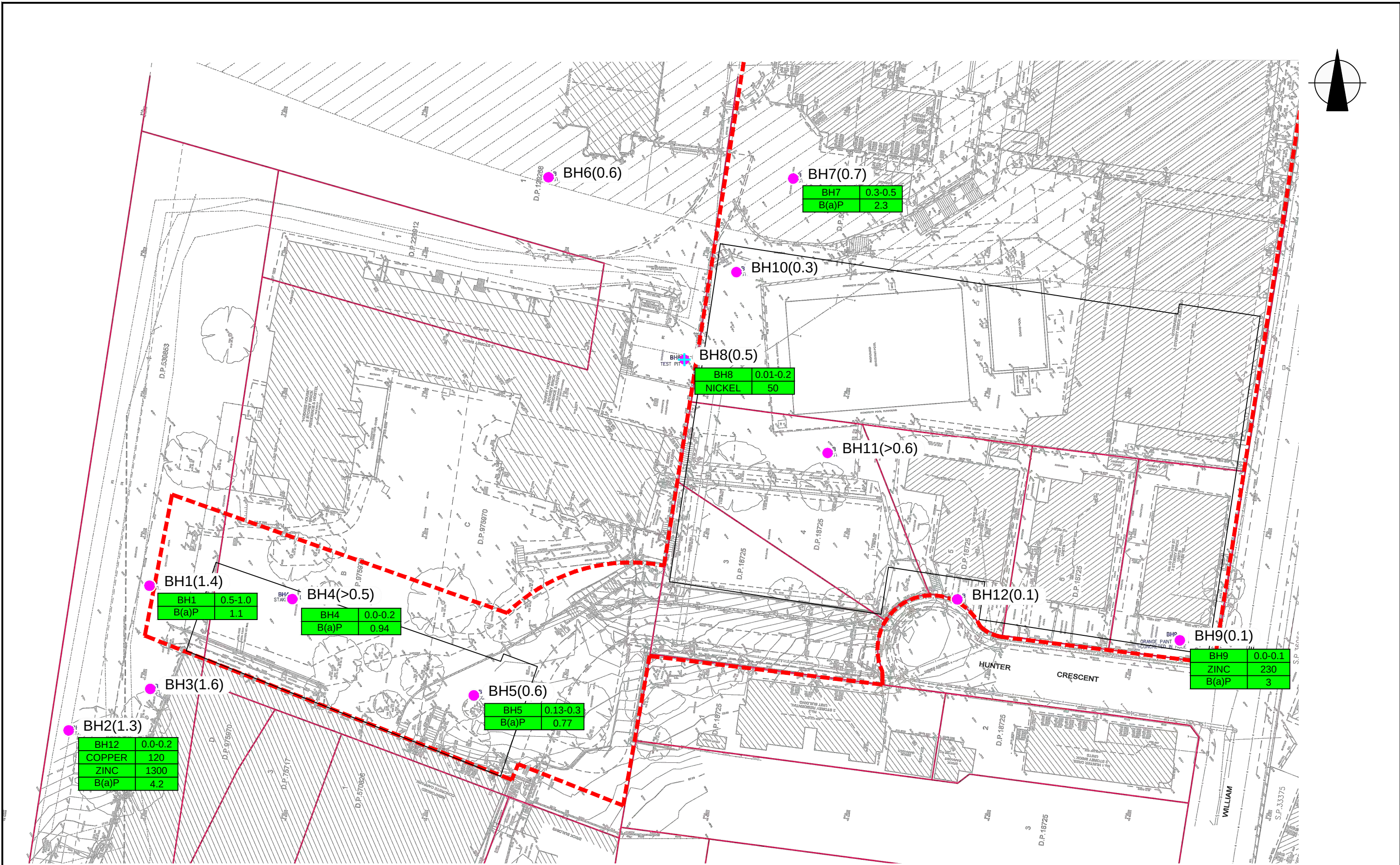
0 5 10 15 20 25
SCALE 1:500 @A3 METRES

This plan should be read in conjunction with the JK Geotechnics report.

