



ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

CONRAD GARGETT PTY LTD

ON

REMEDIATION ACTION PLAN

FOR

PROPOSED DEVELOPMENT

AT

**PARRAMATTA WEST PUBLIC SCHOOL, CRIMEA
STREET, PARRAMATTA, NSW**

23 JULY 2018

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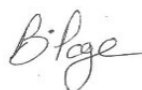
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EXECUTIVE SUMMARY

Conrad Gargett Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)¹ to prepare a Remediation Action Plan (RAP) for the proposed primary school development at Parramatta West Public School, Crimea Street, Parramatta. The site location is shown on Figure 1 and the RAP only applies to the nominated development area defined by the site boundaries as shown on Figure 2.

This RAP has been prepared to address the Secretary's Environmental Assessment Requirements with regards to State Environmental Planning Policy No.55 – Remediation of Land (1998)², for the purpose of a State Significant Development Application lodgement to the NSW Department of Planning and Environment.

Previous investigations at the site identified imported fill/soil that is contaminated with asbestos (in the form of bonded fibre cement) and polycyclic aromatic hydrocarbons (PAHs). The goal of the remediation is to render the site suitable and confirm the suitability of the site for the proposed development from a contamination viewpoint. The primary aim of the remediation is to reduce any human health risks posed by the contaminants of concern (asbestos and PAHs) to an acceptable level.

The proposed remediation strategy includes excavation and off-site disposal of a localised area of fill impacted by PAHs, and capping the site to address the potential risks associated with asbestos. An Environmental Management Plan (EMP) will be required to maintain the integrity of the cap so that risks associated with the asbestos remain low and acceptable.

EIS are of the opinion that the site can be made suitable for the proposed development (described in Section 1.1) 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.

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

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

² *State Environmental Planning Policy No. 55 – Remediation of Land 1998* (NSW) (referred to as SEPP55)

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Proposed Development Details	1
1.2	Background	1
1.3	Remediation Goal, Aims and Objectives	1
1.4	Scope of Work	2
2	SITE INFORMATION	3
2.1	Background	3
2.2	Site Location and Regional Setting	5
2.3	Topography	5
2.4	Site Inspection	6
2.5	Surrounding Land Use	7
2.6	Underground Services	7
2.7	Summary of Geology and Hydrogeology	7
3	CONCEPTUAL SITE MODEL	9
3.1	Contamination Sources and Contaminants of Concern	9
3.2	Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways	9
3.3	Assessment of Data Gaps	9
4	REMEDIATION EXTENT	10
5	REMEDIATION OPTIONS	11
5.1	Soil Remediation Options	11
5.2	Consideration of Remediation Options	12
5.3	Preferred Remediation Option and Rationale	14
5.4	Soil Disposal – Preliminary Volume Analysis	14
6	REMEDIATION DETAILS	15
6.1	Roles and Responsibilities	15
6.2	Sequence of Works	15
6.3	Waste Classification	15
6.4	Remediation of Carcinogenic PAHs in TP32 Area	16
6.5	Remediation of Asbestos/ACM	17
6.6	Remediation Documentation	19
7	VALIDATION PLAN	20
7.1	Validation Sampling and Documentation	20
7.2	Validation Assessment Criteria and Data Assessment	22
7.3	Validation Report and EMP	23
7.4	Data Quality	23
8	CONTINGENCY PLAN	25
8.1	Unexpected Finds	25
8.2	Soil Validation Failure	25
8.3	Capping Around Existing Trees	25
8.4	Importation Failure for VENM or other Imported Materials	26
8.5	Disposal of Hazardous Waste	26
9	SITE MANAGEMENT PLAN FOR REMEDIATION WORKS	27
9.1	Interim Site Management	27
9.2	Project Contacts	27
9.3	Security	28
9.4	Timing and Sequencing of Remediation Works	28
9.5	Site Soil and Water Management Plan	28
9.6	Noise and Vibration Control Plan	28
9.7	Dust Control Plan	29
9.8	Air Monitoring	30
9.9	Odour Control Plan	30
9.10	Health and Safety Plan	31
9.11	Waste Management	31
9.12	Incident Management Contingency	31

TABLE OF CONTENTS

	9.13	Hours of Operation	31
10	CONCLUSION		32
	10.1	Remediation Category	32
	10.2	Regulatory Requirements	33
11	LIMITATIONS		34

List of In-Text Tables

Important Information About this Report

Report Figures

Appendices

Appendix A: Schematic Capping Specifications

ABBREVIATIONS

Asbestos Fines/Fibrous Asbestos	AF/FA
Ambient Background Concentrations	ABC
Added Contaminant Limits	ACL
Asbestos Containing Material	ACM
Australian Height Datum	AHD
Acid Sulfate Soil	ASS
Below Ground Level	BGL
Benzo(a)pyrene Toxicity Equivalent Factor (carcinogenic PAHs)	BaP TEQ
Benzene, Toluene, Ethylbenzene, Xylene	BTEX
Cation Exchange Capacity	CEC
Contaminated Land Management	CLM
Contaminant(s) of Potential Concern	CoPC
Conceptual Site Model	CSM
Development Application	DA
Douglas Partners	DP
Data Quality Indicator	DQI
Data Quality Objective	DQO
Detailed Site Investigation	DSI
Environmental Investigation Services	EIS
Environmental Management Plan	EMP
Environment Protection Authority	EPA
Fibre Cement Fragment(s)	FCF
Health Investigation Level	HILs
Health Screening Level	HSLs
Map Grid of Australia	MGA
National Environmental Protection Measure	NEPM
Organochlorine Pesticides	OCP
Organophosphate Pesticides	OPP
Polycyclic Aromatic Hydrocarbons	PAH
Polychlorinated Biphenyls	PCBs
Photo-ionisation Detector	PID
Protection of the Environment Operations	POEO
Practical Quantitation Limit	PQL
Quality Assurance	QA
Quality Control	QC
Remediation Action Plan	RAP
Site Assessment Criteria	SAC
Source, Pathway, Receptor	SPR
Specific Contamination Concentration	SCC
Toxicity Characteristic Leaching Procedure	TCLP
Total Recoverable Hydrocarbons	TRH
United States Environmental Protection Agency	USEPA
Virgin Excavated Natural Material	VENM
Volatile Organic Compounds	VOC
World Health Organisation	WHO
Work Health and Safety	WHS

ABBREVIATIONS

Units

Litres

L

Metres BGL

mBGL

Metres

m

Millilitres

ml or mL

Milligrams per Kilogram

mg/kg

Percentage

%

1 INTRODUCTION

Conrad Gargett Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)³ to prepare a Remediation Action Plan (RAP) for the proposed primary school development at Parramatta West Public School, Crimea Street, Parramatta. The site location is shown on Figure 1 and the RAP only applies to the nominated development area defined by the site boundaries as shown on Figure 2.

This RAP has been prepared to address the Secretary's Environmental Assessment Requirements with regards to State Environmental Planning Policy No.55 – Remediation of Land (1998)⁴, for the purpose of a State Significant Development Application lodgement to the NSW Department of Planning and Environment.

1.1 Proposed Development Details

A State Significant Development Application is being lodged for alterations and additions to the existing Parramatta West Primary School. The development proposal for the site (referred to as Stage 1A) includes the construction of three new one to two storey buildings over the eastern portion of the site, with new landscaping, seating and covered walkways. It is anticipated that the new buildings will be constructed close to the existing grade of the site and will not require significant excavation.

The north-western quadrant of the site will be utilised as the construction compound during the works, whilst the south-western quadrant will remain grassed and used as an outdoor recreational area by the school.

1.2 Background

Douglas Partners (DP) were engaged to undertake a Contamination Assessment and Preliminary Waste Classification (Ref: 86031.00.R.002.Rev0, dated 5 September 2017) (referred to herein as DP 2017) to facilitate the State Significant Development Application lodgement. Relevant information from the DP 2017 assessment is summarised in Section 2.

EIS subsequently completed a Detailed Site Investigation (DSI) (Ref: E31425KPrpt, dated 21 May 2018) (referred to herein as the DSI) to support the development application. Summary information from the DSI is included in Section 2 and the DSI data was used in the preparation of the Conceptual Site Model (CSM) in Section 3. The DSI should be read in conjunction with this RAP.

1.3 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 development from a contamination viewpoint. The primary aim of the remediation is to reduce any human health risks posed by the contaminants of concern to an acceptable level.

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

⁴ *State Environmental Planning Policy No. 55 – Remediation of Land 1998* (NSW) (referred to as SEPP55)

The objectives of the RAP are to:

- Outline the methodology to remediate and validate the site;
- 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.

