



ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

TANNER KIBBLE DENTON ARCHITECTS PTY LTD

ON

REMEDIAL ACTION PLAN

FOR

**PROPOSED CURL CURL NORTH PUBLIC SCHOOL
REDEVELOPMENT**

AT

PLAYFAIR ROAD, NORTH CURL CURL, NSW

27 APRIL 2018

REF: E29816K RAP.REV2



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EXECUTIVE SUMMARY

Tanner Kibble Denton Architects Pty Ltd (TKD) commissioned Environmental Investigation Services (EIS)¹ to prepare a Remedial Action Plan (RAP) for the proposed Curl Curl North Public School redevelopment at Playfair Road, North Curl Curl, NSW. The site location is shown on Figure 1 and the remediation works will be confined to the site boundaries as shown on Figure 1.

Based on the supplied plans, EIS understand that the majority of the existing buildings will be demolished and a new school will be constructed. In general this will consist of:

- Two rows of buildings extending from the central section of the site to the south boundary;
- The two rows of building will be divided by an area of soft and hard landscaping and synthetic turf;
- A swale will run north to south between the new buildings;
- The north/north-east section of the site will be landscaped and include a synthetic turf sports field and asphalt/concrete paved sports court;
- A paved car park will be located on the south boundary of the site; and
- The majority of existing trees will be retained around the perimeter of the site.

EIS completed a Preliminary Stage 1 ESA at the site in late 2016 (Report Ref: E29816KDrpt, dated 23 January 2017, subsequently revised to account for changes to the proposed development details and referenced as E29816KDrpt.rev1, dated 13 April 2018)². The investigation encountered Fibre Cement Fragments (FCF) containing asbestos on the ground surface across the site. Some of the FCF were assessed to be in poor condition and could be broken easily by hand pressure. These were assessed to be 'friable' based on field information. The remaining fragments could not be broken by hand pressure and were assessed to be 'non-friable'. Asbestos fibres were not identified in soil based on the laboratory testing undertaken.

Due to the cost of off-site disposal, the preferred option for remediation is on-site capping of the fill material. The integrity of the cap will be maintained by the implementation of a long term Environmental Management Plan (EMP). On site treatment (raking and picking) may also be applicable for small isolated areas of the site where excavation may be difficult (e.g. tree zones) and no friable types of asbestos are identified. Construction of the proposed swale will involve excavation and offsite disposal of soil.

EIS understand the remediation will be staged to allow for works in the south section to be completed before commencing works in the north section of the site. Demountable classrooms will temporarily be re-located to the north section of the site during remediation of the south section of the site. EIS understand that the remediation is likely to be completed in two stages involving:

- 1) Remediation the southern area; and
- 2) Remediation of the northern area.

During the remediation of the southern area, EIS understand that the school will be housed in temporary demountable buildings in the north section of the site. During this period the north section of the site will be managed by regular sparrow-picking of the area by the Asset Management Unit (AMU) of the Department of Education (DoE) in line with the existing WSP | PB Asbestos management Plan.

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

² EIS, (2017a). *Report to Tanner Kibble Denton on Preliminary Stage 1 Environmental Site Assessment for Proposed Curl Curl North Public School Redevelopment at Playfair Road, North Curl Curl, NSW.* (referred to as EIS 2017a).

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Proposed Development Details	1
1.2	Remediation Goal, Aims and Objectives	1
1.3	Scope of Work	1
2	SITE INFORMATION	3
2.1	Background	3
2.2	Site Identification	4
2.3	Site Location and Regional Setting	4
2.4	Topography	4
2.5	Site Inspection	5
2.6	Summary of Regional Geology and Hydrogeology	5
2.7	Acid Sulfate Soil Risk and Planning	5
2.8	Receiving Water Bodies	6
3	CONCEPTUAL SITE MODEL	7
3.1	Contaminants, Sources of Contamination and Extent	7
3.2	Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways	7
4	DATA GAP INVESTIGATION	9
4.1	Objectives	9
4.2	Installation of HGG monitoring wells	9
4.3	HGG Monitoring	10
4.4	Quality Assurance/Quality Control	10
4.5	Data Assessment	10
5	REMEDIATION EXTENT AND REMEDIATION OPTIONS	11
5.3	Site Specific Remediation Options	12
5.4	Rationale for the Selection of Remedial Strategy	12
6	REMEDIATION DETAILS	13
6.1	Capping Specifications	13
6.2	Summary of Capping Depths	15
6.3	Integrated Capping Specification between Capped and Treated Areas	16
6.4	Excavation and Capping	16
6.5	Remediation of Soil beneath the Trees	17
6.7	Remediation Documentation	19
6.8	Soil Disposal Quantities	19
7	VALIDATION PLAN	21
7.1	Validation Sampling and Documentation	21
7.2	Validation Assessment Criteria and Data Assessment	24
7.3	Validation Report	25
7.4	Data Quality	25
8	CONTINGENCY PLAN	26
8.1	The Area of the Former Gun Emplacement	26
8.2	Unexpected Finds	26
8.3	Continual Soil Validation Failure	26
8.4	Importation Failure for VENM or other Imported Materials	27
9	SITE MANAGEMENT PLAN FOR REMEDIATION WORKS	28
9.1	Asbestos Controls and Licensing Requirements	28
9.2	Interim Site Management	30
9.3	Project Contacts	30
9.4	Security	30
9.5	Timing and Sequencing of Remediation Works	31
9.6	Site Soil and Water Management Plan	31
9.7	Noise and Vibration Control Plan	31
9.8	Dust Control Plan	31
9.9	Air Monitoring	32
9.10	Odour Control Plan	32
9.11	Health and Safety Plan	33
9.12	Waste Management	33
9.13	Incident Management Contingency	33

TABLE OF CONTENTS

	9.14	Hours of Operation	34
11	CONCLUSION		36
	11.1	Remediation Category	36
	11.2	Regulatory Requirements	37
12	LIMITATIONS		38

List of In-Text Tables

Important Information About The Site Assessment Report

REPORT FIGURES:

Figure 1: Site Location Plan

Figure 2: Construction of Buildings in the South of the Site

Figure 3: Construction of Buildings in the North of the Site

Figure 4: Remediation Diagram

Figure 5: Schematic Cross Sections of Capping – categories 1, 2 & 3

Figure 6: Schematic Cross Sections of Capping – categories 5 & 6

APPENDICES:

Appendix A: Report Explanatory Notes

Appendix B: Development Plans

ABBREVIATIONS

Asphaltic Concrete	AC
Asset Management Unit	AMU
Australian Height Datum	AHD
Asbestos Quantification Assessment	AQA
Contaminated Land Management	CLM
Contaminant(s) of Potential Concern	CoPC
Chain of Custody	COC
Conceptual Site Model	CSM
Department of Education	DoE
Data Quality Indicator	DQI
Data Quality Objective	DQO
Environmental Investigation Services	EIS
Environmental Management Plan	EMP
Environmental Protection Agency	EPA
Environmental Site Assessment	ESA
Fibre Cement Fragment(s)	FCF
Hazardous Ground Gas	HGG
Health Investigation Level	HILs
Health Screening Level	HSLs
International Organisation of Standardisation	ISO
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
Practical Quantitation Limit	PQL
Quality Assurance	QA
Quality Control	QC
Remediation Action Plan	RAP
Relative Percentage Difference	RPD
Site Assessment Criteria	SAC
Sampling, Analysis and Quality Plan	SAQP
Site Audit Statement	SAS
Site Audit Report	SAR
Total Recoverable Hydrocarbons	TRH
United States Environmental Protection Agency	USEPA
Underground Storage Tank	UST
Virgin Excavated Natural Material	VENM
Western Australian Department of Health	WADoH
Work Health and Safety	WHS

1 INTRODUCTION

Tanner Kibble Denton Architects Pty Ltd (TKD) commissioned Environmental Investigation Services (EIS)³ to prepare a Remedial Action Plan (RAP) for the proposed Curl Curl North Public School redevelopment at Playfair Road, North Curl Curl, NSW. The site location is shown on Figure 1 and the remediation works will be confined to the site boundaries as shown on Figure 1.