Title: SITE CONTAMINATION DATA - RISK TO HUMAN HEALTH	
Project: SHORE SCHOOL, OFF WILLIAM STREET NORTH SYDNEY, NSW	
Report No: E27283KB	Figure No: 3
ENVIRONMENTAL INVESTIGATION SERVICES	

EIS

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LEGEND

APPROXIMATE SITE BOUNDARY

BH (Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m) (JK-EIS 2015)

GROUNDWATER MONITORING WELL LOCATION

SAMPLE ID	DEPTH (metres)
CHEMICAL	CONCENTRATION (mg/kg)

SOIL CONTAMINATION ABOVE SAC FOR ENVIRONMENTAL RISK (EIS 2015)

0 5 10 15 20 25

SCALE 1:500 @A3 METRES

This plan should be read in conjunction with the JK Geotechnics report.

Title: **SITE CONTAMINATION DATA - RISK TO ENVIRONMENT**

Project: SHORE SCHOOL, OFF WILLIAM STREET NORTH SYDNEY, NSW

Report No: E27283KB

Figure No: 4

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

Appendix A: Site Information – Table of Drawing Numbers and Titles of the Development Plans

DRAWING NO.	DRAWING TITLE	Revision No.	Revision Date
A-DA-0000	Cover Sheet	2	13.07.16
A-DA-0001	Site Location Plan - Existing	2	13.07.16
A-DA-0002	Site Location Plan - Proposed	2	13.07.16
A-DA-0003	Site Analysis Plan - Existing Buildings	2	13.07.16
A-DA-0004	Site Analysis Plan- Existing Building Tenancy & Usage	2	13.07.16
A-DA-0005	Site Analysis Plan - Heritage Significance	2	13.07.16
A-DA-0006	Site Analysis Plan - Climate & Topography	2	13.07.16
A-DA-0007	Site Analysis Plan - Built Conditions	2	13.07.16
A-DA-0008	Site Analysis Plan - Pedestrian & Vehicle Access	2	13.07.16
A-DA-0009	Site Analysis Plan - NSC LEP Building Height Standards	2	13.07.16
A-DA-0010	Site Plan - Existing	2	13.07.16
A-DA-0011	Site Plan - Demolition	2	13.07.16
A-DA-0012	Site Plan - Proposed	2	13.07.16
A-DA-0013	Site Plan - DA Envelope Comparison	2	13.07.16
A-DA-0014	DA Envelope Comparison - East & South Elevations	2	13.07.16
A-DA-0015	DA Envelope Comparison - West Elevation	2	13.07.16
A-DA-0016	8.5M & 12M Height Standard - Existing	2	13.07.16
A-DA-0017	8.5M & 12M Height Standard- Approved DA 336/98 & MP 10_0149	2	13.07.16
A-DA-0018	8.5M & 12M Height Standard - Proposed	2	13.07.16
A-DA-2100	Lower Ground Floor Plan RL55.00	2	13.07.16
A-DA-2110	Ground Floor Plan RL59.00	2	13.07.16
A-DA-2120	First Floor Plan RL63.00	2	13.07.16
A-DA-2130	Second Floor Plan RL67.20	2	13.07.16
A-DA-2140	Third Floor Plan RL71.30	2	13.07.16
A-DA-2150	Fourth Floor Plan RL75.40	2	13.07.16
A-DA-2190	Bishops Gate - Ground Floor Plan RL56.75	2	13.07.16
A-DA-2191	Bishops Gate - First Floor Plan RL59.60	2	13.07.16
A-DA-2192	Bishops Gate - Roof Plan RL64.50	2	13.07.16
A-DA-3001	East & South Elevations	2	13.07.16
A-DA-3002	Internal Elevations	2	13.07.16
A-DA-3090	Bishops Gate - Union Street Elevation	2	13.07.16
A-DA-4001	Sections - Overall 1	2	13.07.16
A-DA-4002	Sections - Overall 2	2	13.07.16
A-DA-4090	Bishops Gate - Overall Sections	2	13.07.16
A-DA-8000	Shadow Diagrams -Adjacent Buildings	2	13.07.16
A-DA-8001	Shadow Diagrams - 21 March - 9:00AM - Existing Buildings	2	13.07.16
A-DA-8002	Shadow Diagrams- 21 March- 9:00AM- 12M High Compliant	2	13.07.16
A-DA-8003	Shadow Diagrams - 21 March - 9:00AM - Proposed Buildings	2	13.07.16
A-DA-8004	Shadow Diagrams- 21 March- 12 Noon- Existing Buildings	2	13.07.16
A-DA-8005	Shadow Diagrams- 21 March- 12 Noon- 12M High Compliant	2	13.07.16
A-DA-8006	Shadow Diagrams- 21 March- 12 Noon- Proposed Buildings	2	13.07.16
A-DA-8007	Shadow Diagrams - 21 March - 3:00PM - Existing Buildings	2	13.07.16
A-DA-8008	Shadow Diagrams- 21 March- 3:00PM- 12M High Compliant	2	13.07.16
A-DA-8009	Shadow Diagrams - 21 March - 3:00PM - Proposed Buildings	2	13.07.16
A-DA-8010	Shadow Diagrams - 21 June - 9:00AM - Existing Buildings	2	13.07.16
A-DA-8011	Shadow Diagrams - 21 June - 9:00AM - 12M High Compliant	2	13.07.16
A-DA-8012	Shadow Diagrams - 21 June - 9:00AM - Proposed Buildings	2	13.07.16
A-DA-8013	Shadow Diagrams - 21 June - 10:00AM - Existing Buildings	2	13.07.16
A-DA-8014	Shadow Diagrams - 21 June - 10:00AM - 12M High Compliant	2	13.07.16
A-DA-8015	Shadow Diagrams - 21 June - 10:00AM - Proposed Buildings	2	13.07.16
A-DA-8016	Shadow Diagrams - 21 June - 11:00AM - Existing Buildings	2	13.07.16