1.4 Scope of Work

The RAP was prepared in accordance with an EIS proposal (Ref: EP47258KP Rev1) of 13 July 2018 and written acceptance from the client of 17 July 2018. The scope of work included a review and summary of the previous reports, consultation with the client regarding the proposed remedial strategies, and preparation of a RAP.

The RAP has been prepared with reference to the Guidelines for Consultants Reporting on Contaminated Sites (2011)⁵, the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)⁶, SEPP55 and other guidelines made under or with regards to the Contaminated Land Management Act (1997)⁷.

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

⁶ National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)*. (referred to as NEPM 2013)

⁷ Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

2 SITE INFORMATION

2.1 Background

2.1.1 Summary of Existing Asbestos Management Plan

At the time of the DSI, EIS were provided with an existing *Asbestos in Grounds, Asbestos Management Plan* (AMP) for Parramatta West Public School (Parsons Brinkerhoff, November 2012) (referred to herein as the AMP). The AMP indicated that “....possible asbestos impacted fill material....” was identified in the main playing field and at the north and west boundaries of the main playing field (i.e. on the site).

It was noted that asbestos removal/clean-up works had occurred in 2005 that involved removal of visible fragments of suspected asbestos containing material (ACM) from the ground surface. The AMP included recommendations for encapsulating the impacted fill using geofabric and clean capping materials such as soil and mulch. However, the report did not confirm whether these encapsulation works occurred.

The AMP includes a number of provisions for subsurface works within the “asbestos zones”. These include (but are not limited to) the following:

- Work to be undertaken/supervised by a Class A licensed asbestos removalist; and
- Air fibre monitoring is required during the works.

2.1.2 Summary of DP 2017

The DP 2017 investigation included soil sampling from eight geotechnical boreholes and a limited review of historical desktop information including regional geology, a review of the 1943 aerial photograph for the site, and a review of the NSW EPA registers with regards to notified and regulated contaminated sites.

The limited historical assessment indicated that the site was vacant in 1943 and that the use of the areas to the south appeared to be consistent with a school. An interview with staff indicated that the site may have been excavated sometime in the past, however the reason for the excavation was not clear/known.

The intrusive investigation identified relatively deep clayey fill across the proposed building area in the eastern portion of the site, to a maximum depth of 4.65m (a number of boreholes were terminated in fill at depths of between 0.75m to 1.7m). EIS were of the opinion that the presence of deep fill as noted on the DP borehole logs may have been an error based on the data collected during the DSI.

A selection of soil samples were collected and analysed for a range of potential contaminants including Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs), phenol and asbestos. All results

were reported to be below the adopted screening criteria for sensitive land use (such as a primary school). A preliminary waste classification of 'general solid waste' was assigned to the fill.

The DP 2017 report recommended the preparation of an unexpected finds protocol, construction asbestos management plan, and further investigation in relation to asbestos in the context of the proposed land use (or alternatively, remediation and on-going management of asbestos).

2.1.3 Summary of the DSI

The DSI included a review of existing reports, a supplementary site history assessment, soil sampling from 42 (see Figure 2) locations and groundwater sampling from one monitoring well. The historical assessment identified that the site has most likely been vacant and utilised as a recreational area for a school from around the 1930s. Re-contouring and levelling of the site occurred around the 1970s and it appears that fill was imported from off-site areas to facilitate this.

The DSI identified fill across the site that was impacted by building and demolition waste, including brick, concrete and glass fragments, and ACM in the form of bonded fibre cement fragments (FCF). Slag and ash were also identified in fill. The deepest fill (>1.0m) was typically in the western area of the site near the sewer alignment, and in the northern areas. These fill depths were considered by EIS to be consistent with the topography and apparent earthworks that had occurred on site, however it was noted that the fill depths encountered by EIS during the DSI were significantly less than those logged by the previous consultant (DP 2017) who investigated the eastern area of the site.

The DSI indicated that potential risks associated with BTEX, pesticides, heavy metals (other than lead) and PCBs are unlikely to be significant as these contaminants of potential concern (CoPC) were not identified at concentrations above the screening criteria or at concentrations that would warrant further consideration and assessment of risk. Lead, asbestos (as bonded ACM), carcinogenic PAHs and TRH (F3) were identified during the DSI at concentrations above the screening criteria (see Figure 3). Further risk assessment of these compounds indicated that remediation was required to address risks associated with carcinogenic PAHs at one location (TP32) and asbestos (as bonded ACM) in fill across the entire site.

The DSI recommended the preparation of a RAP to facilitate the remediation. The following interim recommendations were also provided in the DSI to further mitigate the risks associated with ACM and PAHs:

- A Class B licensed asbestos removal contractor should be engaged to do a detailed site walkover and 'emu-pick' of any visible fibre cement fragments/ACM. Subsequently, a licenced asbestos assessor should complete a surface clearance certificate; and
- The area in the vicinity of TP32 (impacted by PAHs) should be inspected (this inspection can be limited to the area bound by TP17, TP31 and TP33 on Figure 2). In the event that soil is exposed at the surface, suitable top-dress should be applied together with new rolls of turf. This will need to be watered and maintained so that the turf can establish.

EIS are not aware whether the interim recommendations were implemented prior to the preparation of this RAP.

Table 2-1: Site Identification

Current Site Owner:	The State of New South Wales
Site Address:	Not defined
Lot & Deposited Plan:	Lot 406 DP729083
Current Land Use:	Recreational area that is part of Parramatta West Primary School
Proposed Land Use:	Western area unchanged, eastern area to accommodate new school buildings for Parramatta West Primary School
Local Government Authority:	Parramatta City Council
Current Zoning:	R2 – Low Density Residential
Site Area (m ²):	Approximately 10,000
RL (AHD in m) (approx.):	25-30
Geographical Location (decimal degrees) (approx.):	Latitude: -33.823432 Longitude: 150.990728
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2

2.2 Site Location and Regional Setting

The site is located in an area that is predominantly characterised by low density residential land use. Some recreational and commercial uses, including an ambulance station, park, childcare centre and church are located immediately to the west of the site.

The site is bound by Crimea Street to the north, Railway Street to the south, and is approximately 50m to the west of the intersections with Franklin Street.

2.3 Topography

The site lies on a gently sloping, north-facing hill side that falls towards the north and north-west at approximately 3°. Earthworks have resulted in levelling of the site to form a relatively flat recreational area with two tiers, stepping down towards the western half of the site to accommodate the slope.

Based on the topography, cut to fill was considered likely to have occurred, resulting in cuts along the southern and south-western areas of the site, and filling over the northern and north-western areas (as indicated by the existing batter slopes).

2.4 Site Inspection

A walkover inspection of the site was undertaken by EIS on 24 April 2018, for the DSI. A summary of the inspection findings are outlined in the following subsections:

2.4.1 Current Site Use and/or Indicators of Former Site Use

At the time of the inspection, the site formed part of Parramatta West Public School and was occupied by a grassed recreational area (sport fields).

2.4.2 Buildings, Structures and Roads

There were no buildings, structures or roads on site.

2.4.3 Boundary Conditions, Soil Stability and Erosion

The site was fully fenced and secured (low-rise fence, approximately 1m in height). Erosion was evident along the northern boundary along the fill batters that fell down towards Crimea Street. However, the existing fence and a build-up of vegetation appeared largely to be capturing the eroded soils.

2.4.4 Visible or Olfactory Indicators of Contamination

FCF suspected of containing asbestos were observed at the ground surface in the vicinity of the batters along the northern and western boundaries, towards the crest of the batter that separated the western and eastern areas of the site, and also along the eastern boundary.

2.4.5 Presence of Drums/Chemicals, Waste and Fill Material

Drums, chemicals and waste storage was not observed during the inspection. Fill was suspected to be present based on the topography, and confirmed to be present via visual observations of inclusions such as slag, railway ballast, FCF, gravels and brick fragments in the batters along the northern and western boundaries. Based on the topography, EIS considered that the deepest fill would be expected in the northern areas of the site, to a depth of no more than 2m.

All FCF observed by EIS during the inspection were collected by EIS and disposed of appropriately.

2.4.6 Drainage and Services

Local potable water services were observed in parts of the site, including along the southern boundary and through the central area.

2.4.7 Sensitive Environments

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds.

2.4.8 Landscaped Areas and Visible Signs of Plant Stress

The site was predominantly grassed, however there were patches of bare soil, particularly in the south-eastern areas and along the northern and western batters. Trees were located around the perimeter of the site and appeared to be in relatively good condition, with no obvious signs of extensive dieback.

2.5 Surrounding Land Use

During the site inspection, EIS observed the following land uses in the immediate surrounds:

- North – Crimea Street, free-standing residential dwellings beyond;
- South – Parramatta West Public School (main school area);
- East – Free-standing residential dwellings
- West – Grassed public reserve, with a child care centre, ambulance hub and church beyond.

