SESL AUSTRALIA
Environment & Soil Sciences

Remediation Action Plan

28-32 Evan Street, Penrith NSW

Prepared for:

Morson Group Pty Ltd

December 2019

(Ref: J002300)

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ABBREVIATIONS

AEC	Areas of Environmental Concern
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ASC	Assessment of Site Contamination
ASS	Acid Sulfate Soils
BaP	Benzo(a)pyrene
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CLP	Contaminated Land Policy
CLM	Contaminated Land Management Act
COC	Chain of Custody
CPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation or the Environment
CSM	Conceptual Site Model
DEC	Department of Environment and Conservation NSW
DECC	Department of Environment and Climate Change NSW
DECCW	Department of Environment, Climate Change and Water NSW
DLWC	Department of Land and Water Conservation
DP	Deposited Plan
DQO	Data Quality Objectives
DQI	Data Quality Indicator
DSI	Detailed Site Investigation
EILs	Ecological Investigation Levels.
EPA	NSW Environmental Protection Authority
EPL	Environmental Protection License
ESA	Environmental Site Assessment
ESLs	Ecological Screening Levels
GILs	Groundwater Investigation Levels
GW	Ground Water
GME	Groundwater Monitoring Event
HILs	Health Investigation Levels
HSLs	Health Screening Levels
LEL	Lower Explosive Limit
LEP	Local Environment Plan
LGA	Local Government Area
LCS	Laboratory Control Samples
LOR	Limit of Reporting
LNAPL	Light Non-Aqueous Phase Liquids
mAHD	Metres Australian Height Datum (above mean sea level)
MAHs	Monocyclic Aromatic Hydrocarbons
NAPL	Non-Aqueous Phase Liquid
NATA	The National Association of Testing Authorities
NEPM	National Environment Protection Measure
NHMRC	National Health Medical Research Council
NTU	National Turbidity Unit
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage NSW
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PCOC	Potential Contaminants of Concern
PPM	Parts Per Million
PSI	Preliminary Site Investigation
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RAC	Remediation Acceptance Criteria
RAP	Remedial Action Plan
RPD	Relative Percent Difference
SESL	SESL Australia Pty Limited
SVOC	Semi-Volatile Organic Compounds
SVR	Site Validation Report
SWL	Standing Water Level
TDS	Total Dissolved Solids
TEQ	Toxic Equivalence Quotient
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbon
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound

1 EXECUTIVE SUMMARY

SESL Australia (SESL) was engaged by Morson Group (the client) to prepare a Remedial Action Plan (RAP) to manage known soil contamination located at 28-32 Evan Street, Penrith NSW 2750 (the site), as part of the proposed development of forty (40) residential units over a two level basement parking area. This RAP has been prepared to detail the required actions by which the contamination will be managed, so that the site can be considered suitable for the proposed use in accordance with the relevant regulatory guidelines.

The goal of the remediation is to manage the known contamination in order to remove the unacceptable risk posed to human health, and render the site suitable for the proposed use. The purpose of the RAP is to:

- Provide a plan of remediation for the site to remove the unacceptable risk posed to human health by the known contamination;
- Establish remediation acceptance criteria that are appropriate for the proposed use of the site post remediation and development; and
- Demonstrates that the proposed remediation strategy is compliant with state and local government planning statutes, is complaint with the NSW EPA endorsed guidelines under Section 105 of the Contaminated Land Management Act 1997, and properly addressed issues relating to site environmental management, community relations and contingency planning.

Based on nature of the site and proposed use of the site post remediation, a remedial strategy was selected by the key stakeholders. In consideration of the limitations of the site, cost of remediation, nature of contamination and the associated human health risks, it was determined that the most appropriate remedial option for the site is excavation and offsite disposal.

The objective of the remediation design is to ensure that the contaminated material identified in Areas of Concern (AEC) 1, 2 and 3 are removed from the site and validated, and that the site is considered suitable for the proposed use.

Remediation should be undertaken as follows:

1. AS-a Location (AEC 1) : To remediate asbestos fibres detected at this location, the remediation contractor should excavate the top 100mm of soils in a 2.5m radius (half distance between AS-a and BH1 where no asbestos was detected. This distance equates to an area of approximately 5m^2 as the excavated area is limited to the west and south by the existing dwellings at the site. The estimated volume to be excavated and disposed in a licenced landfill is of 0.5 m^3;
- AS -a-F (AEC 2) : Chrysotile asbestos was confirmed within the ACM fragment collected adjacent to the fibro shed located at the rear of No.28. The asbestos removal contractor should remove it and dispose if appropriately. The contractor should conduct a site walkover to assess and remove any additional pieces that may remain on site; and

- Benzo(a) pyrene (AEC 3): exceeded the ESL concentration at BH8 (BH8-Ca and BH8-E) above the adopted criteria. Impacted material should be removed from the top 200mm of soils in a 4.5m radius around BH8-E (half distance between BH8-E and BH7). This distance equates to an area of approximately 63m_2 as the excavated area is limited to the west by the existing dwellings at the site. The estimated volume to be excavated and disposed in a licenced landfill is of 12.6 m_3.

Based on the contamination identified in the previous site investigations, this RAP has been developed to detail the remediation strategies that will be necessary to render the site suitable for residential land use, following the completion of the proposed development. The Site Environmental Controls and Contingency Plan outlined in this report must be implemented to ensure good environmental practices are adopted and corrective actions are performed in a timely manner.

SESL concludes that the strategies outlined will achieve the objectives of the RAP and render the site suitable for the ongoing recreational use and proposed development. Documentation of the success of remediation is required in a subsequent Site Remediation and Validation Report (SRVR) at the conclusion of remedial works.

2 INTRODUCTION

SESL Australia (SESL) was engaged by Peter Morson Group (the client) to prepare a Remedial Action Plan (RAP) to manage known soil contamination located at 28-32 Evan Street, Penrith NSW 2750 (the site), as part of the proposed development of forty (40) residential units over a two level basement parking area. This assessment is required by Penrith City Council (Council) as part of the Development Approval (DA) conditions. The legal definition of the site is Lot A in Development Plan (DP) 324069 & 355720 and Lot 1 in Development Plan (DP) 510281. This RAP has been prepared to detail the required actions by which the contamination will be managed, so that the site can be considered suitable for the proposed use in accordance with the relevant regulatory guidelines.

A Preliminary Site Investigation (PSI) was undertaken by SESL (SESL Report: J001978 – Preliminary Site Investigation) in August 2019 to assess the status of the site pertaining to potential contamination and comment on the suitability of the site for the proposed development. This PSI included limited intrusive soil assessment. Lead and benzo(a)pyrene concentration were found exceeding the adopted guidelines as well as the presence of fragments of asbestos containing materials were detected on site. A Targeted Environmental Site Investigation (TESI) was then prepared SESL in November 2019 (SESL Report: J002127 – Targeted Environmental Site Investigation) to delineate contamination. The findings of the PSI and TESI are summarised in Section 4 of this plan.

This RAP is required to manage the identified contamination, establish remediation acceptance criteria, detail validation requirements and comment on the requirement for the ongoing management of the site post remediation, to ensure that the developed site is suitable for the proposed land use.

2.1 OBJECTIVES

The overall objective of this RAP is to prescribe appropriate remedial actions that will manage the risks posed to current and future site users by the known contamination, and will render the site suitable for the proposed public open space land use, following the completion of the proposed development. To achieve this objective, the RAP has been designed to:

- Provide a plan of remediation for the site to remove the unacceptable risk that contaminated soils pose to human health;
- Establish remediation acceptance criteria that are appropriate for the intended ongoing use of the site in the context of the identified contamination;
- Detail an appropriate waste management procedure for spoil materials generated as part of the proposed development; and
- Demonstrate that the proposed remediation strategy is compliant with state and local government and planning statutes and compliant with NSW EPA endorsed guidelines under Section 105 of the

Contaminated Land Management Act 1997 and properly addresses issues relating to site environmental management, community relations and contingency planning.

2.2 STAKEHOLDERS

The key stakeholders involved in the implementation of the RAP are provided in Table 1.

Table 1 – Stakeholders

Stakeholder
Penrith City Council (Development Application Approver)
Morson Group (Site Owner)
Remediation Contractor
SESL Australia (Remediation/Validation Consultant)
Current Site Occupier/s
Future Site Occupier/s
Surrounding Land Occupiers & Local Community

2.3 REGULATORY GUIDELINES

The preparation of this RAP has been undertaken in consideration of (but not limited to) the following regulatory guidance documents and standards:

- ANZECC and ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (October 2000);
- ASTM (2000). Standard Practice D2488 90 Description and Identification of Soils (Visual-Manual Procedure). American Society for Testing and Materials;
- Code of Practice for the Safe Removal of Asbestos, 2nd Edition (National Occupational Health and Safety Commission, April 2005);
- EnHealth (2012) Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (2012);
- How to Safely Remove Asbestos: Code of Practice (WorkCover, 2012);
- National Environmental Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended April 2013);
- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Ed.) (2017);
- NSW Department of Urban Affairs and Planning (1998) Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land, August (1998);
- NSW EPA (1995). Sampling Design Guidelines (1995);
- NSW EPA (1996). Protection of the Environment Operations (Waste) Regulation (1996);

- NSW EPA (2014). Waste Classification Guidelines (November 2014);
- NSW EPA (2015). Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 (July 2015);
- NSW OEH (2011). Guidelines for Consultants Reporting on Contaminated Sites (2011). NSW Office of Environment and Heritage;
- Standards Australia (1993) AS1726-1993. Geotechnical Site investigations Australian Standard;
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds AS4482.1 (2005) and Part 2: Volatile substances, AS4482.2 (2005);
- Western Australia Department of Health (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia; and
- Work, Health and Safety Act 2011.

2.4 OUTLINE OF THE RAP

The RAP has been developed under the guidance of the appropriate regulatory framework endorsed by the NSW Environment Protection Authority (EPA) and complies with the provisions of the NSW Contaminated Land Management Act 1997 and associated guidelines and regulations.