A-DA-8017	Shadow Diagrams - 21 June - 11:00AM - 12M High Compliant	2	13.07.16
A-DA-8018	Shadow Diagrams - 21 June - 11:00AM - Proposed Buildings	2	13.07.16
A-DA-8019	Shadow Diagrams - 21 June - 12 Noon - Existing Buildings	2	13.07.16
A-DA-8020	Shadow Diagrams - 21 June - 12 Noon - 12M High Compliant	2	13.07.16
A-DA-8021	Shadow Diagrams - 21 June - 12 Noon - Proposed Buildings	2	13.07.16
A-DA-8022	Shadow Diagrams - 21 June - 1:00PM - Existing Buildings	2	13.07.16
A-DA-8023	Shadow Diagrams - 21 June - 1:00PM - 12M High Compliant	2	13.07.16
A-DA-8024	Shadow Diagrams - 21 June - 1:00PM - Proposed Buildings	2	13.07.16
A-DA-8025	Shadow Diagrams - 21 June - 2:00PM - Existing Buildings	2	13.07.16
A-DA-8026	Shadow Diagrams - 21 June - 2:00PM - 12M High Compliant	2	13.07.16
A-DA-8027	Shadow Diagrams - 21 June - 2:00PM - Proposed Buildings	2	13.07.16
A-DA-8028	Shadow Diagrams - 21 June - 3:00PM - Existing Buildings	2	13.07.16
A-DA-8029	Shadow Diagrams - 21 June - 3:00PM - 12M High Compliant	2	13.07.16
A-DA-8030	Shadow Diagrams - 21 June - 3:00PM - Proposed Buildings	2	13.07.16
A-DA-8031	Shadow Diagrams - 21 September- 9:00AM - Existing Buildings	2	13.07.16
A-DA-8032	Shadow Diagrams- 21 September- 9:00AM- 12M High Compliant	2	13.07.16
A-DA-8033	Shadow Diagrams - 21 September - 9:00AM - Proposed Buildings	2	13.07.16
A-DA-8034	Shadow Diagrams - 21 September - 12 Noon - Existing Buildings	2	13.07.16
A-DA-8035	Shadow Diagrams - 21 September - 12 Noon - 12M High Compliant	2	13.07.16
A-DA-8036	Shadow Diagrams - 21 September - 12 Noon - Proposed Buildings	2	13.07.16
A-DA-8037	Shadow Diagrams - 21 September - 3:00PM - Existing Buildings	2	13.07.16
A-DA-8038	Shadow Diagrams - 21 September - 3:00PM - 12M High Compliant	2	13.07.16
A-DA-8039	Shadow Diagrams - 21 September - 3:00PM - Proposed	2	13.07.16
A-DA-8040	Buildings Proposed & Compliant Height Comparison	2	13.07.16
A-DA-8101	3D View 1	2	13.07.16
A-DA-8102	3DView2	2	13.07.16
A-DA-9001	External Finishes Board	2	13.07.16