EIS have previously investigated the site and have prepared a Preliminary Stage 1 Environmental Site Assessment (ESA) report. Information contained within this document is summarised in Section 2.

1.1 Proposed Development Details

Based on the supplied plans EIS understand that the majority of the existing buildings will be demolished and a new school will be constructed. In general this will consist of:

- Two rows of buildings extending from the central section of the site to the south boundary;
- The two rows of building will be divided by an area of soft and hard landscaping and synthetic turf;
- A swale will run north to south between the new buildings;
- The north/north-east section of the site will be landscaped and include a synthetic turf sports field and asphalt/concrete paved sports court;
- A paved car park will be located on the south boundary of the site; and
- The majority of existing trees will be retained around the perimeter of the site.

1.2 Remediation Goal, Aims and Objectives

The goal of the remediation is to render the site suitable and confirm the suitability of the site for the proposed primary school development.

The primary aim of the remediation is to reduce the potential for exposure to the contaminants of concern so that the potential risks posed by these contaminants are low and acceptable. The objectives of the RAP are to:

- Provide a methodology to remediate and validate the site;
- Provide a framework for staged remediation and validation of the various site areas;
- Provide a contingency plan for the remediation works;
- Outline site management procedures to be implemented during remediation work; and
- Provide an unexpected finds protocol to be implemented during the development works.

1.3 Scope of Work

The RAP was prepared generally in accordance with an EIS proposal (Ref: EP45044KF) of 30 May 2017 and e-mailed acceptance from the client dated 14 July 2017. The scope of work included the following:

³ Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

- Review of the EIS (2017a) contamination assessment report;
- Review of the generic Asbestos Management Plan for NSW Government Schools (2015);
- Review of the proposed development details; and
- Preparation of a 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.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Asbestos Management Plan for NSW Government Schools (2015) ⁴
Contaminated Land Management Act (1997) ⁵
State Environmental Planning Policy No.55 – Remediation of Land (1998) ⁶
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998) ⁷
Guidelines for Consultants Reporting on Contaminated Sites (2011) ⁸
Guidelines for the NSW Site Auditor Scheme, 3 rd Edition (2017) ⁹
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) ¹⁰

⁴ NSW Department of Planning, (2015). *Asbestos management Plan for NSW Government Schools*

⁵ NSW Government Legislation, (1997). *Contaminated Land Management Act 1997*. (referred to as CLM Act 1997)

⁶ NSW Government, (1998). *State Environmental Planning Policy No. 55 – Remediation of Land*. (referred to as SEPP55)

⁷ Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

⁸ NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites*. (referred to as Reporting Guidelines 2011)

⁹ NSW EPA, (2017). *Guidelines for the NSW Site Auditor Scheme, 3rd ed.* (referred to as Site Auditor Guidelines 2017)

¹⁰ National Environment Protection Council, (2013). *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 1999* (as amended 2013). (referred to as NEPM 2013)

2 SITE INFORMATION

2.1 Background

2.1.1 EIS Stage 1 (EIS, 2017a)

EIS completed a Preliminary Stage 1 ESA at the site in late 2016 (Report Ref: E29816KDrpt, dated 23 January 2017 subsequently revised to account for changes to the proposed development details and referenced as E29816KDrpt.rev2, dated 27 April 2018)¹¹. The investigation encountered Fibre Cement Fragments (FCF) containing asbestos on the ground surface across the site. Some of these FCF was assessed to be in poor condition and could be broken easily by hand pressure. These were assessed to be 'friable' based on field information. The remaining fragments could not be broken by hand pressure and were assessed to be 'non-friable'.

Approximately 40 suspected FCF were noted across the surface of the site (particularly in the north and south sections) by EIS on 4 October 2016. WSP | PB were subsequently engaged by the NSW Department of Education (DoE) – Asset Management Unit (AMU) to provide an Asbestos Remediation Clearance Certificate. Approximately 134 FCF were collected from the surface of the site by WSP | PB. The WSP | PB Asbestos in Grounds Management Plan, dated January 2013, was subsequently revised by WSP | PB, in October 2016.

Approximately 30 additional suspected FCF were collected from the site surface during the subsequent EIS site works on 11 December 2016. Although the FCF (or asbestos fibres) were not encountered within the soils samples analysed, EIS were of the opinion that the continual discovery of FCF in large numbers on the ground surface following surface clearances indicates that the source of on-ground FCF is within the fill soils. It would appear that the FCF are being brought to the surface by human disturbance, along with weathering and erosion processes.

EIS recommended a remediation strategy be implemented to make the site suitable for the proposed development. After discussion with the client it was decided to assume that all of the fill material at site was contaminated with asbestos and proceed directly to the preparation of the RAP. A detailed site investigation to fully characterise the site for asbestos would require approximately 80 evenly spaced test pits across the site. The potential disturbance and delays associated with this was not considered viable, bearing in mind that the result was likely to confirm the presence of random FCF across the site.

In the intervening period EIS understand a number of other isolated FCF were discovered at the site. This is likely to be the result of erosion and rainfall.

A former gun emplacement from the Second World War was located beneath the central section of the site. If anything remains of this structure below ground it is likely to consist of reinforced concrete.

¹¹ EIS, (2017a). *Report to Tanner Kibble Denton on Preliminary Stage 1 Environmental Site Assessment for Proposed Curl Curl North Public School Redevelopment at Playfair Road, North Curl Curl, NSW.* (referred to as EIS 2017a).

Initially this area was not going to be disturbed but new development plans indicate that this area is likely to be disturbed. A contingency plan for addressing this is provided in Section 8.1.

2.2 Site Identification

Table 2-1: Site Identification

Current Site Owner:	The State of New South Wales and Minister for Education and Youth Affairs
Site Address:	Playfair Road, North Curl Curl, NSW
Lot & Deposited Plan:	Lot 1 DP731454 and Lot 286 DP752038
Current Land Use:	Primary School
Proposed Land Use:	Primary School
Local Government Authority (LGA):	Northern Beaches Council
Current Zoning:	R2 – Low Density Residential
Site Area (m ²):	28,000
RL (AHD in m) (approx.):	8
Geographical Location (MGA) (approx.):	Latitude: -33.764505 Longitude: 151.289143
Site Location Plan:	Figure 1

2.3 Site Location and Regional Setting

The site is located in a predominantly residential area of North Curl Curl and is bound by Playfair Road to the west and Abbott Road to the south. The site is located approximately 170m to the north and north-west of Greendale Creek and Curl Curl Lagoon, respectively

2.4 Topography

The site is located in relatively flat to gently sloping topography, which grades down to the south at approximately 1 ° to 2°.

2.5 Site Inspection

A walkover inspection of the site was undertaken by EIS on 4 October 2016 and 11 December 2016. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken. Selected site photographs obtained during the inspection are attached in the appendices.

At the time of the fieldwork, the central portion of the site was occupied by several one and two storey brick buildings and weatherboard demountable buildings. The buildings were surrounded by asphaltic concrete (AC) pavements and concrete pathways. Grass covered and synthetic grass playing fields occupied the northern and southern portions of the site, with numerous medium sized trees located around the perimeter of the site. Numerous FCF were observed on the ground surface of the site, most notably the northern and southern playing fields.

The neighbouring properties to the north were occupied by two storey brick houses. The neighbouring properties located to the east of the site boundary were occupied by several one and two storey weatherboard, fibro and brick houses. Ground surface levels across the site boundaries were similar.

2.6 Summary of Regional Geology and Hydrogeology

Regional geological information presented in EIS 2017a indicated that the site is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses in the northern part of the site. The seven boreholes drilled in the north section of the site (BH1 to BH7 inclusive) encountered shallow fill to a maximum depth of 400mm underlain by sand/silty sand/clayey sand to the termination depth of the boreholes at 6.45m.

The geological map indicated the southern part of the site to be underlain by man-made fill (dredged estuarine sand and mud, demolition rubble, industrial and household waste) overlying silty to peaty quartz sand, silt and clay with ferruginous & humic cementation in places and common shell layers. However, the six boreholes (BH8 to BH13 inclusive) drilled in the south section of the site encountered shallow fill to a maximum depth of 200mm underlain by sand/silty sand/clayey sand/silty clay to the termination depth of the boreholes at 6.45m.