The RAP will discuss the following:

- Site Description;
- Summary of Previous Investigation;
- Site Environmental Setting;
- Remediation Design;
- Remediation Acceptance Criteria;
- Compliance with Regulatory Requirements;
- Remediation Methodology;
- Waste Classification and Offsite Disposal;
- Validation Procedures;
- Site Environmental Controls
- Contingency Planning;
- Work Health and Safety; and
- Community Consultation and Liaison.

2.5 PERSONNEL

SESL's Environmental Consulting Team prepared this RAP based on information obtained through the PSI and TESI conducted at the site. The personnel involved for this project is shown in Table 2 – Project Personnel.

Table 2 – Project Personnel

Personnel	Title	Project Task
Andres Grigaliunas BSc (Mar Biol), GradDip Env Mgmt , Prin Env Aud	Principal Environmental Scientist	• Conduct report review and authorisation. • Report Preparation (RAP)
Setareh Pour Kazemi	Environmental Scientist	• Conduct soil sampling (PSI and TESI) • Report Preparation (PSI and TESI)

3 SITE DESCRIPTION

3.1 SITE LOCATION

The site is located at 28-32 Evan Street, Penrith NSW 2750. The total site area is approximately 1,633 m2. The site is occupied by three (3) lots and can be accessed via concrete driveways off Evan Street along the western boundary, as detailed in Table 3 below. The site is situated approximately 46 km West of Sydney CBD (Figure 1).

3.2 SITE IDENTIFICATION

The following details the portion of land subject to this RAP (Table 3).

Table 3 – Site Identification

Site Owner	Morson Group
Site Address	28-32 Evan Street, Penrith NSW 2750
Lot and DP Number	Lot A DP 324069 (28 Evan Street) Lot A DP 355720 (30 Evan Street) Lot 1 DP 510281 (32 Evan Street)
Local Government Area	Penrith Council Local Government Area
Current Zoning	R4 – High Density Residential
Distance from Sydney CBD	Approximately 46km West of the Sydney CBD
Geographical Coordinates (centre of site)	33°45'22.99"S 150°42'08.12"E
Investigation Area	1,633m2
Site Elevation	Approximately 40-38 m AHD
Locality Map	Figure 1
Site Layout	Figure 2

3.3 SITE LAYOUT AND INFRASTRUCTURE

The site lay out can be viewed in Figure 2. The following observations were made during the site visit investigation:

28 Evan Street

- The site boundaries were defined by Evan Street to the west, wooden fences to the north, south and a cemetery to the east;
- The majority of the site was occupied by a single level panel board residential dwelling with colorbond roof. (Fig.2);
- A fibro storage shed was located at the backyard adjacent to the house. Few asbestos fragments was noted on the surface next to the fibro shed;
- A metal colorbond shed was located in the east portion of the site;

- A panel board granny flat was occupied the south west corner of the site. The granny flat was untenanted at the time of the inspection;
- Access to the site was from Evan Street to the west via a concrete driveway along northern boundary;
- Driveway was covered by a metal awning adjacent to the house at the north side;
- A sealed concrete slab also was covering a limited area at the rear of the property adjacent to the house;
- Access to the granny flat was via a concrete/ brick footpath along southern boundary;
- One stormwater drain with stainless steel grate was observed in north portion of the site at the rear of the property;
- Minor oil staining and cracks were noted on the surface of the concrete;
- The remainder of the site was unsealed and covered by grass and trees; and
- No standing water or sign of underground storage tanks were noted during the inspection.

30 Evan Street

- The site boundaries were defined by Evan Street to the west, wooden fences to the north and south, and a cemetery to the east;
- A single level panel board house with tile roof with suspected asbestos containing materials on the eaves was occupied the south-central portion of the site;
- A colorbond garage was located in the north east side of the site. The garage was concrete covered. At the time of the inspection the garage used for general storage area. A lawn mower and a plastic fuel container were stored in the garage;
- Access to the site is from Evan Street to the west via a concrete driveway along northern boundary; and
- Minor cracks and oil staining were noted on the surface of the concrete driveway.

32 Evan Street

- The site boundaries were defined by Evan Street to the west, metal fences to the north and south, and a cemetery to the east;
- The site was occupied by a single level panel board house with tile roof in the west central of the site. Peeling paint was noted on the panel board wall with potential lead based paint;
- A fibro garage with colorbond door in the front was located at the north east corner of the site. Access to the garage was not available at the time of the inspection;
- A small fibro shed used as laundry room was occupied south central portion of the site. ACM fragment was noted on the surface next to the shed;
- A metal shed was located on the top of a concrete slab in the south portion of the site;
- A metal mesh animal house on the top of a concrete slab was also noted in the south east corner of the site;
- Access to the site is from Evan Street to the west via a brick driveway along northern boundary. A narrow brick footpath was the access to the house;

- One stormwater drain with stainless steel grate were observed in the front yard at the south west portion and another one was noted at the rear of the property at the centre of the site;
- Apart from the brick footpath and brick driveway the remainder of the site was unsealed and grass covered; and
- No standing water sign of underground storage tanks were noted during the inspection

3.4 SURROUNDING LAND USE

The site itself and the immediate surrounding areas to the north, east and west are zoned as R4 - High Density Residential within the Penrith City council local government area with the exception of an area to the north east adjacent to the site which is zoned SP1- Special Activities (cemetery). Sites are located approximately 56m to the north are zoned B4 - mixed use. Some areas to the west and south east are zones RE1 - Public Recreation. An area located approximately 208m south of the site is zoned R3 – Medium density residential. Other areas located approximately 175m north west of the site are zoned B3 – Commercial Core, and RE1- Public recreation with one area to the north which is zoned SP2 – Infrastructure.

3.5 SITE HISTORY

A review of the site history was undertaken to assess the historical use of the site, and in particular to identify activities with potential to contaminate soil, groundwater and surface water at the site. The historical review included:

- Current and historical aerial photographs;
- Current and former EPA Licences; and
- EPA Contaminated Lands Register.

This history review did not identify any significant changes in the properties through the years as the properties have been used as residential areas since (at least) 1943.

4 SUMMARY OF PREVIOUS INVESTIGATIONS

4.1 SESL REPORT: J002127 – PRELIMINARY SITE INVESTIGATION

A PSI with limited sampling (SESL Report: J002127 – Preliminary Site Investigation) was undertaken by SESL in August 2019 to assess the contamination status of the site. Nine (9) surface samples were collected from the potentially contaminated areas based on site observations using a hand auger across the site. Samples were tested for heavy metals 8 (arsenic, cadmium, copper, chromium, lead, mercury, nickel and zinc), polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), organochlorine pesticides (OCP), polychlorinated biphenyls (PCB) and asbestos. Fill/topsoil material was encounter in some locations to the maximum depth of 200mm underlain by NATURAL CLAY. Fibro sheds was also located at the rear of properties No.28 and No.32. Multiple fibre cement sheet fragments were noted on the surface at the vicinity of two fibro sheds.

During the site investigation, sampling was conducted on the areas considered to raise potential contamination concerns. Based on the visual observation at the time of the site visit, the site was occupied by three (3) low density residential dwellings with concrete driveways. The concrete surface was generally in good condition with minor cracks and oil staining. The metal garage located at north east corner of No.30 Evan Street, was used for goods storage and used to be use as carparking. A lawn mower with a plastic fuel container were also stored within the garage.

Soil sampling was limited to shallow soils and fill material. The fill/topsoil were encountered within sampling locations, the material consisted predominantly of dark brown sandy clay, medium plasticity, mixed with gravels with no discoloration or odours.

In total, nine (9) primary samples and one duplicate sample was collected and analysed from the site.

Soil results showed that concentrations of heavy metals were considered to be acceptable in all sampling locations, with concentrations of metals analysed met their respective assessment criteria under HILA, with the exception of lead concentration in one sample. Lead concentration of 490mg/kg was detected in borehole BH7(100-200mm) which exceeded the site criteria of 300mg/kg for HIL A.

The results for OCP, PCB, BTEX and PAH were below the limit of detection for all samples, with the exception of PAH (Benzo(a)Pyrene) concentration in three (3) samples. Benzo(a) Pyrene concentration of 0.9mg/kg were detected in borehole BH6 (100-200mm), borehole BH8 (100-200mm) and borehole BH9 (100-200mm), which exceeded the site criteria of 0.7mg/kg under the ESL criteria.

Minor PAH (as BaP TEQ) detection were identified within the samples collected from boreholes BH1 to BH3 and BH6 to BH9; however, the concentration levels were below the site criteria.

No asbestos was detected in any of the sample analysed from the site; however, asbestos fragment was noted on the surface in the vicinity of fibro sheds during the site investigation.

The PSI identified some Areas of Environmental Concerns (AEC) described below:

- AEC 1: Lead concentration at borehole BH7(100-200mm) which exceeded the site criteria of 300g/kg under HIL A;
- AEC 2: Benzo(a)Pyrene concentration at borehole BH6(100-200mm), BH8(100-200mm) and BH9(100-200mm) exceeded the ESL criteria of 0.7mg/kg for the site;
- AEC 3: ACM was found on the surface in the vicinity of fibro sheds located in No.28 and No.32;
- AEC 4: Potential hazardous materials within the structures and eaves; and
- AEC 5: Suspected Lead paint from panel board wall.

Based on the findings of investigation and the laboratory results, SESL concluded that the site present low to moderate contamination concerns in terms of risk to human and environment receptors. SESL recommended further assessments on site to investigate the AECs identified during the investigation and the preparation of a Remedial Action Plan (RAP).

A hazardous materials assessment must be conducted by a suitably qualified hygienist or asbestos assessor prior to demolition.

4.2 SESL REPORT: J002127 – TARGETED ENVIRONMENTAL SITE INVESTIGATION

SESL Australia Pty Ltd (SESL) was engaged in November 2019 by Morson Group (the client) to conduct a Targeted Environmental Site investigation (TESI) for the three (3) properties located at 28-32 Evan Street, Penrith NSW 2750 (the site). The legal definition of the site is Lot A in Development Plan (DP) 324069 & 355720 and Lot 1 in Development Plan (DP) 510281.