EIS did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

2.6 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the DSI in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. A sewer was identified running through the western portion of the site as shown on the attached Figure 2. It was understood that the sewer invert level was approximately 2m below ground. The sewer has the potential to act as a preferential pathway for contaminant migration, however migration of the contaminants identified during the DSI via this pathway would not occur.

2.7 Summary of Geology and Hydrogeology

2.7.1 Regional Geology

Regional geological information reviewed for the DSI indicated that the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite. The DSI generally identified relatively shallow clayey fill overlying natural (residual) silty clay soil and shale bedrock.

2.7.2 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, and is not in a Class 1, 2, 3, 4 or 5 risk area on the local council planning maps. Based on the geology encountered during the DSI, there is considered to be negligible risk associated with ASS at the site. Therefore an ASS management plan was not considered to be required for the development.

2.7.3 Hydrogeology

Hydrogeological information reviewed for the DSI indicated that the regional aquifer on-site and in the areas immediately surrounding the site include porous, extensive aquifers of low to moderate productivity. There were approximately 38 registered bores within 2,000m of the site. In summary:

- The nearest registered bore was located approximately 400m from the site. This was utilised for monitoring purposes;
- The majority of the bores were registered for monitoring purposes. There were no nearby, up-gradient monitoring bores which could suggest potential contamination impacts in groundwater in nearby up-gradient areas of the site; and
- There were no nearby bores (e.g. within 1,000m) registered for domestic or irrigation uses.

The DSI included the installation of one groundwater monitoring well. The observed water level within the well was approximately 7m below ground level (mBGL) at the time of the DSI. Use of groundwater is not proposed as part of the development and the groundwater was not considered to pose a risk to human health or the environment based on the findings of the DSI.

2.7.4 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. Based on a review of Google Maps, Parramatta River appeared to be the closest major surface water body to the site. The river is approximately 1.5km down-gradient and to the north/north-east of the site. Other available maps suggested that Clay Cliff Creek is also located approximately 900m to the east of the site. These water bodies were not considered to be potential receptors for the contaminants of concern identified during the DSI.

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. An iteration of the CSM for the site is presented in the following sub-sections and is based on the findings of the DSI.

3.1 Contamination Sources and Contaminants of Concern

The primary contamination source at the site is imported fill. The fill is widely impacted by bonded ACM (as FCF). Concentrations of asbestos in ACM were found to exceed the Health Screening Level (HSL) criterion based on data collected during the DSI.

The fill at one location (TP32 – see Figure 3) is impacted by carcinogenic PAHs which are considered to be associated with slag (but possibly also asphalt) inclusions within the fill matrix. The carcinogenic PAH concentration in TP32 exceeded the Health Investigation Level (HIL) A criterion and was also greater than 250% of the criterion.

Based on the risk assessment undertaken for the DSI, the lead and TRHs were not considered to pose a significant risk and have therefore not been considered as contaminants of concern in the context of this RAP. It is acknowledged however that the remedial strategies proposed in the RAP are considered adequate to further reduce potential risks from lead and TRHs under the proposed development scenario and land use setting.

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

The ACM and PAHs have been imported onto the site in fill/soil. The affected media includes fill/soil. The asbestos also has the potential to impact the air in the event fibres are generated via disturbance of the ACM.

Humans (adults and primary school-aged children) are the receptors. The adult receptors can be broken down further to include construction workers, future maintenance staff and adult employees that work at the school.

The main exposure pathways for the contaminants include ingestion, dermal contact and inhalation of soil and dust impacted by PAHs, and inhalation of airborne asbestos fibres. Based on the type of asbestos identified (bonded ACM), the potential to generate airborne fibres is relatively low and this has been considered in the context of the remedial strategy.

3.3 Assessment of Data Gaps

A waste classification is required for the fill at the TP32 location prior to remediation. The RAP includes provisions to address this requirement.

4 REMEDIATION EXTENT

Remediation for ACM will extend across the site (as shown on Figure 4) to address all fill/soil. Remediation for carcinogenic PAHs will initially include a 100m² area, which has been delineated as a 10m by 10m area with TP32 at its centre (see Figure 4). Remediation of the TP32 will extend to a depth of 0.7m.

The extent of remediation for carcinogenic PAHs is nominal at this stage and will need to be confirmed via validation. The rationale for defining the extent of the TP32 remediation area is as follows:

- Elevated carcinogenic PAHs (above the screening criteria adopted for the DSI) were encountered in the upper fill profile of TP32. This fill profile extended to a depth of 0.7m and was underlain by a separate fill profile that did not contain inclusions of slag/asphalt nor elevated concentrations of carcinogenic PAHs above the screening criteria; and
- Although fill/soil with similar inclusions to TP32 was identified in the surrounding test pits, slag was not identified in the nearest of these (i.e. TP17, TP31 and TP33) and elevated PAHs (above the screening criteria adopted for the DSI) were also not encountered at these locations. On this basis, the horizontal extent of the area has been nominated in an attempt to minimise the volume of material to be remediated.

To increase the confidence in the remedial extent, it would be prudent to undertake further targeted investigation in the TP32 area prior to remediation. This could be completed concurrently with the data gap/waste classification assessment.

5 REMEDIATION OPTIONS

5.1 Soil Remediation Options

The NSW EPA follows the hierarchy set out in NEPM 2013 for the remediation of contaminated sites. The preferred order for soil remediation and management is as follows:

1. On-site treatment of soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;

Or if the above are not practicable:

3. Consolidation and isolation of the soil by on-site by containment within a properly designed barrier; and
4. Removal of contaminated material to an approved site or facility, followed where necessary by replacement with clean material; or
5. Where the assessment indicates that remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

For simplicity herein, the above hierarchy are respectively referred to as Option 1, Option 2, Option 3 etc.

In addition to the above, important considerations in assessing the acceptability of an asbestos remediation proposal (NEPM, 2013) includes:

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

5.2 Consideration of Remediation Options

The tables below discusses a range of remediation options:

Table 5-1: Consideration of Remediation Options

Option	Discussion	Applicability
<u>Option 1</u> On-site treatment of contaminated soil	With regards to asbestos/ACM, the only relevant on-site treatment option would include the physical removal of bonded ACM via picking. This would include a systematic process whereby the impacted fill is excavated and ACM fragments are physically removed from the soil by hand.	Physical removal of bonded ACM via hand picking is a viable option for the site. This would not address the PAH impacts at TP32.
<u>Option 2</u> Off-site treatment of contaminated soil	Contaminated soils are excavated, transported to an approved/ licensed treatment facility, treated to remove/stabilise the contaminants then returned to the subject site, transported to an alternative site or disposed to an approved landfill facility. This option provides for a relatively short program of on-site works, however there may be some delays if the material is to be returned to the site following treatment and regulatory requirements would need to be carefully considered. The cost per tonne for transport to and from the site and for treatment is considered to be relatively high. The material would also have to be assessed in terms of suitability for reuse as part of the proposed development works.	Not applicable for the site.
<u>Option 3</u> Consolidation and isolation of impacted soil by cap and containment	This would include the placement of an impermeable barrier such as concrete, or a warning barrier and non-contaminated soil material, over the surface of the fill to isolate the contaminated material and thereby reduce the health risk to future site users. The capping and/or containment must be appropriate for the specific contaminants of concern. An ongoing Environmental Management Plan (EMP) would be required and site identification	Cap and containment is a viable option for the site to address both contaminants of concern. The NSW Department of Education have indicated that they support the implementation of an EMP.

Option	Discussion	Applicability
	documentation, including the Section 10.7 Council planning certificate (or other appropriate notification mechanism), would be modified to note the presence of the contamination/EMP. This may impact upon development approval conditions, place restrictions on the use of the land and limit the future potential land value.	
<u>Option 4</u> Removal of contaminated material to an appropriate facility and reinstatement with clean material	Contaminated soils would be classified in accordance with NSW EPA guidelines for waste disposal, excavated and disposed of off-site to an appropriately licensed facility. The material would have to meet the requirements for landfill disposal. Landfill gate fees (which may be significant) would apply in addition to transport costs.	Excavation and off-site disposal is a viable option for the site to address both contaminants of concern.

5.3 Preferred Remediation Option and Rationale

The preferred remediation option for the carcinogenic PAH impacted fill at TP32 includes excavation and off-site disposal (Option 4). The rationale for the selection of this option is that:

- The carcinogenic PAH concentration detected during the DSI was greater than 250% of the screening criterion; and
- The elevated result was identified in surficial fill in an area of the site that is currently and will continue to be utilised as a recreational area.