2.7 Acid Sulfate Soil Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation.

ASS information presented in the Lotsearch report (attached in the appendices) indicated that the site is located within a Class 5 area. Works in Class 5 areas that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent land.

2.8 Receiving Water Bodies

The site location and regional topography indicates that excess surface water flows have the potential to enter Greendale Creek and Curl Curl Lagoon located approximately 170m south and south west of the site, respectively.

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 presented in EIS 2017a

3.1 Contaminants, Sources of Contamination and Extent

FCF containing asbestos was identified at the site. The asbestos containing material (ACM) is most likely to have impacted the surface soils during demolition of the former site buildings. The fill on-site is shallow and is unlikely to have been imported.

FCF was identified in the northern and southern playing fields. Large areas of the central section of the site are paved or covered in buildings. The risk of encountering more FCF in the central section of the site during earthworks is considered to be moderate to high.

For the purpose of the RAP, asbestos is considered to be present across the entire site within fill soil.

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 are outlined in the following CSM table:

Table 3-1: CSM

Potential mechanism for contamination	The primary mechanism for contamination is considered to be 'top down' impacts following demolition activities. However, there is some uncertainty regarding the presence of asbestos in fill beneath the surface. To account for this uncertainty, all fill (to the top of the natural/undisturbed soil profile), is considered to be impacted by asbestos.
Affected media	Soil has been identified as the affected medium, however it is acknowledged that asbestos fibres have the potential to become airborne.
Receptor identification	Human receptors include future site users (i.e. primary school children and adults), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users/residents.
Potential Exposure pathways	The potential exposure pathway relevant to the human receptors is inhalation of airborne asbestos fibres.
Presence of preferential pathways for contaminant movement	There are considered to be no preferential exposure pathways relevant to the contaminant of concern.

Evaluation of Data Gaps	The previous investigations identified impacts from asbestos in/on soils. It is understood that these reports were submitted with an initial State Significant Development (SSD) application lodgement and the various authorities (Council, EPA etc) provided comments. A new SSD application is currently being assembled for a revised development. Following the initial SSD application, Northern Beaches Council provided information relating to an existing Environmental Management plan (EMP) and on-going monitoring of landfill gas associated with John Fisher Park to the south of the site. Elevated concentrations of carbon dioxide have been identified in nearby (off-site) gas wells within John Fisher Park. Following the SSD applications the EPA requested that a site audit statement be prepared by an independent contaminated site auditor. EIS understand that the engagement of a site auditor is currently underway. This RAP may be subject to further revision once the site auditor has reviewed the RAP and initial reports.
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4 DATA GAP INVESTIGATION

The works outlined in this section of the RAP should be addressed as soon as access to the site is available and prior to the commencement of the remediation works outlined in Section 6. The investigation has been designed to address the data gaps identified in Table 3-1: CSM. Any additional work requested by the auditor following their review should also be addressed prior to remediation.

4.1 Objectives

The objectives of the data gap investigation are to:

- Review hazardous ground gas (HGG) data and reports for John Fisher Park made available by Northern Beaches Council;
- Install three HGG wells along the southern boundary of the school;
- Undertake three rounds of HGG monitoring;
- Screen a selection of service pits and enclosed building sub-floor areas where HGG have the potential to accumulate.

4.2 Installation of HGG monitoring wells

The following is to be undertaken for the HGG well installation:

- The requirements under the existing Asbestos in Grounds Asbestos Management Plan will be addressed. This will include submitting the permit to work form, engaging a Class A asbestos removal contractor to be present during the fieldwork and asbestos air monitoring;
- Review of 'Dial Before You Dig' (DBYD) plans;
- Preparation of a job-specific safe work method statement (SWMS); and
- Coordination with the client and the school (as required) to arrange access for the works.
- Installation of three HGG wells along the southern boundary of the school. The well installation locations will be scanned for buried services prior to the commencement of drilling (reference should be made to the proposal assumptions/limitations and conditions of engagement in this regard);
- The wells will be installed using a drill rig with spiral flight augers, to a depth of approximately 0.5m above the observed groundwater level. Wells will be constructed using Class 18 PVC and 2mm sand filter packs around the well response zone. Each well will be appropriately sealed using bentonite, fitted with a landfill gas cap and finished with a lockable steel gatic cover at the surface; and
- Following completion, the ground surface will be checked for any visible debris (such as glass, asbestos containing materials etc) and these materials will be collected and removed from the site. Any surplus soil from the drilling process will also be appropriately managed.

4.3 HGG Monitoring

- For the initial screening to inform the HGG CSM, a minimum of three monitoring should be completed. The first of these will occur on the day of the HGG well installation. Timing for the remaining two monitoring rounds will be dependent on the project requirements/timeframe. If possible one of the monitoring rounds should be co-ordinated with a fall in atmospheric pressure;
- Monitoring will be undertaken using a hand-held landfill gas analyser (GFM430 unit). This instrument will be used to measure HGG concentrations and gas flow in each well. The gases to be monitored will include methane (CH₄), hydrogen sulphide (H₂S), carbon dioxide (CO₂), carbon monoxide (CO) and oxygen (O₂); and
- As part of each monitoring round, HGG concentrations will be screened from a selection of pits (associated with underground services) and enclosed building sub-floor areas where HGG have the potential to accumulate.

4.4 Quality Assurance/Quality Control

The monitoring well with the highest recorded concentration of CO₂ (during each of the three monitoring rounds) will be sampled using a canister for Quality Control/Quality Assurance (QA/QC) purposes. The canister sample will be analysed by a NATA accredited laboratory for CH₄, CO₂ and CO.

4.5 Data Assessment

The data will be assessed in accordance with the NSW EPA *Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases* (2012).

4.6 Reporting

On completion of the investigation, a data gap report should be completed presenting the results of the assessment. If required, the report should include an addendum to the RAP (or a revised/addendum RAP). If the investigation findings alter the proposed remediation, the report will also need to be submitted to, and approved by council.

5 REMEDIATION EXTENT AND REMEDIATION OPTIONS

5.1 Remediation Extent

5.1.1 Fibre Cement fragments

The FCF are considered to be confined to the fill material. Fill material was encountered across the site the fieldwork for EIS 2017a and was found to vary in depth from approximately 0.1m to 0.4m. The fill typically comprised gravel and silty sand.

5.2 Soil Remediation

The NSW EPA follows the hierarchy for the remediation of contaminated sites presented in the ANZECC/NHMRC Guidelines for the Assessment and Management of Contaminated Sites (1992). 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 2017 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.

The NEPM 2013 and Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009)¹² prefer the following asbestos remediation hierarchy:

1. Minimisation of public risk;
2. Minimisation of contaminated soil disturbance; and
3. Minimisation of contaminated material/soil moved to landfill.

Section 7.2.3 of the Asbestos Management Plan for NSW Government Schools (2015) states that the preferred method of remediation is encapsulation of soils on-site.

¹² Western Australian (WA) Department of Health (DoH), (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. (referred to as WA DoH 2009)

5.3 Site Specific Remediation Options

There are limited options available for remediation of asbestos contaminated soil. The primary options available for this project include:

- On-site treatment – this option can only be applied to bonded FCF and does not apply to asbestos fibres in soil or to small fragments of FCF (i.e. asbestos fines/fibrous asbestos - AF/FA);
- Off-site disposal of contaminated soil to a licensed facility – this option could be applied to all asbestos impacted materials; and
- Consolidation and isolation of impacted material by cap and containment – this option could be applied to the site, however restrictions would apply to the land and the site would need to be managed under a long-term EMP.

5.4 Rationale for the Selection of Remedial Strategy

Due to the high cost of off-site disposal, the preferred option for remediation is on-site capping of the fill material across the majority of the site. On site treatment (i.e. raking and picking) will be undertaken around the perimeter of the site where capping may kill the trees. Picking will be appropriate provided that no AF/FA is identified. Some excavation and off-site disposal of fill soil may be necessary (e.g. for the swale).