SESL carried out additional investigation at four (4) locations previously sampled and identified to be contaminated by lead and Benzo(a)Pyrene. Samples were collected from the identified boreholes both vertically and horizontally to delineate the extent of contamination. Samples collected using a hand auger from the centre of the exceedance identified boreholes (BH6, BH7, BH8 and BH9) to a minimum lateral extent of 1m away to the north, east , south and west (were possible). Seventeen (17) samples were collected horizontally from the surface at each location. A duplicate D3 sample (duplicated sample of BH7-S) was also collected for QA/QC purposes.

Auger was also advanced in to fill/topsoil materials to a minimum depth of 200mm and terminated to a depth of 1.0m in to natural material below the depth of identified contamination.

Two (2) additional soil samples and two (2) suspected asbestos containing material (ACM) fragments were also collected and submitted for asbestos analysis during this investigation. Samples were collected adjacent to fibro sheds.

Seventeen (17) surface samples and a duplicate sample (D3 from BH7-S) were collected from BH6, BH7, BH8 and BH9 to delineate previously identified lead and Benzo(a)Pyrene exceedances for the site. Two (2)

additional soil samples were also collected and were submitted for asbestos analysis. The detected concentrations in soil samples were compared to the adopted assessment criteria.

Based on the laboratory results and its comparison with the adopted criteria, a summary of the results is outlined below:

- Lead concentration from previously identified impacted area (BH7) was within the adopted guideline (HIL A).
- Benzo(a)Pyrene concentrations met the ESL site criteria in samples collected from BH6 and the majority of samples from BH9, but exceeded the criteria in samples from BH8 and one BH9 sample as follows:
    - BH8-Ca: Benzo(a)Pyrene concentration of 3.4mg/kg was detected from the surface centre sample, that exceeded the site criteria of 0.7mg/kg for ESL;
    - BH8-N : Benzo(a)Pyrene concentration of 1 mg/kg was detected from the surface, 1 m away from north side of BH8, that exceeded the site criteria of 0.7mg/kg for ESL;
    - BH8-E: Benzo(a)Pyrene concentration of 3.6 mg/kg was detected from the surface 1 m away from the east side of BH8, that exceeded the site criteria of 0.7mg/kg for ESL;
    - BH8-W: Benzo(a)Pyrene concentration of 1.3 mg/kg was detected from the surface, 1m away from the west side of that exceeded the site criteria of 0.7mg/kg for ESL; and
    - BH9-ca: Benzo(a)Pyrene concentration of 0.8 mg/kg was detected within the surface sample collected from the centre of BH9, that exceeded the site criteria of 0.7mg/kg for ESL.

ESLs criteria is applicable for assessing risk to terrestrial ecosystems which corresponds to the root zone and habitation zone. The samples were collected are not located within ecological and landscaping areas based on the current proposed development plans provided by the client, and therefore are not consider to pose an unacceptable ecological risk:

- PAHs (as BaP TEQ) concentrations met the site adopted criteria for HIL A, with the exception of:
    - BH8-Ca: PAH (as BaP TEQ) concentration of 4.7mg/kg was detected within the surface sample collected from the centre of BH9, that exceeded the site criteria of 3mg/kg for HIL A; and
    - BH8-E: PAH (as BaP TEQ) concentration of 5mg/kg was detected from the surface sample collected from east side of the BH8, that exceeded the site criteria of 3mg/kg for HIL A.

Statistical analysis was performed to identify an upper control limit for the likelihood that any hypothetical additional sampling would significantly differ from the calculated mean (1.75 mg/kg). Using a 95% confidence interval, an upper control limit of 2.53 mg/kg was calculated. This means that at a 95% certainty, any additional samples taken at the site will fall between 1.75 and 2.53. This is less than the adopted criteria HIL A.

Chrysotile asbestos was detected within a soil sample collected from a location at the rear of property No.28. Laboratory analysis confirmed the presence of asbestos within the suspected ACM fragment sample collected during the site investigation from the surface next to fibro shed located at the rear of No.28.

Samples were collected from BH6 (BH6-Ca – BH6-N – BH6-S – BH6-W) to delineate the extent of

Benzo(a)Pyrene detected previously. Delineation of contamination at BH6 was successfully achieved as Benzo(a)Pyrene concentration did not exceed the criteria.

Samples were collected from BH7 (BH7-Ca – BH7-N – BH7-S – BH7-E – BH7-W) to delineate the extent of elevated Lead. Delineation of contamination at BH7 was achieved as Lead contamination did not exceed further. The 95% UCL applied to the results shows that the Lead concentrations for the site are below the adopted criteria for HIL A.

Benzo(a)Pyrene concentration was detected at BH8 (BH8-Ca – BH8-N – BH8-E -BH8-W) and BH9-Ca was above the adopted criteria for ESL. Therefore, the delineation at BH8 and BH9-Ca was not achieved.

PAH (as BaP TEQ) was detected within the samples collected from BH8-Ca and BH8-E and is above the adopted site criteria for HIL A. It appears that the contamination is more in the centre and further extended towards the east. However, by applying 95% UCL statistical analysis, PAH concentration is below the site criteria.

In addition, Chrysotile asbestos in soil and in the ACM fragment was confirmed and the extend of it has not been assessed.

4.3 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) was developed based on the information obtained prior to the intrusive sampling and analysis, including desktop review, site walkover and review of previous investigations. This model has been established to assess the potential sources of impact, chemicals of concern, transport mechanism and receptors present at the site.

This review of information identified the following potential Areas of Environmental Concern (AEC):

- AEC 1: Chrysotile asbestos was detected at soil sample collected at the rear of No.28;
- AEC 2: Chrysotile asbestos was confirmed within the ACM fragment collected adjacent to the fibro shed located at the rear of No.28.
- AEC 3: Benzo(a)Pyrene concentration detected within samples BH8(BH8-Ca – BH8-N – BH8-E -BH8-W) and BH9-Ca above the adopted criteria for ESL;
- AEC 4: Potential hazardous material within the building structures; and
- AEC 5: Suspected Lead paint from panel board wall.

5 ENVIRONMENTAL SETTING

5.1 TOPOGRAPHY AND DRAINAGE

The elevation across the investigation area is approximately between 38 to 40 m AHD. Water runoff from the site is assumed to drain into the stormwater infrastructure present at properties in a south westerly direction and into the kerbside stormwater drain along Evan Street.

5.2 GEOLOGY

Reference to the 1:100 000 Penrith Geological Series Sheet indicates that the site is within the area of Wianamatta Group with the geological unit of the site being Bringelly Shale, consisting of Shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff. A review of the Penrith Soil Landscape Series Sheet (1:100,000) map indicates that the site is within the Luddenham landscape group. According to the Atlas of Australia Soils, the major soils are hard acidic red soils with hard neutral and acidic yellow mottled soils on lower slopes and in valleys. Refer to Appendix A for further details.

5.3 HYDROGEOLOGY

A search of NSW Office of Water record identified no groundwater bores within 500m of the site. The aquifers on site are described as porous, extensive highly productive aquifers. The closest bore is located within 1055m to the west of the site and used for Industrial recreation (groundwater) purposes.

Refer to Appendix A for further details.

5.4 SURFACE WATER

No surface water bodies exist within the site investigation area. Surface waters are expected to be managed at the site by stormwater infrastructures. .

5.5 ACID SULFATE SOIL

Information obtained from the Atlas of Australian Acid Sulfate Soils Data Source (CSIRO) indicated the site to be within a class C area of extremely low probability of occurrence. Based on this information and the underlying geology of the area, there is 1-5% chance of occurrence with occurrences in small localised areas.

5.6 PROXIMITY TO LOCAL SENSITIVE ENVIRONMENTS

The site is located with a UPSS environmentally sensitive zone as noted by the Department of Environment, Climate Change and Water.

The closest watercourse is Peach Tree creek located approximately 814 m to the west of the site and eventually discharges into the Nepean River located approximately 2.33 km to the west of the site.

6 REMEDIATION DESIGN

The goal of the remediation is to manage the known contamination in order to remove the unacceptable risk posed to human health, and render the site suitable for the proposed use. The purpose of the RAP is to:

- Provide a plan of remediation for the site to remove the unacceptable risk posed to human health by the known contamination;
- Establish remediation acceptance criteria that are appropriate for the proposed use of the site post remediation and development; and
- Demonstrates that the proposed remediation strategy is compliant with state and local government planning statutes, is complaint with the NSW EPA endorsed guidelines under Section 105 of the Contaminated Land Management Act 1997, and properly addressed issues relating to site environmental management, community relations and contingency planning.

6.1 REMEDIATION HIERARCHY

The preferred order of options for site remediation and management is detailed in Volume 1 of the NEPM (1999 amended 2013. The NEPM Assessment of Site Contamination Policy Framework (16) states the that the preferred hierarchy of options for site clean-up and/or management is:

- On-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site; or,

  if the above are not practicable,
- Consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;

  or,
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

6.2 REVIEW OF REMEDIAL OPTIONS

The possible remediation options considered were:

- Do Nothing;
- Monitored Natural Attenuation;
- On-Site Treatment;
- Excavation and Off-site Disposal; and

- On-Site Management.

6.2.1 *Do Nothing:*

The "Do Nothing" approach involves leaving the contaminated soil materials in their current locations and either continue the development without concern for the remediation of contaminated soils, or continue the existing use. This approach is considered inappropriate due to several factors:

- Areas requiring remediation are at the ground surface and exposed. The current use of the site would be affected by the presence of uncovered contaminated materials and would not be suitable for sensitive land use;
- The areas of concern at the surface exceed the adopted land use criteria and are not considered acceptable for ongoing use without remediation or management being undertaken; and
- The contaminants that have been identified are known to be persistent in the environment and will pose a long-term health and environmental hazard if left on the site in their current state.