The preferred remediation option for the ACM impacted fill includes cap and containment (Option 3). The rationale for the selection of this option is that:

- The asbestos is present in fragments of bonded fibre cement. As the asbestos is bound within the cement matrix, the risk of generating airborne asbestos fibres from this material is relatively low (compared to friable asbestos material);
- Notwithstanding the above, this option is in-line with the principles of managing/remediating asbestos in NEPM 2013 (i.e. minimising public risk, minimising contaminated soil disturbance and minimising contaminated material/soil moved to landfill); and
- Capping will adequately eliminate the potential exposure pathway to the contaminant of concern, thus reducing the associated risks to an acceptable level.

5.4 Soil Disposal – Preliminary Volume Analysis

Assuming remediation of the TP32 area occurs to the extent described in Section 4, EIS estimate that approximately 70m³ of fill will be excavated and disposed off-site as part of the remediation works.

Bulk density testing has not been completed and this should be undertaken if a more accurate estimate of the waste tonnage is required. However, conservatively adopting a conversion factor of 2 tonnes per 1m³, the estimated tonnage of the waste to be disposed from the TP32 remediation area is approximately 140 tonnes.

6 REMEDIATION DETAILS

6.1 Roles and Responsibilities

The two primary roles under the RAP include the validation consultant and the remediation contractor. The validation consultant should be engaged to undertake the waste classification and to implement the validation plan outlined in this RAP. It would be prudent to select a consultant that is a Certified Environmental Practitioner (Site Contamination Specialist) under the Environment Institute of Australia and New Zealand scheme.

The remediation contractor should be engaged to carry out the remediation tasks required under this RAP. The role of the contractor is to remediate the site in accordance with the remediation methods and the validation consultant's advice, apply for any necessary permits/licenses required for remediation, retain all necessary documentation for waste disposal, imported materials etc, and to keep the validation consultant informed regarding the progress of the site works and any unexpected finds.

6.2 Sequence of Works

EIS anticipate the following sequence of work for the project (in the context of the remediation):

1. Waste classification of the fill in the TP32 remediation area (it would also be prudent to collect additional data to confirm the remedial extent during this work);
2. Excavation and off-site disposal of the carcinogenic PAH contaminated fill in the TP32 remediation area;
3. Backfilling of the TP32 remediation area;
4. Capping and containment of the site; and
5. Site validation on completion of remediation, including validation of all imported materials until the finalisation of the site validation report.

EIS recommend that the client engage early with the consent authority so that the requirement to provide the site validation report is appropriately conditioned within the consent. Given that the proposed development features such as landscaping, footpaths and building floor slabs etc will form part of the capping requirements for the remediation of asbestos, it would not be possible to complete the remediation and validation prior to a construction certificate being granted. It would however be viable to complete the validation prior to the application for the occupancy certificate.

6.3 Waste Classification

The site validation consultant should undertake a waste classification of the fill in the TP32 remediation area prior to commencement of remediation. This classification is to be undertaken in accordance with

the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014)⁸ and any other relevant documentation under the Protection of the Environment Operations regulations/legislation.

As a minimum, the scope of the assessment should include the following:

- Implementing the controls outlined in the existing AMP;
- Soil sampling from nine locations on a grid-based plan within the nominated extent of remediation. Samples should be collected from all fill profiles encountered, with a minimum of one sample per location collected from the 0-0.2m interval (this is the interval where the elevated PAHs were identified during the DSI);
- Samples should be analysed for a broad range of potential contaminants based on the site history (the analytical suite must include heavy metals, PAHs, TRHs and asbestos as a minimum);
- Toxicity characteristic leachate procedure (TCLP) analysis should be undertaken as required;
- The data should be assessed with regards to the Waste Classification Guidelines 2014 and a report should be prepared. Relevant data from the DSI must also be considered; and
- Once the waste classification is finalised, submit an application to the receiving facility and obtain an authorisation to dispose of the waste.

6.4 Remediation of Carcinogenic PAHs in TP32 Area

Prior to commencement of remediation, appropriate steps should be taken to implement the *Site Management Plan for Remediation Works* (Section 9). Advice regarding shoring and excavation in relation to the remediation should also be provided by a suitably qualified geotechnical engineer, and this advice should also be implemented to the extent required to facilitate the remediation. Specific consideration of the adjacent sewer (see indicative alignment on the attached Figure 2) is required.

The specific steps for the remediation of carcinogenic PAH impacted fill in the TP32 area are provided below. These steps assume that remediation will occur to the extent described in Section 4 (see also Figure 4). However, it is acknowledged that the extent may change depending on the outcome of the initial results from the waste classification and the final validation.

Table 6-1: Remediation Details (off-site disposal of fill from TP32 area)

Step	Procedure
1	<u>Establish asbestos related controls and arrange licenses and tracking requirements</u> Prior to the commencement of any excavation: • Notification of bonded asbestos removal should be submitted to SafeWork NSW by the remediation contractor (who must have a Class B asbestos removal license); • Register with NSW EPA WasteLocate for the transport of asbestos waste. Other notifications may also be required depending on the waste classification of the fill;

⁸ NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste*. (referred to as Waste Classification Guidelines 2014)

Step	Procedure
	- An asbestos removal control plan should be prepared by the remediation contractor for the works required. This should include details for works health and safety (WHS) and personal protective equipment (PPE), which as a minimum should include requirements for wearing safety helmets and steel capped boots, disposable coveralls rated type 5 category 3 (prEN ISO 13982–1) or equivalent and P2 masks conforming to the requirements of AS/NZS 1716:2009, and use of appropriate gloves; and - The existing AMP should be reviewed and implemented as required.
2.	<u>Stability/shoring:</u> Appropriate measures should be implemented as required (in accordance with the advice provided by the nominated geotechnical engineer) to protect the integrity of the adjacent sewer and adjoining areas.
3.	<u>Removal of fill:</u> Remediation of fill will be undertaken as follows: - Excavate the fill to the full extent of remediation under the guidance of the validation consultant; - Load the fill onto trucks and dispose in accordance with the assigned waste classification; and - Validate the excavation in accordance with Section 7.
4.	<u>Reinstatement of remedial excavation:</u> Subject to the successful validation of the excavation, reinstate the area to an appropriate level using clean (validated) material. Validation requirements for imported material are outlined in Section 7.

6.5 Remediation of Asbestos/ACM

Prior to commencement of remediation, appropriate steps should be taken to implement the *Site Management Plan for Remediation Works* (Section 9).

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

Table 6-2: Remediation Details (asbestos/ACM – entire site)

Step	Procedure
1.	<u>Surface clearance:</u> Prior to works commencing on-site, a surface pick and removal of visible fragments/ACM should be undertaken by an appropriately trained person in accordance with the Safe Work Australia How to Safely Remove Asbestos Code of Practice (2016)⁹ (a Class B licensed contractor could also be used in an absence of an appropriately trained person). As this removal process will not include removal

⁹ Safe Work Australia, (2016). *How to Safely Remove Asbestos Code of Practice* (referred to as Safe Work Australia 2016)

Step	Procedure
	of greater than 10m² of bonded ACM, the work does not constitute licensed removal work and use of a Class B licensed contractor is not mandatory. All fragments should be double bagged and disposed of to a licensed facility. Following the removal, a licenced asbestos assessor should inspect the site and provide a surface clearance certificate.
2.	<u>Asbestos related controls, PPE and WHS:</u> Asbestos-related controls are not required for work that does not disturb the fill/soil. For any intrusive work (e.g. piling, trenching for service installations, earthworks etc), asbestos related controls will be required. An appropriate WHS plan and controls should be developed and implemented prior to the commencement of intrusive work. The minimum controls are outlined in the existing AMP and the minimum PPE requirements are outlined in Step 1 of Section 6.4 in this RAP.
3.	<u>Review of proposed capping design and adjustment of site levels:</u> The contractor should undertake a review of the minimum acceptable capping standards outlined in Step 4 below. In the event that the site levels need to be reduced in order to achieve these standards, a waste classification should be undertaken for the material to be excavated. The material should subsequently be excavated and disposed off-site under the waste classification provided. Step 1 in this table should be repeated for any areas where soil is disturbed.
4.	<u>Capping procedures:</u> The following are considered to be the minimum acceptable capping standards for the purpose of remediation: • Unpaved areas including landscaped or grassed areas with shallow plantings and/or turf – visual marker layer comprising geogrid (e.g. TriAx) and geofabric¹⁰ over the contaminated fill, overlain by a minimum of 0.3m of clean (validated) soil; • Unpaved areas including landscaped or grassed areas with tree plantings – tree plantings should be boxed out to 1m deep over a 1m by 1m area. The base and sidewalls of the tree pits should be lined with visual marker layer comprising geogrid and geofabric over the contaminated fill. Areas where no trees are to be planted can include the marker layers and 0.3m of clean soil as noted above. The root ball of the tree should be approximately 0.3m above the marker layer; • New hardstand areas, including areas beneath the building slab and paved walkways – visual marker layer comprising geogrid and geofabric over the contaminated fill, overlain by pavement/hardstand materials; and • Underground services – all services are to be placed in trenches backfilled with clean soil, above the marker layer. If service installations extend into the contaminated fill, the base and walls of service trenches are to be lined with a visual marker layer comprising geogrid and geofabric.