The integrity of the cap will be maintained by the implementation of a long term EMP. This will require site identification documentation, possibly including modification of the Section 10.7 (2 & 5) council planning certificate, land title or other appropriate statutory documentation (in consultation with the DoE), to note the presence of the contamination. This may impact upon development approval conditions, place restrictions on the use of the land and limit the future potential land value.

This approach is considered to be the suitable as it will:

1. Minimise public risk;
2. Minimise disposal of contaminated material/soil moved to landfill; and
3. Isolate the soil on-site by containment within a properly designed barrier, thus reducing the potential exposure pathway and risks to site users; and
4. Provide an effective and robust low maintenance capping solution and a simple long term management procedure.

6 REMEDIATION DETAILS

Prior to commencement of any demolition, site preparation or remediation work within the remediation area, a suitably qualified contaminated land consultant¹³ should be engaged as the validation consultant to validate the implementation of the RAP. The site management plan for remediation works (see Section 9) should also be reviewed and implemented by the remediation contractor.

EIS understand that the remediation is likely to be completed in two stages involving remediation of the southern area, followed by remediation of the northern area.

During the remediation of the southern area, EIS understand that the school will be housed in temporary demountable buildings in the north section of the site. During this period the north section of the site will be managed by regular sparrow-picking of the area by the Asset Management Unit (AMU) of the DoE in line with the existing WSP | PB Asbestos management Plan.

EIS are of the opinion that the sequence of the proposed development/remediation works will not have a significant impact on the outcome of the validation provided that the potential for cross-contamination is considered during all on-site activities.

6.1 Capping Specifications

In this RAP the entire site has been grouped into five capping categories of final finished surfaces as detailed below and shown schematically in Figures 5 and 6:

- **Category 1** – Building with raised/suspended slabs;
- **Category 2** – Areas with continuous concrete or asphalt paving on grade (e.g. on-grade building slabs, concrete paths, car park;
- **Category 3** – Areas paved with synthetic turf;
- **Category 4** – Landscaping with shallow plantings above marker layer (i.e. within imported topsoil material);
- **Category 5** - Landscaping with deeper plantings (i.e. trees/shrubs that would otherwise require excavation below the marker layer required under Category 4).

¹³ EIS recommend that the consultancy engaged for the work be a member of the Australian Contaminated Land Consultants Associated (ACLCA) and the individual writing and/or reviewing the report be certified under one of the NSW EPA endorsed certified practitioner schemes

6.1.1 Category 1 Capping Details

The proposed buildings will be partially suspended above the ground therefore the contaminated soil can be capped in-situ and access to the sub floor void physically restricted by panels or blockwork. The cap will be constructed in the following manner:

- The building footprint will be covered in geofabric and geogrid. The geofabric and geogrid layer will extend approximately 1m outside of the footprint to provide overlap with the adjoining area;
- The geofabric/geogrid layer inside the building footprint will then be covered with approximately 100mm of clean soil (e.g. crushed sandstone/shale VENM) to protect the geogrid/geofabric layer;
- Details of a methodology to puncture the capping layer for installation of piles for the building will need to be agreed with the building contractor (if possible, piling should be undertaken prior to installation of the geofabric/geogrid and cap);
- On completion of the building, access to the sub-floor voids will be restricted by the construction of vertical panels or blockwork (final specification to be agreed). This final specification will need to minimise the risk of floodwater from overland flows washing asbestos contaminated soil out of the building footprint; and
- The geofabric/geogrid that extends outside of the building footprint will be covered by the final surface in that area (e.g. top soil/pavement).

6.1.2 Category 2 Capping Details

The continuous paved areas outside the buildings paved with asphalt or concrete will be adequate to prevent any casual or accidental access to the underlying fill soil. In these locations no additional capping measures should be necessary. However, any adjoining areas where geofabric/geogrid is placed will require an adequate overlap (500mm) beneath the pavement to ensure adequate integration between the two areas.

Service trenches should be boxed out using High Visibility (non-woven) Geotextile and backfilled with clean sand or sub-base (see Figure 5).

6.1.3 Category 3 Capping Details

The synthetic turf areas should be capped using the following method:

- The footprint of the area should be covered with geofabric. The geofabric should extend approximately 500mm outside the footprint so that it can be incorporated into any adjacent capping;
- Put down the sub-grade layers required for the synthetic turf as per specifications; and
- Lay the synthetic turf.

The geogrid can be omitted from beneath the synthetic turf as the synthetic turf and associated base course will be resistant to accidental disturbance.

6.1.4 Category 4 Capping Details

The landscaped areas should be capped using the following methods:

- The footprint of the area should be covered in geofabric and geogrid. The geofabric and geogrid should extend approximately 500mm outside of the footprint of the area so that it can be incorporated into any adjacent capping; and
- An appropriate depth of clean topsoil should be placed over the geofabric/geogrid. The depth of clean topsoil will be dependent on the plant species. However it should not be less than 200mm – 300mm.

Small landscaped areas that will be boxed out with concrete will not require geofabric and geogrid if the base and walls of the planting area are concrete lined.

6.1.5 Category 5 Capping Details

For deeper plantings we assume that some excavation will be required. In this case the following procedure will be required.

- Excavate the planting area to the required depth and dispose of the excavated soil appropriately. The maximum depth of fill encountered on the site was 0.4m. Therefore it is likely that the excavation will terminate in natural soil. This should be confirmed by inspection;
- If the excavation terminates in natural soil then the walls of the excavation can be covered in geofabric. The geofabric should extend approximately 500mm outside of the footprint of the planting area so that it can be incorporated into any adjacent capping. Covering the base of the excavation with geofabric is optional if natural soil is present (it may be easier to do);
- Backfill the excavation and adjoining surfaces with at least 200mm of clean topsoil.

6.2 Summary of Capping Depths

A summary of capping depths is provided below:

Table 6-1: Summary of Anticipated Capping depths

Capping	Materials and approximate depth		
Concrete pavement pedestrian	-	75mm Sub-base	100mm Concrete
Concrete pavement traffic	-	100mm Sub-base	180mm Concrete
Synthetic turf	Geofabric	Road base (approx. 50mm)	Underlay 20mm Synthetic turf 40mm
Landscaping with less than 500mm new topsoil	3mm geogrid and Geofabric	At least 200mm of clean topsoil	

Capping	Materials and approximate depth		
Landscaping with deeper planting	Geofabric along walls and base	At least 200mm of clean topsoil as cap in areas adjoining the deeper planting	

6.3 Integrated Capping Specification between Capped and Treated Areas

Prior to the commencement of works, the contractor should prepare a specification detailing how each of the capping specifications will be integrated between the various areas. This should include a detailed specification for the integration of the marker layers and capping materials between capped and treated areas.

6.4 Excavation and Capping

Table 6-2: Remediation Details – Excavation and Capping of the of the site

Step	Procedure
1.	<u>Site Set-Up:</u> Reference should be made to Section 9.1 prior to commencement of works.
2.	<u>Personal Protective Equipment (PPE) and Work Health and Safety (WHS):</u> Check PPE and WHS requirements prior to commencement of remediation works. The minimum PPE required for the remediation of asbestos includes the following: • Disposable coveralls rated type 5, category 3 (prEN ISO 13982–1) or equivalent. The hood must be worn; • Disposable gloves (heavy duty may be required); and • P2/P3 respirator conforming to the requirements of AS/NZS 1716:2009. Other site/project specific PPE may be required including hard hat, covered clothing, eye protection, steel toed boots and will be dependent on the requirements of the contractor.
3	<u>Site Preparation and Surface Clearance:</u> The ground surface should be inspected and any visible FCF/ACM should be picked from the surface, double bagged and disposed of to a licensed facility. A surface clearance inspection for visible asbestos materials should subsequently be undertaken by a licensed asbestos assessor or similar competent person. A clearance certificate should be provided for inclusion in the validation report.
4.	<u>Delineation of the Capping Areas</u> The boundaries of the various capping areas should be established and marked. This should be in accordance with Figure 3.