6.2.2 *On Site Treatment:*

On site treatment methods include both in-situ and ex-situ treatments of soils. Treatment may be physical, chemical, mechanical or biological. On site treatments have the potential to be cheaper than offsite disposal. The main disadvantages of some onsite treatment are the time constraints, or the inability to treat the contaminants to an acceptable level.

On site Treatment is not considered to be an appropriate remedial action, as some contaminants present at the site (asbestos) cannot be easily or effectively treated.

6.2.3 *On Site Management:*

On Site Management of the contamination would involve selective remediation across the site to reduce the impact to human health or the environment and long-term management of any remaining contamination.

On site management would primarily involve the placing of a permeable surface marker layer (such as geo-fabric material) across the contaminated area and then covering with soil layers or encapsulating the contaminated materials with hardstand concrete (or other media). The site would then require a site-specific Environmental Management Plan (EMP) to prevent the exposure of the contamination to the users or future workers of the site.

The disadvantages of such a strategy would be the imposing of an ongoing site specific EMP, associated notification obligations on the land title and ongoing management of the site for compliance with the EMP. SESL considers this remediation method not to be suitable for the site as the project involves significant excavation works in a limited area and management of impacted soils would be costly and inefficient.

6.2.4 *Excavation and Off-site Disposal:*

This method includes the excavation of the fill material, and the disposal of said material at an appropriately licensed landfill.

This approach has the advantage of removing the contaminated soils from the site (to an extent practicable) and removing land use restrictions associated with contaminated soils. It also has the advantage of being relatively fast and may not further impact other areas of the site. The main disadvantage of excavation and disposal is the expense associated with offsite disposal to an appropriately licensed landfill, and the requirement to import materials to return the topography of the site to design level. SESL considers this remediation method to be suitable for the site.

6.2.5 *Selected Remediation Option:*

Based on nature of the site and proposed use of the site post remediation, a remedial strategy was selected by the key stakeholders. In consideration of the limitations of the site, cost of remediation, nature of contamination and the associated human health risks, it was determined that the most appropriate remedial option for the site is 'Excavation and Offsite Disposal'.

This method involves surface scraping in areas of failed validation and disposal from the site. Further details are provided in Section 9 of this plan.

This remedial option was selected based on the following:

- The requirement to manage unacceptable health risks posed to current and future site users;
- The immobile nature of the identified soil contamination at the site; and
- The minor locations of failed validation results.

7 REMEDIATION ACCEPTANCE CRITERIA

Remediation acceptance criteria (RAC) are a set of criteria that detail the required condition and nature of the site media, in regard to known contamination, for the site to be considered suitable for the proposed use.

The Remediation Acceptance Criteria (RAC) requires that:

- All soils proposed for offsite disposal must be adequately characterised and disposed of offsite to an appropriately licensed waste facility;
- All soils imported onto the site (if required) must be characterised as either Excavated Natural Material (ENM) in accordance with the NSW EPA Excavated Natural Material Order, 2014 or Virgin Excavated Natural Material (VENM) in accordance with the definition of VENM as stated in the Protection of Environment Operations (POEO) Act, 1997. All imported materials must be accompanied by a characterisation/classification report developed by a reputable environmental professional;
- Imported soils (if required) used as a capping layer must be appropriately validated to ensure it complies with the 'imported material acceptance criteria' detailed in Table 4 below. Validation must be undertaken by a suitably qualified environmental professional. Further details are provided in Section 12 of this RAP;
- The imported material acceptance criteria has been derived from the *NSW EPA excavated natural material order, 2014*. This criteria has been selected based on its low contaminant threshold. The selected criteria is more sensitive than the previously adopted human health criteria for insitu site materials (Health Investigation Levels – A, NEPM (1999, Amended 2013)) and will ensure protection of human health, based on the proposed use of the site;
- A suitably qualified environmental consultant must conduct the validation inspections and validation sampling required during and following the completion of the remediation works. The consultant must ensure the validation analysis frequencies outlines in the ENM Order (if applicable) or VENM materials at a rate of 1 sample per 250m3. (See additional detail in Section **Error! Reference source not found.**). VENM results must assessed as reflective of natural background levels for the source site, and be below the ENM criteria for applicable contaminants. No organic contaminants or asbestos can be detected in the VENM materials; and
- Soils remaining on site should comply with the adopted guidelines described in sections 7.1 and 7.2 below.

Table 4 – ENM Acceptance Criteria

Contaminant	Acceptance Criteria	Guideline Reference
Mercury	1 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Cadmium	1 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Lead	100 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Arsenic	40 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Chromium	150 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Copper	200 mg/kg	NSW EPA Excavated Natural Material Order, 2014

Contaminant	Acceptance Criteria	Guideline Reference
Nickel	60 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Zinc	300 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Polycyclic Aromatic Hydrocarbons	40 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Benzo(a)pyrene	1 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Benzene	0.5 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Toluene	65 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Ethyl-benzene	25 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Xylene	15 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Total Recoverable Hydrocarbons (C_{10} – C_{36})	500 mg/kg	NSW EPA Excavated Natural Material Order, 2014
Rubber, plastic, bitumen, paper, cloth, paint and wood	0.1%	NSW EPA Excavated Natural Material Order, 2014
Asbestos (all forms)	Absent	

7.1 Ecological Screening Levels (ESLs)

Ecological screening levels (ESLs) apply to petroleum hydrocarbon fractions, BTEX, benzo(a)pyrene, F1 and F2. They are only applicable to the top 2m of the soil profile which corresponds to the root zone or habitation zone of most species. Like Health Investigation Levels (HSLs), ESLs are based on soil texture. For the present project, there were exceedances of benzo(a)pyrene at BH8 and BH9 sampling locations. For remediation purposes and based on the latest amendment to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (the NEPM) on 16 May 2013, material left on site should have concentrations below urban residential and public open space areas (Table 1b(5)) of 1.4 mg/kg for both fine and course material.

7.2 Asbestos

NEPM 2013 adopted the HSLs from the Western Australia Department of Health (WA DoH) *Guidelines of Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009.* The HSLs are based on scenario-specific likely exposure levels, that includes bonded and friable asbestos levels.

Asbestos only poses human health risk when asbestos fibres are made airborne and inhaled. Bonded asbestos is not readily made airborne except through substantial physical damage. NEPM 2013 states “the assessment and management of asbestos contamination should take into account the condition of the asbestos materials and the potential for damage and resulting release of asbestos fibres”.

The HSLs are to be used for Tier 1 assessment, in the event of an exceedance that triggers the need for a Tier 2 site-specific assessment. Site-specific assessments of asbestos contaminated sites should be designed to describe the nature and quantity of asbestos present in the soil that can sufficiently develop a risk management plan for the current and proposed land use of the site. For the present project, the HIL for asbestos contamination is Residential A (0.01% w/w), 0.001% w/w for fibrous asbestos (FA) and asbestos fines (AF) and no visible asbestos for surface soils.

Table 5 – Health Screening Levels for Asbestos Contamination in Soil

Health Screening Level (w/w)				
Form of asbestos	**Residential A[1]**	**Residential B[2]**	**Recreational C[3]**	**Commercial/ Industrial D[4]**
Bonded ACM	**0.01%**	0.04%	0.02%	0.05%
Fibrous Asbestos (FA) and Asbestos Fines (AF) [5] (Friable Asbestos)	**0.001%**			
All forms of asbestos	**No visible asbestos for surface soil**			

Note: This table is adapted from Table 7 in Schedule B1: Health Screening Levels of Asbestos Contamination in Soil, *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013* (NEPC 2013).
1 Residential A with garden/accessible soil also includes childcare centres, preschools and primary schools.
2 Residential B with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
3 Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.
4 Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.
5 The screening level of 0.001% w/w asbestos in soil for FA and AF (i.e. non-bonded/friable asbestos) only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.

8 COMPLIANCE WITH REGULATORY REQUIREMENTS

8.1 Environmental Planning and Assessment Act and Regulations

Remedial works at the site are not considered to present a designated development under Schedule 3 of the Environmental Planning and Assessment Act 1979. Furthermore, the program of rehabilitation works described in this RAP has been designed so that works shall not adversely affect the environment and will be an improvement to the environment. For these reasons the remediation works should not require the preparation of an Environmental Impact Statement (EIS).

8.2 State Environmental Planning Policy (SEPP No.55 – Remediation of Land)

State Environmental Planning Policy No 55 (SEPP 55) - Remediation of Land under the Environmental Planning and Assessment Act 1979 (EP&A Act) applies to works involving remediation or management of contaminated land in NSW. The objective of this planning policy is to provide a state-wide planning approach to the remediation of contaminated land. In particular, the policy aims to promote the remediation of contaminated land for the purpose of reducing risk of harm to human health or any other aspect of the environment.

Remediation can be Category 1 requiring consent of the relevant planning authority or Category 2 not requiring consent. Both Category 1 and Category 2 remediation require notification 30 days prior to the planned commencement of remediation to the consent authority. This remediation program is considered Category 1 and can be conditioned in the existing DA.

8.3 NSW Protection of the Environment Operations Act 1997

The objective of the Act relevant to this RAP is to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development and to increase opportunities or public involvement and participation in environmental protection. The Act prohibits the contamination of land through any means including the improper application of waste and prescribe the requirements for triggering which sites require an environmental protection license to operate. The objectives of the RAP align with the Act by focusing on an improved human and environmental amenity of the site and providing details of community consultation requirements.

9 REMEDIATION METHODOLOGY

The Remediation Contractor who undertakes the remediation work must prepare a work method statement incorporating relevant sections of this RAP into a work methodology. Asbestos related works must be supervised by a suitably qualified asbestos removalist contractor (Class A).