¹⁰ Reference to 'geofabric' in the context of this RAP includes a high visibility (e.g. orange), non-woven product that is also suitable from a free drainage, engineering and geotechnical point of view.

Step	Procedure
	Overlying capping requirements are to meet the specification for hardstand/paved or unpaved areas depending on the finished surface above the service installation. A schematic capping specification plan for the above is provided in the appendices. The integration of the different capping requirements across the site and between the various areas should be appropriately considered prior to commencement of construction. Considering the minimum acceptable capping standards, remediation of the site will be undertaken as follows: • The marker layer placement should be inspected by the validation consultant prior to the placement of the overlying clean capping materials/pavement. This should be documented photographically; • In any unpaved areas, a levels survey should be completed to document the ground levels at the time the visual marker layers are installed (and prior to placement of the clean capping materials); • Any tree pits and service trenches should be inspected and documented by the validation consultant; • Imported capping materials should be validated in accordance with Section 7; • Construct the capping layers to meet the requirements of the development and address the minimum acceptable capping standards; and • Following installation of the capping materials in unpaved areas, a levels survey should be completed to document the finished ground levels. This survey will be compared to the previous survey to confirm the minimum capping thickness of 0.3m is achieved in the unpaved areas.

6.6 Remediation Documentation

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

- Soil disposal docket;
- Imported materials information;
- Photographs of remediation works;
- Asbestos removal documentation, including licences, removal control plans and air monitoring results;
- Survey information for the capping installations; and
- Waste tracking documentation (where relevant).

Copies of the above documentation must be forwarded to the validation consultant for evaluation and inclusion in the final validation report.

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 together with the observation/documentation requirements. This is the minimum requirement based on the remedial strategies provided.

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>Fill Removal (Carcinogenic PAHs in TP32 Area)</i>			
Base of excavation after fill removal is complete	Minimum of four samples (5m x 5m grid spacing)	PAHs	Observations to be recorded. Photographs to be taken. Disposal dockets to be retained.
Walls of excavation after fill removal is complete	Two samples each wall (5m lineal spacing), targeted at the depth of the initial exceedance which was 0-0.2m.		
<i>Capping (ACM – entire site)</i>			
Capping	Refer to imported materials validation requirements in the following sections of this table	Refer to imported materials validation requirements in the following sections of this table	Visual inspection and photo-documentation of marker layer installation. Levels surveys following placement of marker layers and following placement of capping material (unpaved areas). Documentation of capping materials and thickness of capping layers above the marker layers. Validation of imported materials used as capping. Disposal dockets to be retained for any fill requiring off-site disposal.

Aspect	Sampling	Analysis	Observations and Documentation
Imported Materials – relevant to all site works			
Imported VENM backfill (if required)	Minimum of three samples per source	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH, BTEX PAHs, OCP/OPP, PCBs and asbestos. Additional analysis may be required depending on site history.	VENM documentation/ report required (should include source site history to demonstrate analytes are appropriate). Material to be inspected upon importation to confirm it is free of visible/olfactory indicators of 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, OCP/OPP, 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 consultant's discretion based on supplier documentation.	At the validation consultant's 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 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.

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

7.2 Validation Assessment Criteria and Data Assessment

The validation assessment criteria (VAC) 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 Waste Classification Guidelines 2014 and any associated exemptions/approvals.
Soil validation – post excavation of fill (TP32 area)	Carcinogenic PAHs $\leq 3\text{mg/kg}$ Total PAHs $\leq 300\text{mg/kg}$
Capping	Documentation of continuous marker layer installation across the site. Surveys demonstrating clear differential of at least 0.3m between the marker layer surface and final surface level in unpaved areas. Documentation of continuous hard surfaces above marker layers in hardstand areas.
Imported materials	Heavy metal concentrations are to be less than the most conservative Added Contaminant Limit (ACL) concentrations for an urban residential and public open space exposure setting presented in Schedule B1 of NEPM (2013). Organic compounds are to be less than the laboratory practical quantitation limits (PQLs) and asbestos to be absent. Results for VENM and other imported materials will need to be consistent with expectations for those materials.

Validation Aspect	Criteria
	Aesthetics: soils to be free of staining and odours

Analytical data should initially be assessed as above or below the VAC. Statistical analysis may be applied if deemed appropriate by the consultant and undertaken in accordance with the NEPM (2013).

7.3 Validation Report and EMP

As part of the validation process, a site validation report will be prepared by the validation consultant. The report will outline the remediation work undertaken at the site and any deviations to the remediation strategy. The report will present the results of the validation assessment and will be prepared in accordance with the Reporting Guidelines 2011. The validation 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).

The site will require on-going management via an EMP to address the presence of ACM that will remain on-site beneath the cap. 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.

7.4 Data Quality

Appropriate QA/QC samples should be obtained during the validation and analysed for the contaminants of concern. As a minimum, QA/QC sampling should include duplicates (5% inter-laboratory and 5% intra-laboratory), trip spikes, trip blanks and rinsate samples. Duplicate samples are not required for asbestos analysis.

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 (based on NEPM 2013) and should be reflected in the validation report. The seven DQO 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 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: suspected friable types of asbestos in soil, and odorous or stained hydrocarbon impacted soils.

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

- In the event of an unexpected find, all work in the immediate vicinity should cease and the client should be contacted immediately;
- Temporary barricades should be erected to isolate the area from access to the public and workers;
- In the event suspected friable asbestos material is encountered, a qualified occupational hygienist and/or asbestos consultant should be contacted (preferably the validation consultant will have an in-house hygienist or asbestos assessor);
- The client should engage a qualified environmental consultant to attend the site and assess the extent of remediation that may be required;
- An additional sampling and analytical rationale should be established by the consultant and should be implemented with reference to the relevant guideline documents;
- In the event remediation is required outside the purview of the RAP an addendum RAP should be prepared and submitted to the client and consent authority for approval; and
- Appropriate validation sampling should be undertaken and the results should be included in the validation report.

8.2 Soil Validation Failure

In the event of a soil validation failure, the excavation should be extended in the direction of the failure (in consultation with the validation consultant) and the area re-validated.

8.3 Capping Around Existing Trees

There is a potential that the placement of 0.3m of clean soil capping beneath the existing trees may not be permitted by the arborist. In the event that this occurs, the validation consultant, arborist and other relevant stakeholders (such as the Department of Education) will need to discuss and develop an acceptable alternative strategy for remediating/capping these areas. This alternative strategy must still address the remedial goal and aim of this RAP.

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 detailed in Section 7, the material should not be accepted unless it can be demonstrated that the material poses a negligible risk to human health and the environment, and the use of the material on-site is not contrary to relevant legislation and guidance regarding waste and resource recovery.

8.5 Disposal of Hazardous Waste

Material classed as 'Hazardous Waste' under the Waste Classification Guidelines (2014) may require further assessment and stabilisation prior to off-site disposal. Disposal approval may also be required from the NSW EPA and licensed landfill facility. The presence of Hazardous Waste may result in significant delays and additional cost to the project.

9 SITE MANAGEMENT PLAN FOR REMEDIATION WORKS

The information outlined in this section of the RAP is for the remediation work only and should be implemented concurrently with any other requirements outlined in the development consent/approval.

In addition to the requirements below, EIS understand that all works are to be undertaken in accordance with the following documents:

- The existing site-specific AMP; and
- The Asbestos Management Plan for NSW Government Schools (August 2016).

9.1 Interim Site Management

The existing AMP remains in force and should be implemented for the site.

The following interim recommendations were also provided in the DSI to further mitigate the risks associated with ACM and PAHs at the site:

- A Class B licensed asbestos removal contractor should be engaged to do a detailed site walkover and 'emu-pick' of any visible FCF/ACM (as discussed in Section 6.5, this could also be undertaken by an appropriately trained person). Subsequently, a licenced asbestos assessor should complete a surface clearance certificate; and
- The area in the vicinity of TP32 (impacted by PAHs) should be inspected (this inspection can be limited to the area bound by TP17, TP31 and TP33 on Figure 2). In the event that soil is exposed at the surface, suitable top-dress should be applied together with new rolls of turf. This will need to be watered and maintained so that the turf can establish.

9.2 Project Contacts

Emergency procedures and contact telephone numbers should be displayed in a prominent position at the site entrance gate and within the main site working areas. The contact details of key project personnel are summarised below.