Step	Procedure
	The footprint of the proposed buildings should be marked out. The fill/topsoil within the proposed building footprint will be capped in-situ.
5.	<u>Excavation</u> If any excavation of the fill/topsoil is required (such as for the swale) it should be undertaken as follows • The excavation and removal of asbestos contaminated soil should be completed in accordance with the National Code of Practice “How to Manage and Control Asbestos in the Workplace”, Safe Work Australia 2011; • Air monitoring will be required along the site boundaries and targeted around the remediation area during the fill excavation works. Monitoring should commence prior to the start of works and continue daily for the duration of the works; • A water system will need to be in place to spray the excavated soil during excavation/remediation works and to decontaminate trucks entering the work area. The general site area should be kept damp during remediation works; • Excavate the topsoil/fill down to the underlying natural soil. The details of the excavation works will need to be agreed with the remediation contractor. The works should be done in the most efficient manner that minimises cross contamination; • Dispose of the fill soil to a landfill licensed to receive Special Waste - General Solid Waste containing asbestos; • All documents including landfill dockets and daily air monitoring results etc. should be retained and forwarded to the client and validation consultant for inclusion into the validation report prepared. • Areas where the fill material is removed and disposed off-site (e.g. excavation for the swale) will not require capping provided they are successfully validated (See Section 7). However the perimeter of the validated area should be covered with geofabric that extends approximately 500mm into the footprint of the validated area to ensure adequate integration between the validated and capped areas.
6.	<u>Capping</u> Cap the appropriate areas in accordance with the capping category set out in Section 6.1.

6.5 Remediation of Soil beneath the Trees

Although capping beneath the tree canopy is the preferred option for remediation (as it will be fast and effective) this may not be feasible as it may result in the death of the tree. Advice should be obtained from an arborist on the suitability of capping the area beneath the tree canopy. If capping of the topsoil beneath the trees is not possible an alternative procedure is provided below. This method will only be suitable if it can be demonstrated beforehand (by pre-remediation sampling) that the soil beneath the trees has not been impacted by AF/FA. This method may also be applicable in any areas where the final levels cannot be raised as they may negatively impact over land flow. If AF/FA is present below the tree canopy then the method specified in Table 6-3 will not be suitable. The pre-remediation sampling will involve:

- Excavating shallow test pits by hand on an approximate 10m by 10m grid beneath the trees. As most of the trees are located in a narrow zone around the perimeter of the site this will most likely result in a line of test pits at a spacing of approximately 10m;
- Sieving of a 10L soil sample through a 7mm sieve;
- Any FCF or other material that could potentially contain asbestos will be sampled and recorded noting the physical condition of the sample;
- A 500ml soil sample will be sub-sampled from the 10L bulk sample prior to sieving; and
- The 500ml soil sample will be sent to a NATA registered laboratory for asbestos analysis.

If the sampling and analysis indicates the presence of AF/FA in the soil beneath the trees then a capping strategy will need to be agreed with an arborist. If the sampling and analysis does not identify FA/FA then the following methodology will be suitable.

Table 6-3: Remediation Details – Fill soil beneath the trees

Step	Procedure
1.	<u>Site Set-Up:</u> Reference should be made to Section 9 prior to commencement of works.
2.	<u>PPE and WHS:</u> As per Section 6.4.
3.	<u>Delineation of Remediation Area:</u> The remediation area will be limited to the dripline of the tree canopy (or area confirmed by the arborist).
4.	<u>Remediation of ACM</u> The remediation will be undertaken as follows: • All works will need to proceed in a methodical manner that minimises the risk of cross contamination; • Groups of trees can be treated at the same time however the maximum fill volume of each treatment parcel should be limited to approximately to 40m³ (e.g. if the topsoil/fill is 0.2m deep then the corresponding treatment parcel will be 200m²) ; • Multi directional raking should be undertaken on each parcel to turn over and disturb the soil; • Raking should occur in a north-south direction then east-west on a 1m transect across the parcel; • During raking all visible fragments of FCF/ACM should be picked and placed in a plastic bag. The bag should be sealed upon completion of remediation of the area, “double bagged” and placed in a nominated storage container; • The bagged FCF/ACM should be disposed of appropriately; • The removal of FCF/ACM should be completed in accordance with the National Code of Practice “How to Manage and Control Asbestos in the Workplace”, SafeWork Australia 2011;

Step	Procedure
	• Raking the parcel in one direction (e.g. north –south) will be considered as one “pass” for the purpose of validation. Therefore, raking the entire parcel along the north-south and east-west transect will be two passes; • The raking and picking process will be documented and each individual parcel will be validated in accordance with Table 7-1. Validation will not be deemed successful until there is no FCF/ACM identified during four consecutive passes of each area; • Following remediation, validation and clearance of each area/parcel the fill will need to be “quarantined” to minimise the potential for cross contamination. This can be undertaken by barricading the fill with star pickets and tape; and • In the event that inclement weather renders the material too wet, works should be postponed until the weather improves and the material is workable.

6.6 Disposal Requirements

Asbestos waste can only be disposed of to a waste facility licensed to receive asbestos waste. The nominated landfill should be contacted to obtain the required approvals prior to commencement of excavation and or loading of asbestos waste.

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. At present there is an exemption under this clause for the transportation of soil contaminated with asbestos until September 2017.

Documentation of waste disposal will be required to address the Site Auditor Guidelines 2017.

6.7 Remediation Documentation

The remediation contractor must retain all documentation associated with the remediation, including but not limited to:

- Asbestos removal documentation; including licences, removal control plans and air monitoring results;
- Any waste tracking documentation; and
- Soil/asbestos disposal dockets.

Copies of these documents must be forwarded to the environmental/validation consultant on completion of the remediation for inclusion in the final validation report.

6.8 Soil Disposal Quantities

The construction of the swale will require the excavation of approximately 1,074m³ of material (approximately 1,790m² * 0.6m). The quantity of contaminated material requiring off-site disposal will

be dependent on whether there will be an attempt to separate the contaminated soil from the underlying natural soil during excavation. If there is an attempt to separate the contaminated soil from the underlying natural soil a validation process for this is described in Section 7.

7 **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 sampling program for the validation is outlined in Section 7.1. This is the minimum requirement based on conditions anticipated 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 of FCF will be recorded.

7.1 **Validation Sampling and Documentation**

The table below outlines the validation requirements for the site.

Table 7-1: Validation Requirements

Aspect	Sampling	Analysis	Observations and Documentation
<i>Exposed natural soil</i>			
Natural soil exposed during construction of swale (following removal of topsoil /fill) and prior to excavation of natural soil	Soil samples to be taken on a 10m grid across the base of the exposed area.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, OPPs, PCBs and asbestos. This data will be used to assign a VENM classification to the excavated natural soil	Visible fragments to be sparrow picked from the surface. Asbestos assessor surface clearance certificate (for ACM) to be provided following completion of sparrow pick of the surface. Air monitoring results to be reviewed. Photographs to be taken.
<i>Soil Beneath Capping Layers</i>			
Soil surface prior to laying geogrid and/or geofabric	None	None	Visible fragments to be sparrow picked for the surface. Asbestos assessor surface clearance certificate (for ACM) to be provided following completion of sparrow pick of the surface.