The indicative work methodology can be summarised as follows:

9.1 EXCAVATION AND OFFSITE DISPOSAL

Removal of contaminated material will be required to ensure the site is suitable for residential land use. Remediation should be undertaken as follows:

2. AS-a Location (AEC 1) : To remediate asbestos fibres detected at this location, the remediation contractor should excavate the top 100mm of soils in a 2.5m radius (half distance between AS-a and BH1 where no asbestos was detected. This distance equates to an area of approximately 5m$_2$ as the excavated area is limited to the west and south by the existing dwellings at the site. The estimated volume to be excavated and disposed in a licenced landfill is of 0.5 m$_3$;

- AS -a-F (AEC 2) : Chrysotile asbestos was confirmed within the ACM fragment collected adjacent to the fibro shed located at the rear of No.28. The asbestos removal contractor should remove it and dispose if appropriately. The contractor should conduct a site walkover to assess and remove any additional pieces that may remain on site; and
- Benzo(a) pyrene (AEC 3): exceeded the ESL concentration at BH8 (BH8-Ca and BH8-E) above the adopted criteria. Impacted material should be removed from the top 200mm of soils in a 4.5m radius around BH8-E (half distance between BH8-E and BH7). This distance equates to an area of approximately 63m$_2$ as the excavated area is limited to the west by the existing dwellings at the site. The estimated volume to be excavated and disposed in a licenced landfill is of 12.6 m$_3$.

As excavation and offsite disposal is required throughout the remedial works, the following methodology must be implemented:

- A suitably qualified remediation/excavation contactor must be engaged to supervise the earthworks conducted as part of the remediation of the site. This contactor must hold (at a minimum) a Class A removalist licence for AEC 1 and AEC 2;
- Prior to excavation/earth moving, warning signs at the boundaries of the site (at least 10m from the removal areas) must be erected. Signs must conform to AS1319 - 1994 – Safety Signs for the Occupational Environment;
- A stockpiling area must be established where excavated soils will be stockpiled awaiting waste classification sampling and offsite disposal. This stockpiling area must have appropriate erosion and sediment controls installed, and cannot include areas of validated capping soils. Excavated material from AEC 1 and AEC 3 should be stockpiled separately as they may be classified different waste types;

- Excavation of soils and other fill material should occur utilising plant equipment (excavator or similar), until the proposed depth is reached. Spoil material is to be stockpiled in the designated stockpiling area detailed above;
- The contractor must barricade the area so that only workers wearing correct PPE and experienced in handling the material are allowed in the vicinity of the works. The licensed asbestos contractor should dampen the soil during the excavation and loading process to ensure asbestos fibre migration is minimised;
- The persons involved in the works, including excavator operators, must be wearing correct Personal Protective Equipment (PPE) when inside the works area. PPE at a minimum must include: disposable coveralls of 100% synthetic materials or a mixed natural/synthetic fabric capable of providing adequate protection against fibre penetration, a P2 (or better) disposable, half-face particulate respirator, gloves, hardhat and steel cap boots;
- During any works where disturbance of asbestos contaminated materials is required, the contractor is to ensure daily air monitoring at selected sensitive receptors is implemented;
- The stockpiled materials are considered to be asbestos containing, and must be managed as such. All practicable precautions should be taken to prevent/reduce dust generation throughout the stockpiling processes. When stockpiled materials are being disturbed (moved, added to or loaded out) dust suppression techniques should be utilised to prevent dust generation. When stockpiles are not being disturbed, they must be covered with plastic;
- Following stockpiling, spoil materials must be subject to waste classification sampling and analysis undertaken by a suitably qualified environmental professional. Sampling and analysis is to be conducted at a ratio of 1 sample per 100 m_3 (1:100m_3). Waste classification results are to be supplemented with results from previous investigation conducted at the site (PSI and TESI).
- Following waste classification assessment, the validating consultant must prepare a waste classification report detailing the findings of the assessment in accordance with the NSW EPA Waste Classification Guidelines, 2014. Further details are provided in Section 10 of this plan;
- Following waste classification spoil materials are to be loaded into trucks under dust suppression procedures, and transported to a licensed waste facility suitable for accepting the wastes. All excavation and disposal works must be conducted by a suitably qualified asbestos removalist contractor;
- The Protection of the Environment Operations (Waste) Regulation 2014 states that tracking and reporting of asbestos waste is required for waste loads consisting of greater than 100kg of asbestos waste or more than 10 square metres of asbestos sheeting. This requirement utilises the NSW EPA WasteLocate online consignment tool (https://wastelocate.epa.nsw.gov.au/); and
- Spoils considered asbestos containing must be tracked using the NSW EPA 'Waste Locate System', and all weighbridge dockets are to be provided to the validating consultant.

10 WASTE CLASSIFICATION AND OFFSITE DISPOSAL

The selected remediation method may require the excavation and offsite disposal of excess soil materials, in order to achieve the required design levels following the completion of the remedial works. As such, a waste classification assessment is required to be undertaken by the validating consultant, as stated in Section 9.1 of this plan.

In accordance with the NSW EPA Waste Classification Guidelines, any materials propose for offsite disposal must be subject to a Waste Classification Assessment. In line with industry best practice, this assessment should be conducted by a suitably qualified environmental professional. This assessment is required to determine an appropriate waste classification for the offsite removal of materials in accordance with the NSW EPA Waste Classification Guidelines – Part 1: Classifying Waste (2014), and Identify issues that may impact the classification of the waste materials.

10.1 Assessment Criteria

The NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014) is a set of guidelines used to classify waste materials for the purpose of offsite disposal. This document details a six step procedure for determining the type of waste and the waste classification. Part of the procedure, for materials not classified as special waste or pre-classified waste, is a comparison of analytical data initially against contaminant threshold (CT) values specific to a waste category. Alternatively, the data can be assessed against specific contaminant concentration (SCC) thresholds when used in conjunction with toxicity characteristic leaching procedure (TCLP) thresholds.

10.2 Sampling and Analysis Plan

Waste classification assessment and sampling must be conducted by the validating consultant (or suitably qualified environmental professional). The sampling objective was to gather information with regard to the type, location, level and extent of potential contamination within stockpiled materials, for the purpose of off-site disposal.

Sampling and analysis is to be conducted at a ratio of 1 sample per 100 m_3 (1:100m_3) in order to appropriately characterise wastes. Samples must be collected from stockpiles utilising hand equipment with a minimum of 200 mm of surface material removed before collecting the sample. The samples must be placed in laboratory supplied containers and labelled & stored in ice before being transferred to a NATA accredited laboratory for the purpose of analysis.

The analysis of soil samples must be undertaken against the criteria outlined in the NSW EPA Waste Classification Guidelines – Part 1: Classifying Waste 2014. This includes at a minimum:

- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn);

- Polycyclic aromatic hydrocarbons (PAH);
- Total petroleum hydrocarbons C6 to C36 (TPH);
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Organochlorine Pesticides (OCP);
- Polychlorinated Biphenyls (PCB); and
- Asbestos in Soil (presence/absence). As material to be disposed was excavated due to the presence of asbestos, it is not necessary to test asbestos again.

Soil sampling for the purpose of waste classification must be performed under the following procedures:

- Decontamination of all sampling equipment between sampling;
- Use of disposable gloves during sampling, with each pair of gloves disposed of between individual sample collection;
- Labelling of sampling containers with individual and unique identification; and
- Controlled under chain of custody procedures.

10.3 Reporting

For each waste classification assessment conducted, the validation consultant (or environmental professional) undertaking the assessment must prepare a 'Waste Classification Report'. The report must detail the process and findings of the investigation, including:

- Introduction and Background;
- Assessment Objective;
- Sampling and Analysis Plan;
- Assessment Criteria;
- Fieldwork and Analytical Results; and
- Conclusions/Findings.

10.4 Current Classification

Based on previous investigation undertaken at the site (PSI and TESI), in-situ soils are known to contain an asbestos. As such, all soils are considered to be asbestos containing and classifiable as Special Waste (asbestos containing) in accordance with the NSW EPA Waste Classification Guidelines, 2014. Additional waste classification assessment is required to confirm the contaminant concentrations of any soils proposed for offsite disposal, to accurately characterise these soils and confirm an appropriate waste classification.

The concentration of the asbestos containing materials within materials at the site is currently unknown, as the intrusive investigation conducted was limited to borehole construction.

11 QUALITY ASSURANCE AND CONTROL

11.1 DATA QUALITY OBJECTIVES (DQO)

In determining the type, quantity and quality of data needed to support decisions relating to the validation of this remediation program, the seven-step DQO approach has been undertaken in accordance with Schedule B2 under ASC NEPM 2013. The DQOs are presented in detail in the following sections.

11.1.1 Step 1 - State the Problem

Previous site investigations have confirmed the presence of fill materials across the site, that in discrete locations exceed the adopted HIL's and are also suspected to contain asbestos. Sufficient validation certainty is required to supplement the previous investigations to ensure the site can be considered suitable for the ongoing public open space use.

11.1.2 Step 2 - Identify the Decision/Goal of the Study

Refer to Section 2.1 of the report for the detailed objectives of this study. The goal of the validation program is to confirm that the adopted remediation strategies are implemented effectively, identify any residual contamination on-site, identify associated potential risk and provide suitable evidence that the remediated site is suitable for ongoing public open space use.

The decisions to be made based on the results of this assessment are as follows:

- Have remediation methods been successful in managing contamination on the site?
- Are residual insitu surface materials in the TPZ suitable for the ongoing landuse?
- What are the potential requirements for further investigation, remediation and/or management of potential contamination identified on the site in the future?

11.1.3 Step 3 - Identify Information Inputs

The inputs required to make the above decisions are as follows:

- Historical investigations, including geotechnical and environmental reports;
- Validation inspections and analytical results;
- Site level surveys; and
- Imported material validation certificates.

11.1.4 Step 4 - Define the Study Boundaries

The boundaries of the environmental assessment have been identified as follows:

- The study boundary is the development area as described in (Figure 3);

- The study will include all historical information for all soil points within the development boundary, and additional validation of the final site surface (top 200mm); and
- The findings of this study are required prior to site occupation.