Table 9-1: Project Contacts

Task	Company	Contact Details
Project Manager	To be appointed	-
Remediation Contractor	To be appointed	-
Environmental Consultant	EIS (at the time of the RAP preparation)	9888 5000
Certifier	To be appointed	-
NSW EPA	Pollution Line	131 555

Task	Company	Contact Details
Emergency Services	Ambulance, Police, Fire	000

9.3 Security

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

9.4 Timing and Sequencing of Remediation Works

Remediation of the TP32 area will occur initially and this will be followed by the capping remediation of the site concurrently with the development works. In the event of unexpected delays, builder's plastic (or similar) should be used to cover the remediation areas in order to reduce the dust generation, surface water run-off and/or exposure to receptors.

9.5 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.

9.6 Noise and Vibration Control Plan

The guidelines for minimisation of noise on construction sites outlined in AS-2460 (2002)¹¹ 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 authorities.

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.

¹¹ Australian Standard, (2002). AS2460: *Acoustics - Measurement of the Reverberation Time in Rooms*.

9.7 Dust Control Plan

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

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

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

- Use of water sprays on unsealed or exposed soil surfaces;
- Covering of stockpiled materials and excavation faces (particularly during periods of site inactivity and/or during windy conditions) or alternatively the erection of hessian fences around stockpiled soil or large exposed areas of soil;
- Establishment of dust screens consisting of a 2m high shade cloth or similar material secured to a chain wire fence;
- Maintenance of dust control measures to keep the facilities in good operating condition;
- 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 working environment.

If stockpiles are to remain on-site or an excavation remains open for a period of longer than one day, 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.

9.8 Air Monitoring

Requirements for air monitoring should be considered by the asbestos removal contractor for any asbestos-related works. EIS recommend that air monitoring be undertaken for the duration of remediation works due to the sensitive nature of the surrounding land uses (residential/primary school).

9.9 Odour Control Plan

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

- Maintenance of construction equipment so that exhaust emissions comply with the Clean Air Regulations issued under the Protection of the Environment Operations Act;
- Demolition materials and other combustible waste should not be burnt on site;
- The spraying of a suitable proprietary product 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.

Disturbance of hydrocarbon soils is not expected during remediation, however this may occur in the event of an unexpected find. The following odour management plan should be implemented to limit the exposure of site personnel and surrounding land users to unpleasant odours:

- Excavation and stockpiling of material should be scheduled during periods with low winds if possible;
- A suitable proprietary product could be sprayed on material during excavation and following stockpiling to reduce odours;
- All complaints from workers and neighbours should be logged and a response provided. Work should be rescheduled as necessary to minimise odour problems;
- The site foreman should consider the following odour control measures as outlined in NEPM:
 - reduce the exposed surface of the odorous materials;
 - time excavation activities to reduce off-site nuisance (particularly during strong winds); and
 - cover exposed excavation faces overnight or during periods of low excavation activity.
- If continued complaints are received, alternative odour management strategies should be considered and implemented.

9.10 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 and Safe Work Australia 2016.

As a minimum requirement, personnel must wear appropriate protective clothing, including long sleeve shirts, long trousers and steel cap boots. Asbestos-related PPE is also required as outlined in Section 6 (and to be formally documented in the asbestos removal control plan). 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.

9.11 Waste Management

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

9.12 Incident Management Contingency

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

9.13 Hours of Operation

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

10 CONCLUSION

EIS are of the opinion that the site can be made suitable for the proposed development described in Section 1.1 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.

10.1 Remediation Category

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

Table 10-1: 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 state or regional environmental planning policy 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 development application or as a new and separate development application. Category 1 remediation work is identified as advertised development work unless the remediation work is a designated development or a state significant development.
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.

Considering the above, EIS have assessed that the remediation work is Category 2. However, it is noted that the RAP is to be submitted as part of the development application. EIS recommend that a specialist planner confirm the remediation category prior to the submission of this report to the Department of Planning.

10.2 Regulatory Requirements

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

Table 10-2: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination (2015)	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, including the asbestos air monitoring data.
Protection of the Environment Operations Act 1997	Section 143 of the Protection of the Environment Operations 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. Appropriate waste tracking is required for all relevant waste that is disposed off-site. Asbestos waste must be tracked using WasteLocate.
WHS Code of Practice (2016)	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). Notification of the bonded asbestos removal work associated with the excavation and off-site disposal of fill from the TP32 area is required. The need for further notification for general site works will depend on the extent of disturbance and should be assessed by the contractor prior to commencement.

11 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or land use. 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 2-1: Site Identification	5
Table 5-1: Consideration of Remediation Options	12
Table 6-1: Remediation Details (off-site disposal of fill from TP32 area)	16
Table 6-2: Remediation Details (asbestos/ACM – entire site)	17
Table 7-1: Validation Requirements	20
Table 7-2: VAC	22
Table 9-1: Project Contacts	27
Table 10-1: Remediation Category	32
Table 10-2: Regulatory Requirement	33

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

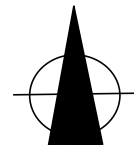
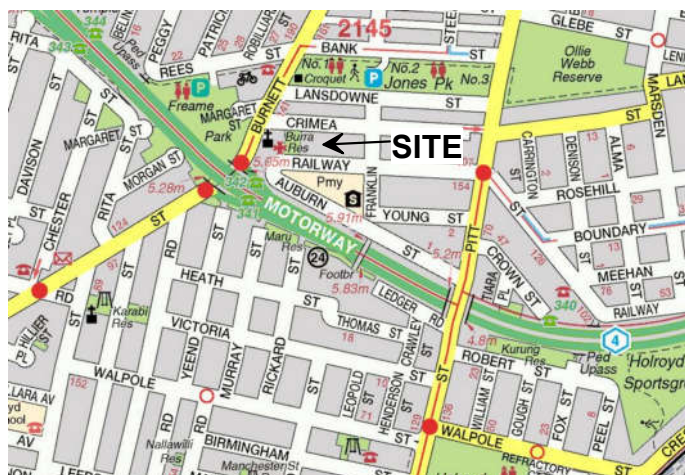


Image Sources:
<https://maps.six.nsw.gov.au/>
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 Images not scaled

Title:

SITE LOCATION PLAN

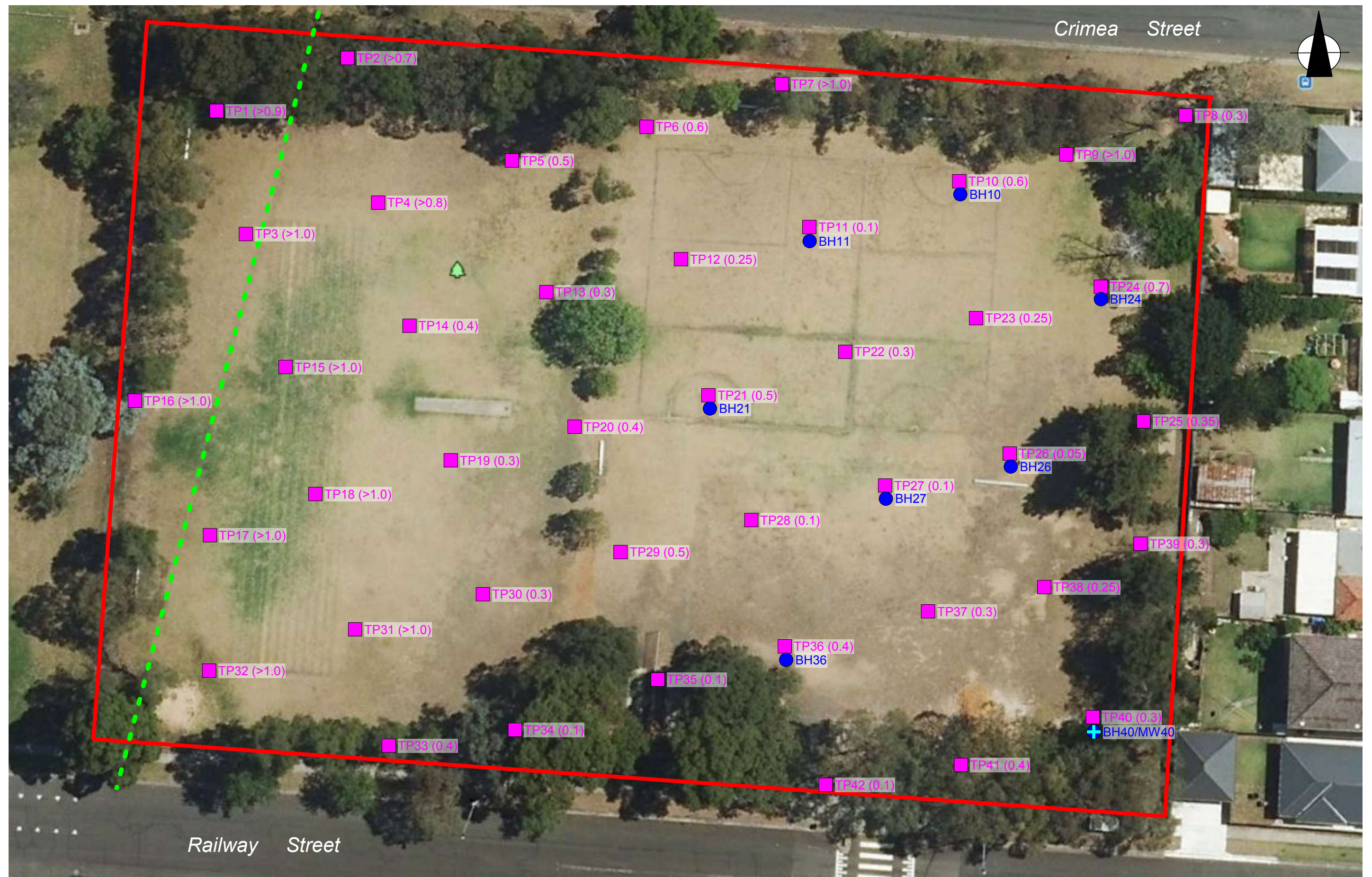
Location: PARRAMATTA WEST PUBLIC SCHOOL,
 CRIMEA STREET, PARRAMATTA