Aspect	Sampling	Analysis	Observations and Documentation
			Air monitoring results to be reviewed. Photographs to be taken.
<i>Soil beneath drip line of trees (if raking adopted)</i>			
Each parcel of approx. 40m ³ (approx. 0.2m deep fill over 200m ²)	Bulk field screening of 1 sample per parcel for ACM.	Bulk asbestos quantification in field i.e. sieving of 10L sample.	Field records to be maintained documenting the following: - The extent of the excavated area - The parcel identifier - The number of raked passes and the number of ACM fragments identified during each pass (clearly showing at least four consecutive passes with no ACM) Weight of sample and fragments encountered during sieving to be recorded. Asbestos assessor surface clearance certificate (for ACM) to be provided following backfilling. Air monitoring results to be reviewed and included in the validation report. Photographs to be taken.
<i>Imported Materials – Materials importation (e.g. for landscaping, drainage, pavement base materials etc)</i>			
Imported VENM backfill	Minimum of three samples per source	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX PAHs, OC/OP pesticides, PCBs and asbestos	VENM documentation/ report required (should include source site history to demonstrate analytes are appropriate). Additional analysis may be required depending on site history. Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of

Aspect	Sampling	Analysis	Observations and Documentation
			contamination and is consistent with documentation.
Imported engineering materials such as recycled aggregate, road base etc	Minimum of three samples per source/material type	Heavy metals (as above), TRHs, BTEX, PAHs, OC/OP pesticides, PCBs and asbestos	Documentation required to confirm material has been classified with reference to a relevant exemption and is fit for purpose on site. Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of contamination and is consistent with documentation. Dockets for imported material to be provided.
Imported engineering materials comprising only natural quarried products such as blue metal etc	At the validation consultants discretion based on supplier documentation	At the validation consultants discretion based on supplier documentation	Documentation to be provided from the supplier confirming the material is a product comprising only VENM (i.e. quarried product). Review of quarry POEO licence. Material to be inspected upon importation to confirm it is free of anthropogenic materials, visible and olfactory indicators of contamination, and is consistent with documentation. Dockets for imported material to be provided.
Imported landscaping materials	Minimum of three samples per source/material type	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRHs, BTEX, PAHs, OCPs, OPPs,	Documentation required to confirm material has been produced under an appropriate standard and is fit for purpose on site. Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of

Aspect	Sampling	Analysis	Observations and Documentation
		PCBs and asbestos	contamination and is consistent with documentation. Dockets for imported material to be provided.

Where clearance inspections are undertaken for horizontal (or near horizontal) surfaces, the inspection will be undertaken by traversing the area on foot, with each traverse spaced approximately 2m apart. Visual observations of the ground surface will be made from the inspector's eye level. An inspection record will be maintained documenting the date, time and location of the area inspected, (including an appropriate reference to the remediation area identifier where appropriate), a description of the soils type(s) exposed across the inspection area and any suspected asbestos finds.

Where inspections of vertical (or near vertical) surfaces are required, this will only be undertaken where it is safe to do so. The inspection will include walking along the excavation wall and recording visual observations from the inspector's eye level. Records will be kept as required during the inspection of vertical surfaces.

7.2 Validation Assessment Criteria and Data Assessment

The validation assessment criteria (VAC) to be adopted for the validation assessment are outlined in the table below:

Table 7-2: VAC

Validation Aspect	Criteria
Waste classification (soil disposal)	In accordance with the procedures and criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014) ¹⁴ .
Soil validation beneath tree canopy prior to raking	AF/FA <0.001% w/w.
Soil validation beneath tree canopy after raking	FCF in Surface Fill/Soil beneath tree canopies – FCF absent at the surface during four consecutive passes after raking, and FCF visually absent in 10L screened soil validation sample.
Imported materials	Heavy metal concentrations to be consistent with background range, organic compounds to be less than the laboratory practical quantitation limits and asbestos to

¹⁴ NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste*. (referred to as Waste Classification Guidelines 2014)

Validation Aspect	Criteria
	be absent. Imported landscaping materials are also to consider Tier 1 ecological criteria outlined in NEPM (2013). Aesthetics: soils to be free of staining and odours.

Data should initially be assessed as above or below the VAC. For imported materials, further assessment of risk can be considered in relation to site specific circumstances/application and available documentation for each material type.

7.3 Validation Report

As part of the validation process, a site validation report will be prepared by the environmental/validation 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 Reporting Guidelines 2011. The report should draw conclusions regarding the success of the remediation/validation and the suitability of the site for the proposed development (from a contamination viewpoint).

7.4 Data Quality

Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) should be clearly outlined and assessed as part of the validation process. A framework for the DQO and DQI process is outlined below and should be reflected in the validation report.

DQOs should be established for the validation with regards to the seven-step process outlined in the Site Auditor Guidelines 2006 and with reference to USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). The seven steps include the following:

- State the problem;
- Identify the decisions/goal of the study;
- Identify information inputs;
- Define the study boundary;
- Develop the analytical approach/decision rule;
- Specify the performance/acceptance criteria; and
- Optimise the design for obtaining the data.

DQIs are to be assessed based on field and laboratory considerations for precision, accuracy, representativeness, completeness and comparability.

8 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. A contingency plan for unexpected finds is outlined below, in conjunction with a selection of other contingencies that may apply to this project.

8.1 The Area of the Former Gun Emplacement

This area is currently inaccessible. After the demolition of the buildings in this area and prior to removing the pavements a ground penetrating radar (GPR) survey should be undertaken to attempt to locate the precise location of the former gun emplacement. When the area becomes accessible a series of test pits should be excavated in the area of the emplacement. This will allow for a physical inspection of the structure. Sampling and analysis of the soil in the area should be undertaken to characterise the nature of the fill in this area. The number of samples and analytes will be dependent on the nature of the material uncovered. Once the results are known a decision can be taken on whether the material can remain in place and be capped or excavated and disposed off-site.

8.2 Unexpected Finds

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: odorous or stained hydrocarbon impacted soils, or significant pockets (>10m²) of FCF and/or suspected friable asbestos materials.

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 additional friable asbestos material is encountered, the Class A asbestos removalist should be notified;
- 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 a supplementary 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.

8.3 Continual Soil Validation Failure

Where validation sampling indicates that ACM or AF/FA is still present, there are two primary options:

- Re-excavate or continue raking/picking (ACM) and re-sample until the validation data meets the VAC; or

- Revise the remedial strategy to include the cap and contain approach (if possible).

8.4 Importation Failure for VENM or other Imported Materials

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

9 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 for specific site management requirements for the overall development of the site.

EIS understand that there is a requirement for the school to remain in operation during the remediation works. A site management plan is provided below to minimise impacts on the areas adjoining the remediation zone. Additional steps that can be undertaken to minimise impacts are:

- Scheduling the works so that as much as possible of the initial capping is completed within one of the longer school holidays;
- Implement any additional controls recommended by the Class A licensed Asbestos removalist; and
- Implement any additional controls recommended by the Asset Management Unit. EIS understand that the asbestos controls in the north section of the site will be managed by the Asset Management Unit.

9.1 Asbestos Controls and Licensing Requirements

The following requirements should be met for the asbestos remediation works at the site:

- A Class A licensed asbestos removalist should be engaged to undertake the excavation/removal works. The licenced contractor is to prepare an Asbestos Removal Control Plan for the site works;
- SafeWork NSW are to be notified prior to excavation works (minimum 5 business days);
- All personnel and contractors must be informed of site conditions, asbestos work areas and any exclusion zones;
- Mandatory air monitoring is to be undertaken on a daily basis during any works in the AF/FA contaminated area and all readings are to be below the detection limit of 0.01 fibres per millilitre. The requirement for daily air monitoring has been set due to the 'friable' nature of the asbestos, the highly visible nature of the site within a residential area and duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard of 0.01 fibres/ml is not exceeded. The requirement for air monitoring during the ACM remediation will be at the discretion of the removal contractor;
- Asbestos clearance certificate/s should be provided by a SafeWork NSW licensed asbestos assessor following the removal of all asbestos contaminated fill material and ACM from the site. EIS note that validation sampling is required; and
- The site is managed in accordance with this plan and the general requirements of SafeWork NSW and strategies outlined in the relevant regulations, guidelines, codes and standards.

9.1.1 General Site Set Up for Asbestos Remediation Works

9.1.1.1 Barricaded Asbestos Work Area

Access to the barricaded asbestos work area must be restricted by the erection of temporary barrier tape/fencing and asbestos warning signage. Only personnel employed by the licenced asbestos removal contractor are to work in the barricaded asbestos removal area.

9.1.1.2 Personal Decontamination and Storage of PPE

A personal decontamination area must be set up in a designated area located on the edge of the asbestos work area. The area must include an asbestos waste bin, wet rags/wet wipes and a sink with soap to wash hands. Additional PPE must be located in this area. Personnel must enter / exit through this area only.

9.1.1.3 Watering System

A watering system such as a hose must be made available for the spray application to soil during excavation and to decontaminate trucks exiting the barricaded area. The general ground surface should also be kept damp.