11.1.5 Step 5 - Develop the Analytical Approach (or Decision Rule)

The decision rules for this assessment are as follows:

- If validation works, including visual assessment, and analysis of contaminants of concern, identify the remediation works are successful, then remediation works and validation findings will be used to develop the management actions required to maintain the site's suitability for the ongoing public open space use; and
- If validation works, including visual assessment, and the analysis of contaminants of concern, identify that remediation works have not been successful, then additional remediation and validation will be required.

11.1.6 Step 6: Specify the Performance or Acceptance Criteria

The acceptable limits on decision errors to be applied for the assessment and the manner of addressing possible decision errors have been developed based on the DQIs of precision, accuracy, representativeness, comparability and completeness and are in the DQIs presented Section 11.2.

The potential for significant decision errors are to be minimised by:

- Appropriate supervision and control of remediation works by experienced environmental consultants;
- Implementation of remediation works by contractors experienced in remediation projects;
- Preparation of robustly reviewed assessment reports, including site auditor review;
- Ensuring the validation works provide sufficient evidence of remediation success; and
- Ensuring that the criteria set for the validation works are appropriate for the proposed use of the site.

The potential for significant decision errors are to be minimised by completing a robust QA/QC program.

11.1.7 Step 7: Optimise the Design for Obtaining Data

Based on the objectives of the remediation and validation works, the design of the validation program is based obtaining visual confirmation at multiple stages of the remediation program, robust validation data on all imported materials, combined visual and analytical assessment of residual uncapped surface soils (i.e. TPZ) and presentation of all new and historical information in the validation report.

11.2 DATA QUALITY INDICATORS AND DATA EVALUATION

SESL has selected the following Data Quality Indicators (DQIs) to ensure that the data obtained from the validation program are of sufficient quality to be used to draw reliable and representative conclusion in regards to the decision rules.

Table 6 – Data reliability assessment

DQI	Laboratory considerations	Field considerations	Comments
Completeness	Sampling frequencies meet validation requirements. Analysis conducted in accordance with validation requirements. Appropriate laboratory methods employed. Sample documentation including field notes, COC, SRA complete. Sample holding times complied with.	All site areas and critical locations inspected. All hold points visually confirmed (as necessary). Site assessment conducted in accordance to SESL's SOPs. Site assessment conducted by experienced contaminated land consultant. Documentation undertaken correctly and peer reviewed.	As per ASC NEPM 2013 data considered acceptable and reliable.
Comparability	Utilise consistent methods with historical investigations and compliant with ASC NEPM 2013. Adopt standard laboratory PQL for all analytes. Maintain the same primary laboratory as historical assessments (where possible)	Same site inspection methodologies used on each day of validation, with consistent notes taking procedures. Site assessment conducted in accordance to SESL's SOPs. Site assessment conducted by experienced contaminated land consultant.	As per ASC NEPM 2013, data considered acceptable and reliable.
Representativeness	All analysis performed in accordance with the validation requirements.	Appropriate selection of media, sampling method, preservation and compliance to holding times.	As per ASC NEPM 2013, data considered acceptable and reliable.
Precision	Review and assessment of laboratory and inter-laboratory duplicates. Appropriate field duplicates.	Site inspection conducted appropriately and complied with ASC NEPM 2013 Schedule B2. Site assessment conducted in accordance to SESL's SOPs.	As per ASC NEPM 2013, data considered acceptable and reliable.
Accuracy	Analysis and assessment of field blanks, rinsate blanks, and laboratory QA data (matrix, method and surrogate result).	Site inspection conducted appropriately and complied with ASC NEPM 2013 Schedule B2. Site assessment conducted in accordance to SESL's SOPs.	As per ASC NEPM 2013, data considered acceptable and reliable.

In the event if any of the DQIs are not met, the following steps will be undertaken:

- Review information provided or obtained to identify the non-conformances;
- Determine the cause of the non-conformances; and
- Identify the course of action required to rectify the non-conformances.

In the event the non-conformances cannot be rectified, determine how the non-conformance will significantly affect the usefulness of the data to determine if the data will be used with discretion or marked as invalid.

12 VALIDATION PROCEDURES

12.1 ENVIRONMENTAL CERTIFICATION

A qualified professional must undertake a validation assessment, presented in a Site Remediation and Validation Report (SRVR), in accordance with the relevant NSW EPA guidelines and AS4482.1.

Validation assessment should be conducted throughout the remediation works, and incorporate the critical hold points as detailed in Section 12.4. Sufficient validation works should be conducted so that the validation report will be able to conclude that the residual soils present at the site will meet the remediation acceptance criteria and NSW EPA standards, and that the site will be suitable for the proposed residential land use.

12.2 VALIDATION REGIME

12.2.1 Validation of Imported Material

The validation of imported materials must be undertaken to ensure compliance with the RACs outlined in Section 7 of this plan, and must be completed prior to the instalment of the material;

- Any materials to be used for engineered backfilling should ideally be sourced from certified Virgin Excavated Natural Material (VENM), as defined in the Protection of Environment Operations Act (POEO), 1997;
- Other imported materials may also include Excavated Natural Material (ENM) as defined by the NSW EPA in 'the excavated natural material order 2014', provided the ENM is also aesthetically acceptable;
- Imported material certified as VENM or ENM must be supported by the appropriate certification documents as well as the results from laboratory analysis conducted on the material;
- Prior to installation (spreading) of these materials, they must be subject to assessment to confirm suitability for use. Sampling and analysis of imported materials must be conducted by the validating consultant at a ratio of 1 sample per 250 m_3 (1:250m_3), to ensure suitability and verify the classification as ENM/VENM. This analysis must include all contaminants outlined in Table 4 of this plan. Additionally, each load of materials imported to the site must be inspected and documented as consistent with the source of the material;
- Samples must be collected from imported material stockpiles utilising hand equipment with a minimum of 200 mm of surface material removed before collecting the sample. The samples must be placed in laboratory supplied containers and labelled & stored in ice before being transferred to a NATA accredited laboratory for the purpose of analysis; and
- It is recommended that imported horticultural soils (i.e. turf and garden soils), should assessed to ensure acceptable performance for the proposed plantings. SESL recommends that the soils be determined fit for purpose by an appropriate qualified horticultural soil scientist, and be supported by appropriate laboratory analysis. In addition to the validation analysis detailed in Table 4, analysis should include cation exchange capacity, organic matter, nitrogen, phosphorus, major and minor plant nutrients and

trace elements. Consideration should also be given to geophysical factors, including such as permeability.

12.3 VALIDATION OF REMEDIATED AREAS

The validating consultant should validate that soils impacted with asbestos fibres in AEC 1 and B(a)P in AEC 3 have been removed and remaining soils are below the adopted criteria which is HSL of 0.001% (Fibrous Asbestos (FA) and Asbestos Fines (AF) and 1.4 mg/kg for B(a)P. Validation should be carried out as follows:

- Visual inspection of the remediated area to validation that there was no visible asbestos present in surface soil for AEC 1;
- Collection of soil samples at a rate of 1 sample per 72m$_2$ (8.5x8.5m);
- Submit samples to a NATA accredited laboratory;
- Assess that samples results are below the adopted criteria;
- If sample results are above the adopted criteria, additional material should be excavated as described in Section 7.1 above; and
- Once the site has been remediated, prepare a validation report summarizing the works undertaken. The report is to be provided to the Council for review and approval.

12.4 CRITICAL HOLD POINTS

Throughout the remediation process, a number of critical hold points must be adhered to prior to progression of the remediation works. These hold points have been established in order to assure that the required remediation steps have been appropriately completed before additional works are conducted. The sign off of these holds points will ensure the appropriate implementation of this RAP.

Critical hold points for the required remedial works are detailed in Table 7 below.

Table 7 – Critical hold Points

#	Critical Hold Point	To Be Completed Prior To
1	Inclusion of these Category 1 remediation works into the development application for the redevelopment with subsequent notification to Council 30 days prior to commencement of works.	Commencement of remediation works
2	Receipt of conditions of consent	Commencement of remediation works
3	Engagement of appropriately qualified excavation/remediation contractor (Class A asbestos removalist as necessary) and remediation consultant review of contractor work plans	Commencement of remediation works
4	Remediation consultant witness of site controls	Commencement of remediation works
5	Waste Classification Assessment	Offsite disposal of excavated soil materials
6	Imported material RAC compliance validation (if required)	Installation of capping soils
7	Validation of remediated soils	

12.5 SITE REMEDIATION AND VALIDATION REPORT

Following the conclusion of the remedial works, the validating consultant must prepare a Site Remediation and Validation Report (SRVR). This SRVR must detail:

- The methodologies used in the remediation of the site;
- Site validation inspection and sampling events conducted throughout the remedial works;
- Disposal records (weighbridge dockets) of the materials excavated and disposed of throughout the remedial works;
- Compliance of the remedial works with the RACs detailed in this plan;
- Compliance with the critical hold points, detailed in Section 12.4 of this plan; and
- The findings of the validation assessment.

The SRVR must be prepared in consideration of the *Contaminated Site: Guidelines for Consultants Reporting on Contaminated Sites* (NSW OEH, 2011) and must come to a conclusion as to whether the site can be considered suitable for the proposed use following the completion of the remedial works, in accordance with the adopted legislative guidelines.

13 SITE ENVIRONMENTAL CONTROLS

13.1 OVERVIEW

The remediation of the site must be carried out in a manner that does not harm or degrade the environment (both on-site and off-site). People involved in the project must ensure the protection of human health and the environment throughout the duration of the works with special consideration of the following:

- Asbestos Management;
- Work procedures;
- Control of fugitive emissions;
- Dust control measures;
- Erosion, sediment and surface water management;
- Equipment cleaning and operation; and
- Stockpiles.

13.2 WORK PROCEDURES

13.2.1 Establishment and Site Preparation

Prior to commencement of remediation activities, the remediation contractor shall prepare a work site management plan. The objectives of the work site management plans are:

- To protect the health of site workers, adjacent landowners and the general public during remediation works; and
- To ensure workers do not negatively impact on potential environmental receptors and comply with applicable environmental legislations.

A control strategy must be proposed within the plan for the management of all possible sources of exposure or dust release on the site.