Report No: E31425KPrpt-RAP

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS



LEGEND:

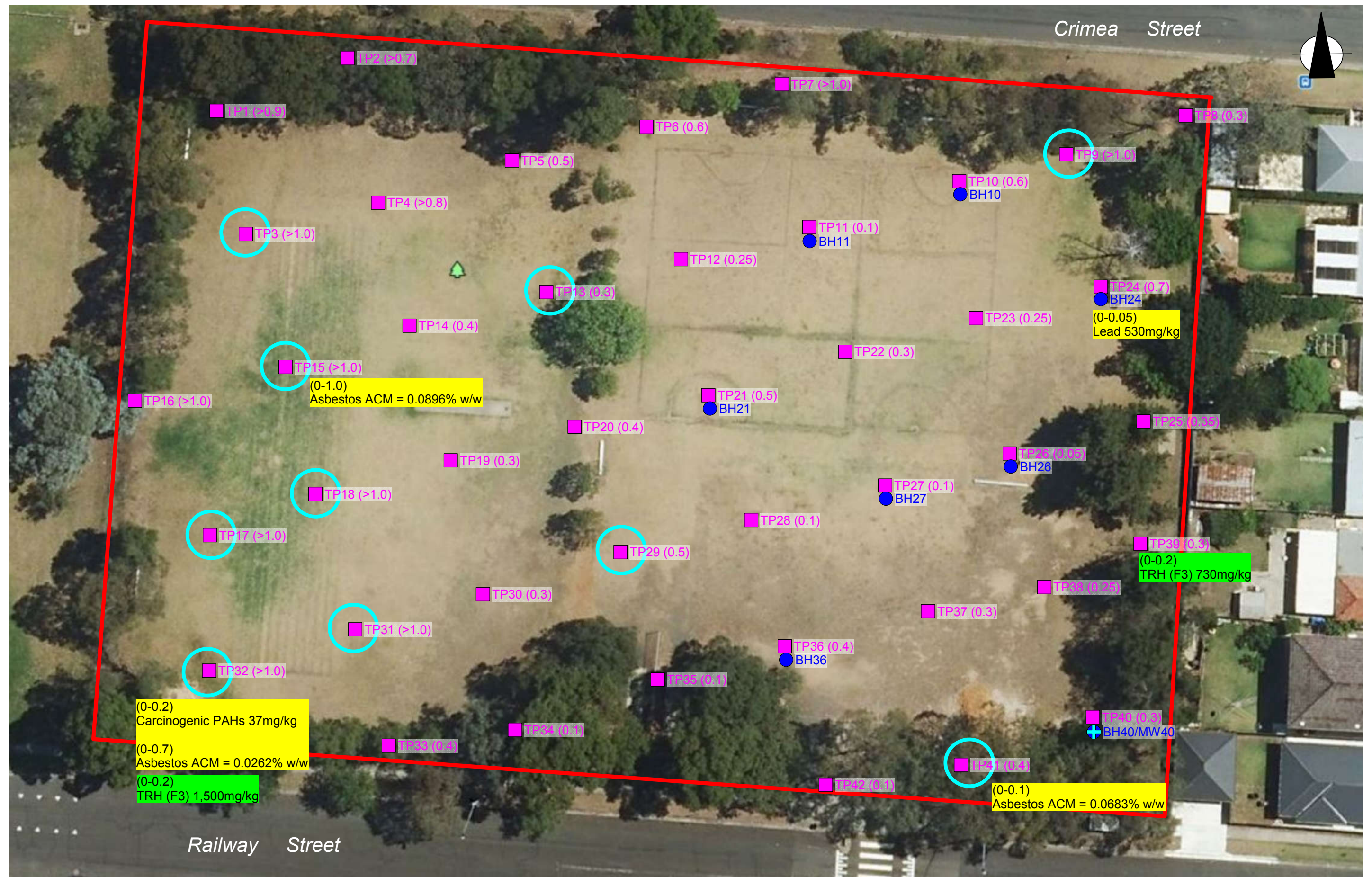
- | | | | |
|--|---|--|--------------------------------|
| ■ TP40 (0.3) | TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m) | --- | APPROXIMATE ALIGNMENT OF SEWER |
| ● BH36 | BOREHOLE LOCATION AND NUMBER | --- | APPROXIMATE SITE BOUNDARY |
| + MW40 | MONITORING WELL LOCATION AND NUMBER | | |



Figure recreated using Google Earth

Title: SAMPLE LOCATION PLAN (DSI)	
Location: PARRAMATTA WEST PUBLIC SCHOOL, CRIMEA STREET, PARRAMATTA	
Report No: E31425KPrpt-RAP	Figure No: 2
ENVIRONMENTAL INVESTIGATION SERVICES	





LEGEND:

- TP40 (0.3) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH36 BOREHOLE LOCATION AND NUMBER
- MW40 MONITORING WELL LOCATION AND NUMBER

- ACM/FCF ENCOUNTERED IN FILL

(0-0.05) DEPTH (m) AND CONTAMINANT CONCENTRATION ABOVE HUMAN HEALTH SAC
Lead 530mg/kg

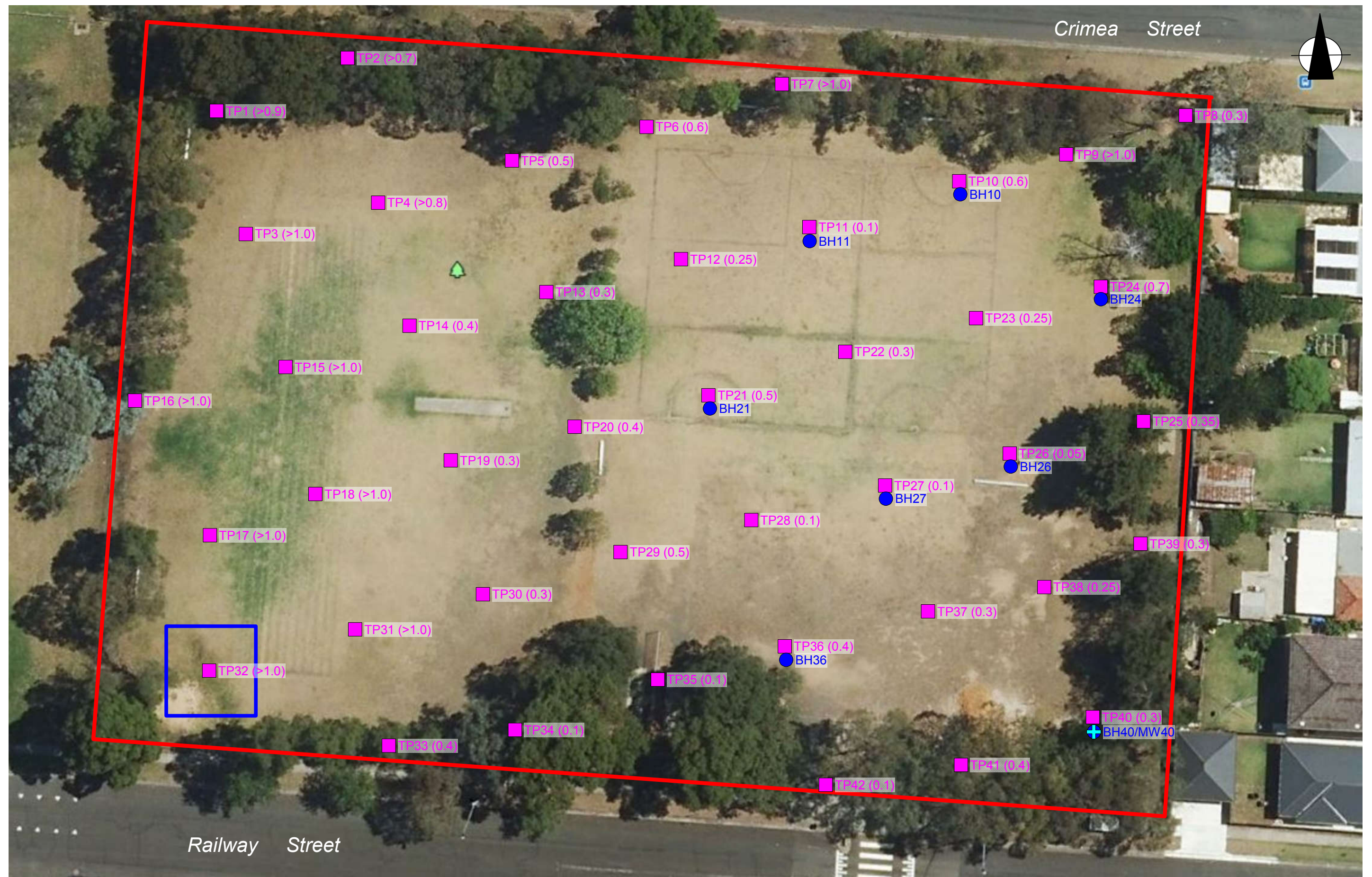
(0-0.05) DEPTH (m) AND CONTAMINANT CONCENTRATION ABOVE ENVIRONMENTAL SAC
Lead 530mg/kg