9.1.1.4 Truck Wash Bay

A temporary wash bay must be set up inside the barricaded area. Trucks should park over the wash bay for loading of soil then be washed down with water prior to exiting the barricaded area. Entry and exit to the barricaded area can be maintained simply by the temporary opening of the barrier/flagging tape.

9.1.2 Asbestos Air Monitoring

Air monitoring will be required along the site boundaries and targeted around the remediation area during the fill excavation works. Monitoring should commence prior to the start of works and continue for the duration of the remediation works.

EIS recommend that air monitoring is undertaken on a daily basis for the following reasons:

- The site is within a residential area and is highly visible to the public; and
- There is a duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard of 0.01 fibres/mL is not exceeded.

Air monitoring must only be carried out by personnel registered and accredited by NATA (National Association of Testing Authorities). Filter analysis must only be carried out within a NATA certified laboratory. The monitoring results must conform to the requirements of the NOHSC Guidance note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

The monitoring program will be used to assess whether the control procedures being applied are satisfactory and that criteria for airborne asbestos fibre levels are not being exceeded. The following levels will be used as action criteria during the air monitoring:

- <0.01 Fibres/ml: Work procedures deemed to be successful;

- 0.01 to 0.02 Fibres/ml: Inspection of the site and review of procedures; and
- >0.02 Fibres/ml: Stop work, inspection of the site, review of procedures, clean-up, rectification works where required and notify the relevant regulator.

9.2 Interim Site Management

The following interim measures should be adopted:

- Maintain fences to prevent access to the remediation area/site;
- Construct new fences following remediation works 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.

9.3 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 contact details of key project personnel are summarised below.

Table 9-1: Project Contacts

Task	Company	Contact Details
Project Manager	Coffey	9406 1000
Remediation Contractor/ Asbestos Removal Contractor	To be appointed	-
Environmental Consultant	EIS (at the time of the RAP preparation)	9888 5000
Asbestos Consultant	Environmental Investigation Services (at the time of the RAP preparation)	9888 5000
Certifier	Design Confidence	8399 3707
NSW EPA	Pollution Line	131 555
Emergency Services	Ambulance, Police, Fire	000

9.4 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.

9.5 Timing and Sequencing of Remediation Works

EIS understand that the remediation and construction will be staged. The first stage will involve relocation of the school to temporary classrooms in the north section of the site whilst the south section of the site is remediated and constructed. The south section of the site will be occupied while the north section of the site is remediated and constructed.

9.6 Site Soil and Water Management Plan

The 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.

9.7 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)¹⁵ 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 the consent authority.

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 likely to affect residences, notifications should be provided to the relevant authorities and the residents by the project manager, specifying the expected duration of the noisy works.

9.8 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:

¹⁵ Australian Standard, (2002). AS2460: *Acoustics - Measurement of the Reverberation Time in Rooms*.

- 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 several 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.

9.9 Air Monitoring

Air monitoring is mandatory for the removal of friable asbestos from the site and should be undertaken constantly during remediation works. Excavation works and air monitoring should be undertaken in accordance with the SafeWork NSW requirements.

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

9.10 Odour Control Plan

Odours are not expected to be an issue in relation to the proposed remediation. However, 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 Protection of the Environment Operations Act (1997¹⁶);
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a solution of BiosolveTM or other appropriate product if required to suppress any odours that may be generated by excavated materials; and
- Use of protective covers (e.g. tarpaulins or builder's plastic).

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.

9.11 Health and Safety Plan

A site specific 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 SafeWork NSW WHS regulations.

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 (additional asbestos-related PPE is also required as outlined previously in this RAP). 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.

9.12 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 natural excavated material wherever possible.

9.13 Incident Management Contingency

The environmental consultant engaged to undertake the validation assessment 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 environmental consultant should be advised to assess potential impacts on site contamination conditions and the remediation/validation timetable.

¹⁶ NSW Government, (1997), *Protection of Environment Operations Act*. (referred to as POEO Act 1997)

9.14 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.

10 LONG-TERM ENVIRONMENT MANAGEMENT PLAN (EMP)

Following completion of the remediation work and successful validation of the site, an EMP will be required and will include the following:

- Site details;
- Site description;
- A brief summary of the site history, investigations and remediation;
- A description of the contaminants of concern (asbestos) and the contamination extent;
- Potential exposure pathways for asbestos;
- A detailed description of the final capping system. This will include the survey co-ordinates of the burial cells; descriptions and photographs of the capping system; dimensions of the capping system; dimensions of the containment cells; plans showing locations; and representative cross sections through the capping system;
- A Management Plan for ongoing maintenance of the capping layer (including inspection requirements);
- A contingency plan to be implemented in the event that the capping layer has to be disturbed or penetrated (e.g. installation of new services);
- An inspection protocol for the capping system. Apart from visual inspections no active ongoing monitoring (i.e. sampling of soil, water or air) would be required.
- Nomination of a timeframe for periodic review of the EMP;
- Requirement for public notification of the EMP;
- Nomination of a primary point of contact;
- Nomination of roles and responsibilities of stakeholders; and
- A statement to the effect that the containment system provides a suitable barrier to eliminate the potential exposure pathway for asbestos during day to day use.

EIS recommend that early engagement be undertaken with the consent authority and any other relevant stakeholders so that the EMP can be publically notified and enforceable.

11 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed school development provided this RAP is implemented accordingly. A site validation report and EMP should be prepared on completion of remediation activities and should be submitted to the consent authority.

11.1 Remediation Category

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

Table 11-1: Remediation Category

Category	Details
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).
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.

The client should seek advice from their planning consultant regarding the appropriate category. Council should be notified of the proposed remediation.

11.2 Regulatory Requirements

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

Table 11-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015) ¹⁷	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination. This requirement should be reassessed following review of the validation results.
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.
WHS Code of Practice (2016) ¹⁸	Sites with asbestos become a 'workplace' when work is carried out there and require a register and asbestos management plan. Appropriate SafeWork NSW notification will be required for asbestos removal works or handling. Contractors are also required to be appropriately licensed for the asbestos works undertaken (i.e. bonded or friable asbestos works).

¹⁷ NSW EPA, (2015), *Guidelines on the Duty to Report Contamination under the Contamination Land Management Act 1997*. (referred to as Duty to Report Contamination 2015)

¹⁸ Safe Work Australia, (2016), *Code of Practice – How to Manage and Control Asbestos in the Workplace*.

12 LIMITATIONS

The report limitations are outlined below:

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

LIST OF IN-TEXT TABLES

Table 1-1: Guidelines	2
Table 2-1: Site Identification	4
Table 3-1: CSM	7
Table 6-1: Summary of Anticipated Capping depths	15
Table 6-2: Remediation Details – Excavation and Capping of the of the site	16
Table 6-3: Remediation Details – Fill soil beneath the trees	18
Table 7-1: Validation Requirements	21
Table 7-2: VAC	24
Table 9-1: Project Contacts	30
Table 11-1: Remediation Category	36
Table 11-2: Regulatory Requirement	37