The following are the major points that need to be considered in the work site management plan:

- Safety of personnel both on and off site;
- Responsibility for the supply and application of isolating materials (e.g. ropes, barriers, plastic screens, waste containers, warning signs, etc), if required;
- Limiting access to remediation area;
- Perimeter/security fencing and erosion control;
- Transport facilities;

- Availability of water and drainage;
- Staff amenities and decontamination areas;
- Protection of adjacent residential structures;
- Waste disposal responsibilities and clean-up requirements;
- Notification to, and approval from, regulating authorities where necessary; and
- Cleanliness standards that much be achieved to fulfil the contract.

13.2.2 Site Boundaries and Fencing

Warning signs at the boundaries of the remediation areas (at least 10 metres from the removal areas) should be labelled "REMEDIATION AREA – NO UNAUTHORISED ENTRY". Signs must conform to Australian Standard 1319-1994 – *Safety Signs for the Occupational Environment.*

Entry to the remediation area shall be restricted to personnel directly engaged in the soil remediation. Other persons entering the area shall be required to observe the appropriate safety precautions for that area.

13.2.3 Supervisory Personnel

Supervisory personnel shall have a detailed knowledge of the precautions and procedures demanded by contaminated soil remediation and clean-up. In the light of this knowledge and personal experience, supervisors shall assume the following responsibilities:

- The total remediation procedure; the setting up, the actual remediation (i.e. removal) and final cleaning operation;
- Ensure that all necessary measures are taken to reduce the airborne dust, and that in any case, workers are not exposed to levels exceeding the recommended exposure standard;
- Arrange for, and assess results of, air monitoring where appropriate;
- Ensure that all workers under their supervision are adequately trained in the safe working practices associated with working on constructions sites;
- Ensure that the remediation of the contaminated soil is continually supervised and that the operation is carried out in a safe and proper manner;
- Ensure that personal protective equipment is available to all workers and maintained in good condition; and
- Ensure that the remediation site is maintained in a clean condition, that waste is quickly and properly disposed of, and that the personal hygiene procedures are continually observed.

13.2.4 Emission Controls

The contaminated stockpiles, unless in use (i.e. loading out, etc.), shall be covered with an impermeable cover, or maintained in a manner to prevent (as far as practicable) the generation of dust. The covering must be

weighted down so it does not blow away with wind. Physical barriers such as construction fencing must restrict access to these areas.

Wetting of all work areas, where active soil disturbance shall occur that day, shall begin prior to the start of the disturbance activities. Wetting shall be conducted as appropriate, based on the visual observations of the Site Manager or other appointed supervisor. This may be done by hand or using mechanical sprayers.

Maintenance wetting shall occur at the close of each workday in preparation of the following day's work zones. If maintenance wetting from the previous workday appears adequate (in other words, preliminary movement of machinery to a work zone must not yield emissions), and passes inspection, additional initial wetting will not be required. Wetting shall occur to prevent the possible emission of material during the movement of equipment to another location. Care must be taken to assure that the application of water does not produce emissions from the ground surface and that there is not excessive over-watering.

During the actual soil disturbance activity, water shall be applied to the site of the disturbance, as appropriate, to suppress any visible emission. In general, personnel tasked with wetting duties must be assigned to each soil disturbance area to complete this wetting activity. Wetting shall be undertaken using a hose with spreading head to ensure even wetting occurs.

13.2.5 Wind Speed Work Stoppage

The application of a wind speed work stoppage requirement is designed to control fugitive emissions due to increased air velocity. In the event of high wind speeds, excavation work must be stopped at the site until wind speeds are reduced to a speed that shall not generate visible emissions from the site. For the purposes of this site, work must be stopped when:

- Wind speeds reach a sustained 40 km/h; or,
- Any wind speed at which particulates are observed by site personnel to be entrained in the air stream.

If site-specific weather creates conditions that may result in fugitive emissions, work stoppage may occur at wind speeds less than specified above based on decisions of the Site Manager. The Site Manager shall make the decision as to when it is appropriate to restart.

13.2.6 Dust Control Measures

Prior to any intrusive works or other disruptive activities carried out on site, consideration must be given to how the work or activity can be undertaken with minimal dust generation. All works should be undertaken with control of dust as a priority. The dust control or avoidance measures should be documented in a SWMS prepared for the proposed works. Secondary controls, such as the wearing of dust masks should also be considered during potential dust exposure.

Should any unexpected hazards arise, the Client should be contacted immediately so that the risks (health or safety) can be re-evaluated and the appropriate level of management and/or protection can be implemented prior to the recommencement of any works.

The following procedures and techniques will aid to control dust generation:

- Erection of dust screens around the perimeter of the site;
- A tarpaulin (or equivalent) will securely cover all loads of soil material entering or leaving the site;
- Water sprays will be used across the site over unsealed or bare surfaces;
- Plastic sheeting will be used by the remediation contractor to cover excavation faces and stockpiles where necessary; and
- Materials at the site will be processed, handled, moved and stored in a proper and efficient manner in order to minimise exposure.

If the above procedures and techniques are not sufficient to control dust, then further contingency measures may include:

- Reduce area of disturbed surfaces;
- Installation of perimeter sprays on the remediation site boundary fencing;
- Conducting work in more favourable weather conditions;
- Modifying the manner in which excavation work is conducted at the site;
- Using different equipment which generates less dust; and
- Using equipment in more favourable weather conditions.

13.2.7 Spills and Leaks

On site control measures must be in place throughout the remediation works to protect the surrounding environment from spills and leaks:

- Construction of stormwater retention basins or diversion drains;
- Presence of an emergency supply spill control equipment, such as oil absorbent materials; and
- Containment of any storage tanks or drums within bunded areas, which have the capacity of 110% of the largest tank contained, or 25% of the total volume of all drums, whichever is greater.

Works required within this RAP do not contain activities that will require any liquids to be stored on site, with the exception of fuels for machinery. These shall be kept to a minimum at all times.

13.3 ASBESTOS MANAGEMENT

In the event that remediation works are being undertaken that involve the excavation or disturbance of asbestos containing materials or suspected asbestos containing materials, the following site controls must be adhered to.

13.3.1 Site Boundaries and Fencing

Prior to excavation/earth moving, warning signs at the boundaries of the site (at least 10m from the removal areas) must be erected. Signs must conform to AS1319 - 1994 – Safety Signs for the Occupational Environment.

Entry to the asbestos works area shall be restricted to personnel directly engaged in works, and that are adequately trained in the handling of asbestos containing materials.

13.3.2 Supervisory Personnel

Asbestos works must be supervised by a suitably qualified asbestos removalist contractor (Class A).

13.3.3 Personal Protection Equipment

The contractor must barricade the area so that only workers wearing correct PPE and experienced in handling the material are allowed in the vicinity of the works. The licensed asbestos contractor should dampen the soil during the excavation and loading process to ensure asbestos fibre migration is minimised.

All persons involved in the works, including excavator operators, must be wearing correct Personal Protective Equipment (PPE) when inside the works area. PPE at a minimum must include: disposable coveralls of 100% synthetic materials or a mixed natural/synthetic fabric capable of providing adequate protection against fibre penetration, a P2 (or better) disposable, half-face particulate respirator, gloves, hardhat and steel cap boots.

13.3.4 Stockpile Management

All stockpiled materials are considered to be asbestos containing, and must be managed as such. All practicable precautions should be taken to prevent/reduce dust generation throughout the stockpiling processes. When stockpiled materials are being disturbed (moved, added to or loaded out) dust suppression techniques should be utilised to prevent dust generation. When stockpiles are not being disturbed, they must be covered with plastic.

13.4 EROSION, SEDIMENT AND SURFACE WATER MANAGEMENT

13.4.1 Approach

An important part of the remedial works shall be the management of erosion, sediment and surface water. The strategy to be adopted must aim to:

- Prevent soil erosion at the site;
- Protect off site waters and sediment from being polluted by onsite sources; and

- Minimise impacts to on-site surface waters from remedial works during the project; and facilitate the implementation of the remedial works program.

The strategy shall involve the installation and operation of a number of environmental control measures that shall be progressively implemented as work progresses across the site. The design approach adopted must satisfy the following principles:

- Control water flow from the top of the site, through the works and out the bottom of the site via the construction of earthen bunds to regulate water flow;
- In the case of an extreme rainfall event, overflow water from unremediated areas shall be filtered through straw bales and silt fences prior to discharge from the fill area. Given the short duration of the rehabilitation program, the probability of an extreme event occurring is considered to be low; and
- Rehabilitate disturbed lands as quickly as possible.

Regular maintenance of all erosion, sedimentation and pollution control devices shall be undertaken to ensure their continuing effective and efficient operation.

13.4.2 Stormwater Control in Remediated Areas

Erosion protection in disturbed areas of the site shall be provided by:

- Grassing and the establishment of other vegetation; and
- The construction and maintenance of or erosion and sediment control measures such as contour drains, straw bales and silt fences.

13.5 Noise and Vibration Control Measures

Noise and vibration levels must be controlled throughout the project. Special precautions must be taken to avoid nuisance in neighbouring areas, particularly from machinery, vehicles and warning sirens. The control measures to be implemented shall include the following:

- All construction vehicles involved in the rehabilitation project must generally enter and leave the site in accordance with specified site entry controls; and
- Use of suitable construction techniques and methodologies.

13.6 Equipment Cleaning and Operation

Throughout the remediation, controls must be placed on the operation and movement of equipment. General procedures that shall be implemented include the following:

- Equipment working within an excavation area must be washed inside the area so that any wash water shall run into the excavation. Wash waters shall be allowed to naturally evaporate or be removed from the excavation area along with ponded surface water;

- Equipment washing facilities must be provided for the effective cleaning of equipment after they have been exposed to contaminated fill, and prior to their leaving the site. The facilities shall also be used to clean other earthmoving plant and equipment used on site;
- All vehicles transporting materials on site shall be operated in a manner so as to prevent any loss of materials during loading, transport and unloading activities; and
- Any storage tanks or drums used for fuels or liquids shall be bunded and bund shall contain at least 110% of the largest tank contained or 25% or the total volume of all drums, whichever is the greater, and the bund shall not be penetrated by any services.