Figure recreated using Google Earth

Title:		CONTAMINATION DATA PLAN (DSI)	
Location:		PARRAMATTA WEST PUBLIC SCHOOL, CRIMEA STREET, PARRAMATTA	
Report No:		E31425KPrpt-RAP	Figure No: 3
ENVIRONMENTAL INVESTIGATION SERVICES			





LEGEND:

- TP40 (0.3) TEST PIT LOCATION, NUMBER AND DEPTH OF FILL (m)
- BH36 BOREHOLE LOCATION AND NUMBER
- MW40 MONITORING WELL LOCATION AND NUMBER

- APPROXIMATE SITE BOUNDARY (REMEDIATION AREA FOR ACM)
- REMEDIATION AREA FOR PAHs (TO BE CONFIRMED VIA VALIDATION)



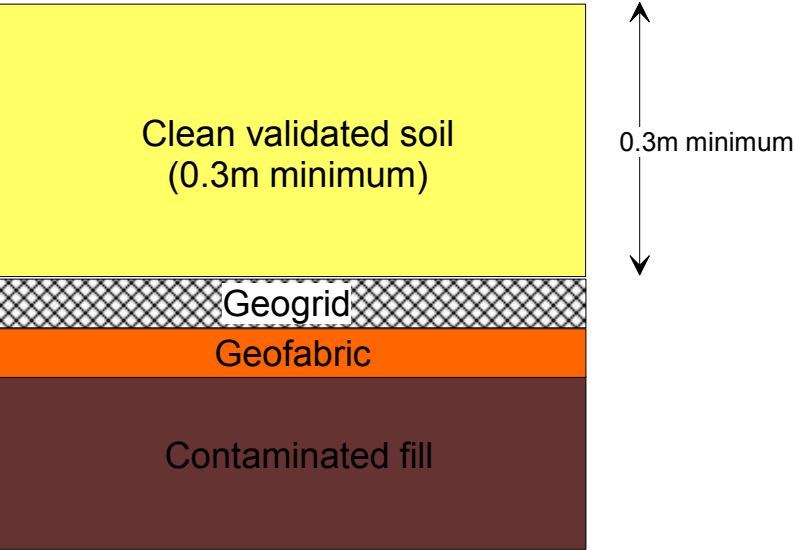
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Title: REMEDIATION AREA PLAN	
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Report No: E31425KPrpt-RAP	Figure No: 4
ENVIRONMENTAL INVESTIGATION SERVICES	

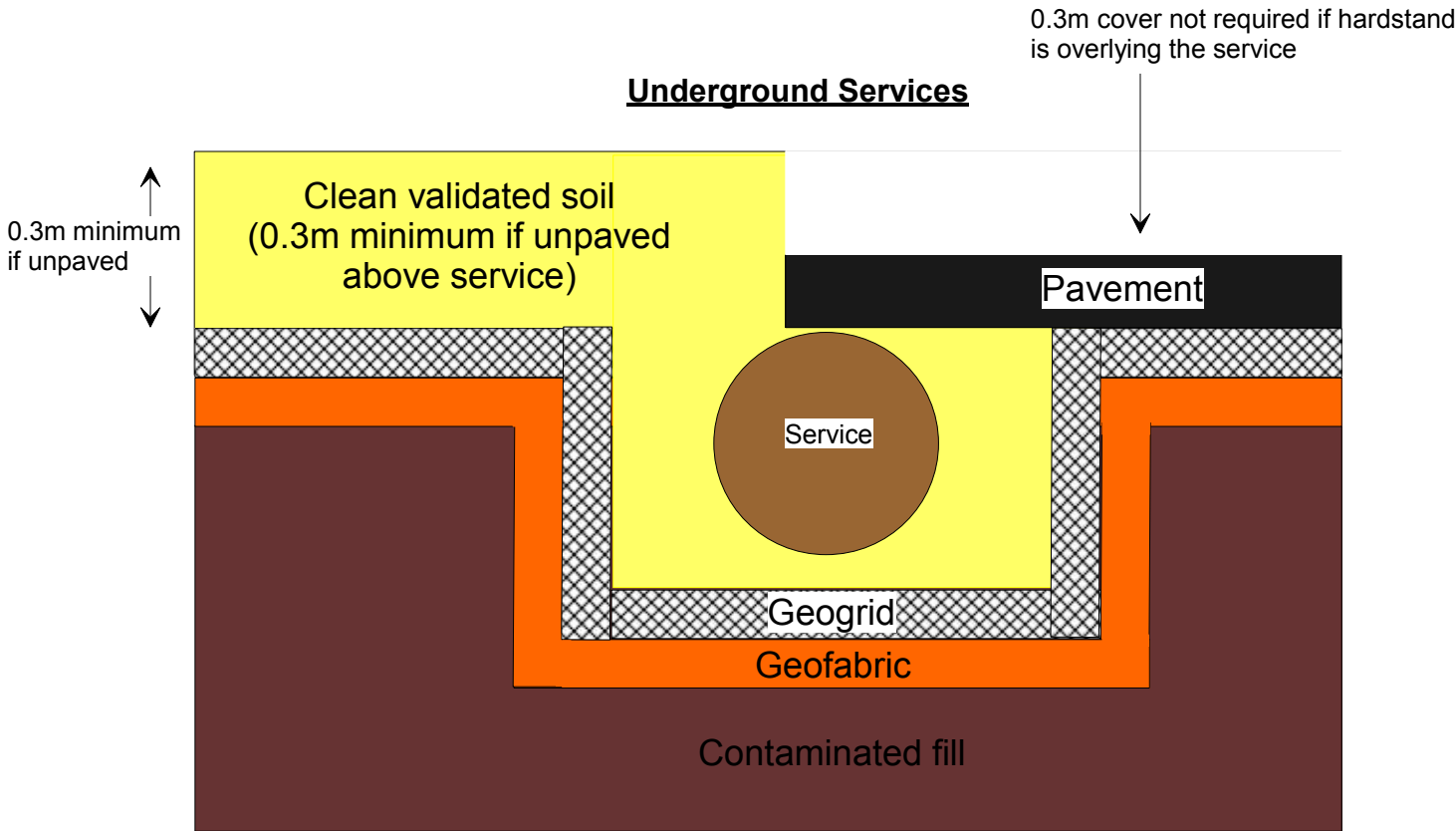
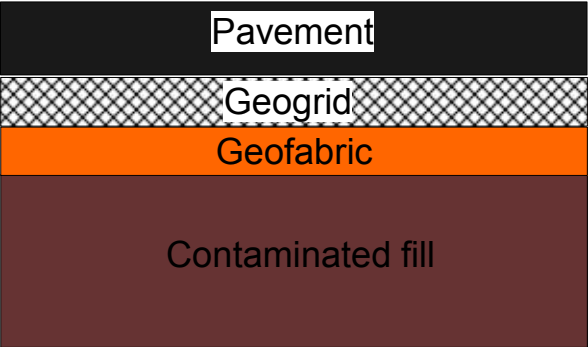


Appendix A: Schematic Capping Specifications

Unpaved Areas (shallow plantings)



Hardstand



Unpaved Areas (tree plantings)