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

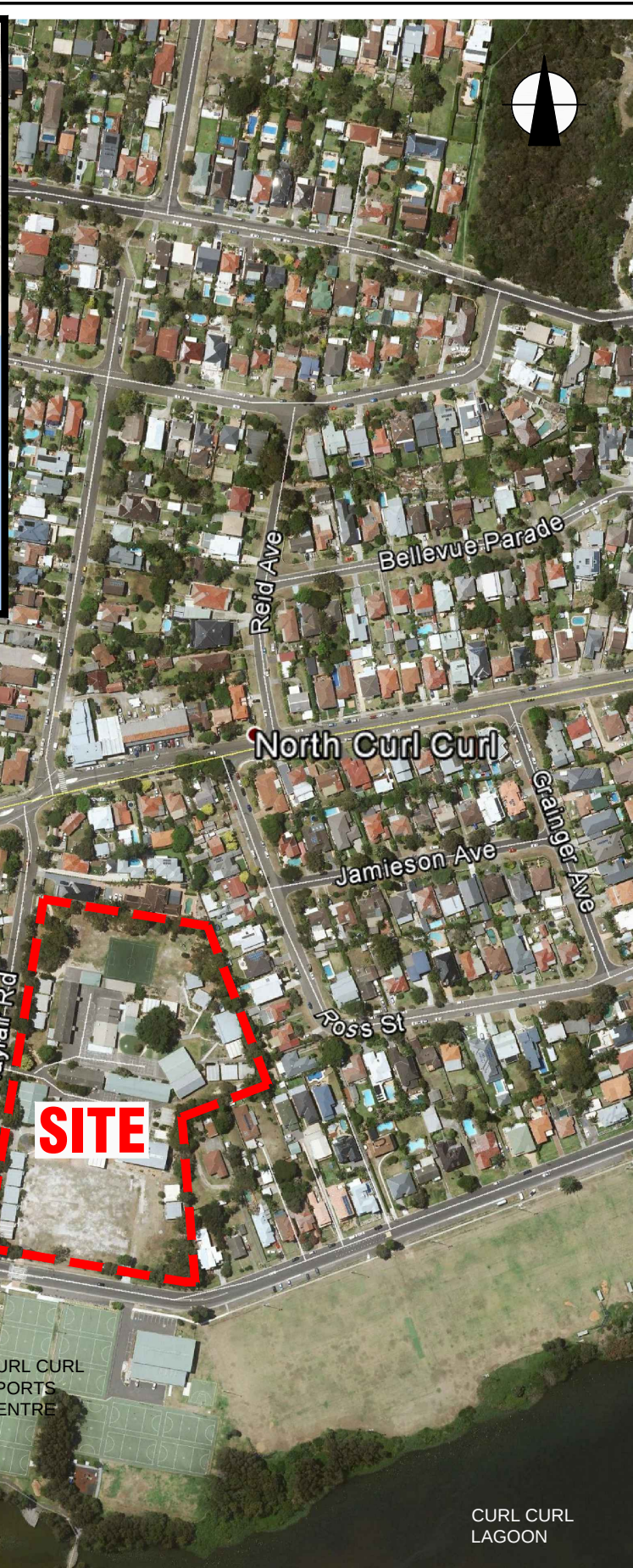
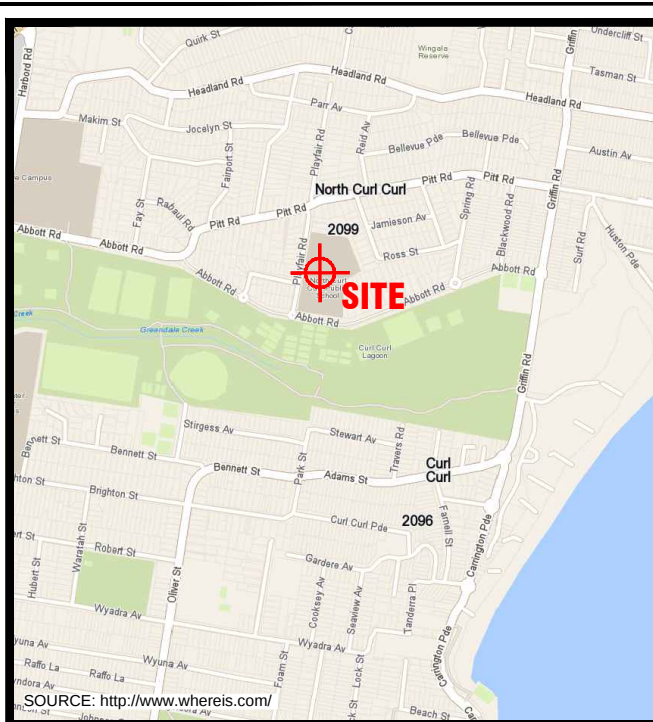
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other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

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Title:

SITE LOCATION PLAN

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CURL CURL, NSW

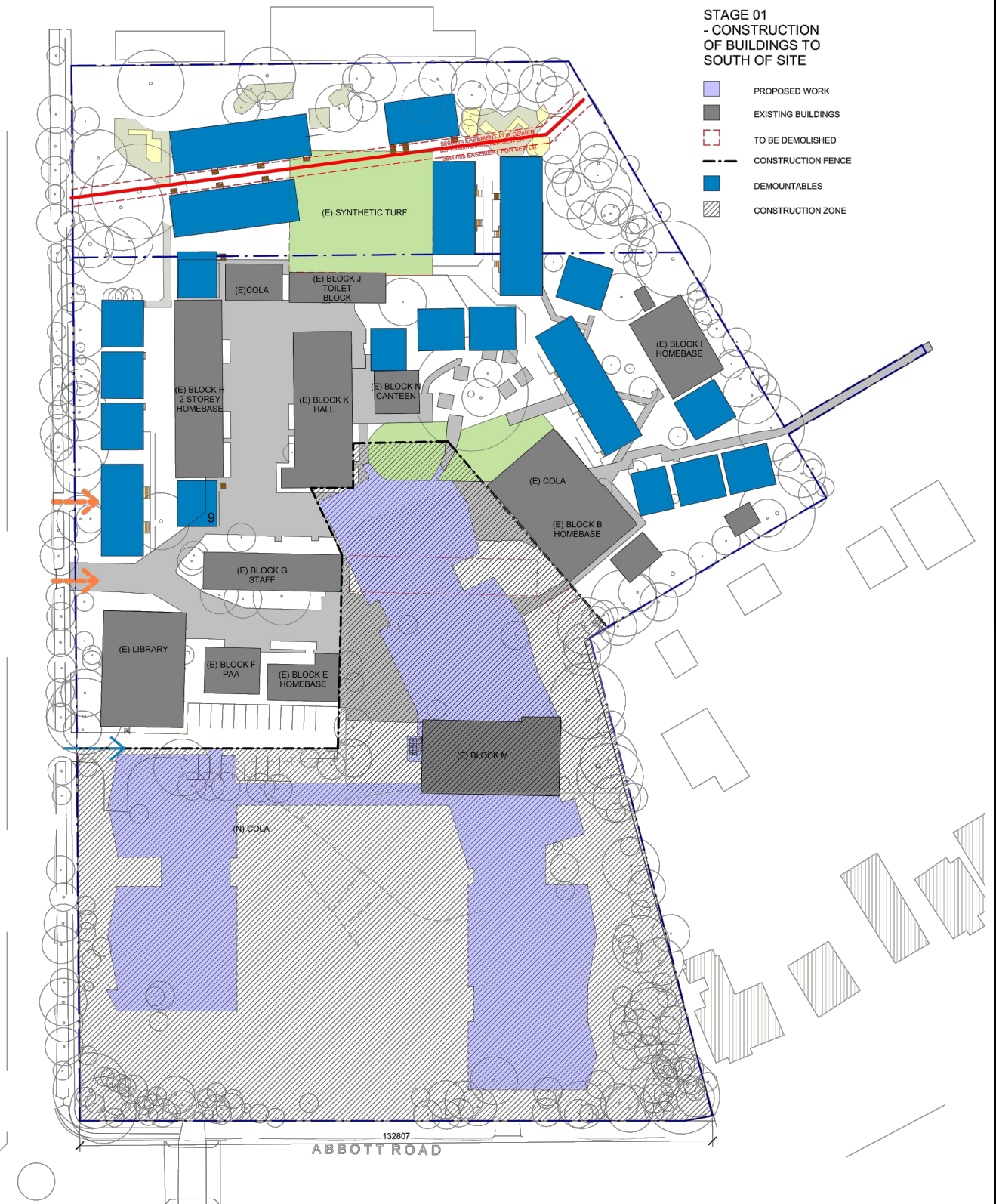
Report No: E29816KD2

Figure No: 1

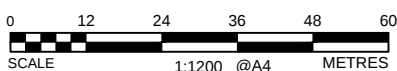
ENVIRONMENTAL INVESTIGATION SERVICES



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



DRAWING SOURCE: TKD ARCHITECTS, AR.SK. 141, P1, AUG 2017.



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

Title:

CONSTRUCTION OF BUILDINGS IN SOUTH OF SITE

Location:

CURL CURL NORTH PUBLIC SCHOOL, (RAP)
CURL CURL, NSW

Report No:

E29816KD2

Figure No:

2

ENVIRONMENTAL INVESTIGATION SERVICES