13.7 STOCKPILES

- All excavated fill materials excavated from AEC1 or soils are considered to be contaminated and asbestos containing;
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered; and
- All stockpiles of contaminated soil shall be stored in a secure area and be covered as soon as practicable, and remain covered at all times, unless loading out.

13.8 REMEDIATION SCHEDULE

It is recommended that site remediation activities be coordinated with other trades to prevent unauthorised personnel from being present in the remediation area. Works are not considered complete until validation certificates are presented.

13.8.1 Hours of Operation

This remediation process must be conducted in normal site hours as required by the Former Holroyd Council DCP.

- Monday - Friday 7am - 6pm;
- Saturday 8am - 4pm ; and
- No work is permitted on Sundays or Public Holidays.

No machinery or trucks must operate on site outside of the times.

13.8.2 Potential Effects on Community and Environment

There is a potential for fugitive dust generated during the excavation and loading of trucks. The leading hand must arrange the following dust control measures:

- Hosing with fine spray of water on exposed surfaces particularly during hot windy days;

- Hosing vehicles and covering loads prior to movement on site and especially prior to leaving the site (if required); and
- Ensure public roadways are kept as clean as possible.

The noise producing equipment should meet the requirements of the Protection of the Environment Operations Act 1997 (NSW) and Protection of the Environment Operations Act (Noise Control Regulations) 2008. All contractors must ensure work times are adhered to.

The control of odours during excavations must be monitored during the remediation process. Should odours be detected beyond the site boundary suppressant equipment must be deployed immediately to control odours entering nearby properties. All work must cease upon the detection of odours outside the property boundary. Commencement of work may take place once odours are controlled and validated by a suitably qualified professional.

13.8.3 Personnel

Prior to commencement of the remediation works the remediation contractor must prepare a complete list of remediation contacts including site personnel. Personnel must hold the required certificates to complete the works required.

14 CONTINGENCY PLANNING

14.1 OVERVIEW

The unexpected conditions that could feasibly occur at the site include:

- The uncovering of greater amounts of ground contamination than presently estimated;
- Removal of contaminated materials;
- The uncovering of presently unknown types of contamination (e.g. Coal Tar);
- The generation of unacceptable dust;
- The generation of unacceptable odours;
- The generation of unacceptable noise and or vibration levels; and
- Spills or leak of hazardous materials.

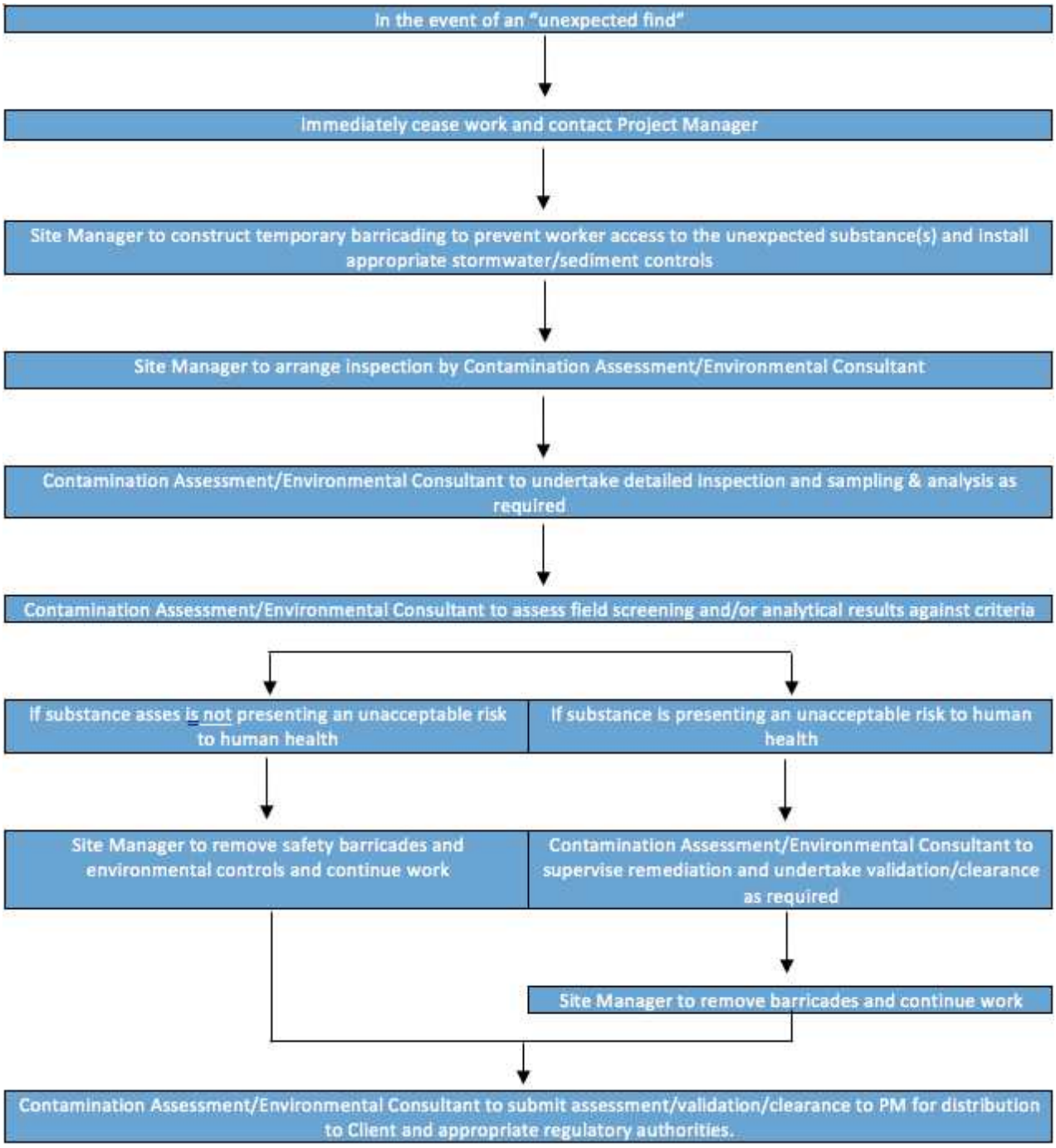
Procedures that shall be used to address these contingencies are provided in the following sections.

14.2 UNKNOWN TYPES OF MATERIALS / UNEXPECTED FINDS

If any unknown materials are encountered during remedial works by the observation of any unusual physical/sensory characteristics of the material (i.e. odours), the procedure detailed in Section 15 of this plan must be followed.

15 UNEXPECTED FINDS

This procedure details the actions to be taken if contamination is in soil or material not detailed in this report is suspected to have been encountered during excavation/remediation activities:



16 WORK HEALTH AND SAFETY

The remediation contractor must prepare a Work Health and Safety Plan to establish standard health and safety procedures for the personnel involved in the remedial works at the site.

Areas to be addressed in the plan include but are not limited to:

- Identification and Management of hazards, including:
  - Exposure and possible absorption through skin of contaminants;
  - Inhalation of volatile contaminant vapours;
  - Slips, trips, bumps, falls, falling objects, crushing injuries typical of every construction related job site;
  - Fire or explosion; and
  - Physical hazards, noise and hot weather.
- General work procedures for personal hygiene;
- Personal Protective Equipment (PPE); and
- Emergency management.

17 CONCLUSION

Based on the contamination identified in the previous site investigation, this RAP has been developed to detail the remediation strategies that will be necessary to render the site suitable for residential land use, following the completion of the proposed development.

The Site Environmental Controls and Contingency Plan outlined in this report must be implemented to ensure good environmental practices are adopted and corrective actions are performed in a timely manner.

SESL concludes that the strategies outlined will achieve the objectives of the RAP and render the site suitable for the ongoing recreational use and proposed development. Documentation of the success of remediation is required in a subsequent Site Remediation and Validation Report (SRVR) at the conclusion of remedial works.

18 REFERENCES

- ANZECC and ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (October 2000);
- ASTM (2000). Standard Practice D2488 90 Description and Identification of Soils (Visual-Manual Procedure). American Society for Testing and Materials;
- Australian Standard AS1726:1994 Geotechnical Site Investigations;
- Australian Standards AS4482.1:2005 Guide to the Sampling and Investigation of Potentially Contaminated Soil (Part 1 & 2);
- enHealth 2012, Australian exposure factor guidance. Environmental Health Subcommittee (enHealth) of the Australian Health Protection Principal Committee, Canberra, Australia;
- Code of Practice for the Safe Removal of Asbestos, 2nd Edition (National Occupational Health and Safety Commission, April 2005);
- EnHealth (2012) Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (2012);
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- National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013) (NEPC 2013, Canberra);
- NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Ed.) (2017);
- NSW EPA (2014) Waste Classification Guidelines Part 1: Classifying Waste;
- NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines ;
- NSW EPA (1999) Contaminated Sites: Guidelines of Significant Risk of Harm from Contaminated Land and the Duty to Report;
- NSW Department of Urban Affairs and Planning (1998) Managing Land Contamination: Planning Guidelines: SEPP 55 Remediation of Land, August (1998);
- NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites;
- Soil Series No. 1, 2nd Edition, 1998 and 3rd Edition, (1999) Health-Based Soil Investigation Levels, National Environmental Health Forum monographs;
- SESL (2019a) Preliminary Site Investigation 28-32 Evan Street, Penrith NSW. August 2019;
- SESL (2019b) Targeted Environmental Site Investigation 28-32 Evan Street, Penrith NSW November 2019;
- Standards Australia (1993) AS1726-1993. Geotechnical Site investigations Australian Standard;
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds AS4482.1 (2005) and Part 2: Volatile substances, AS4482.2 (2005);
- WA DoH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009); and
- Work, Health and Safety Act 2011.

19 LIMITATIONS

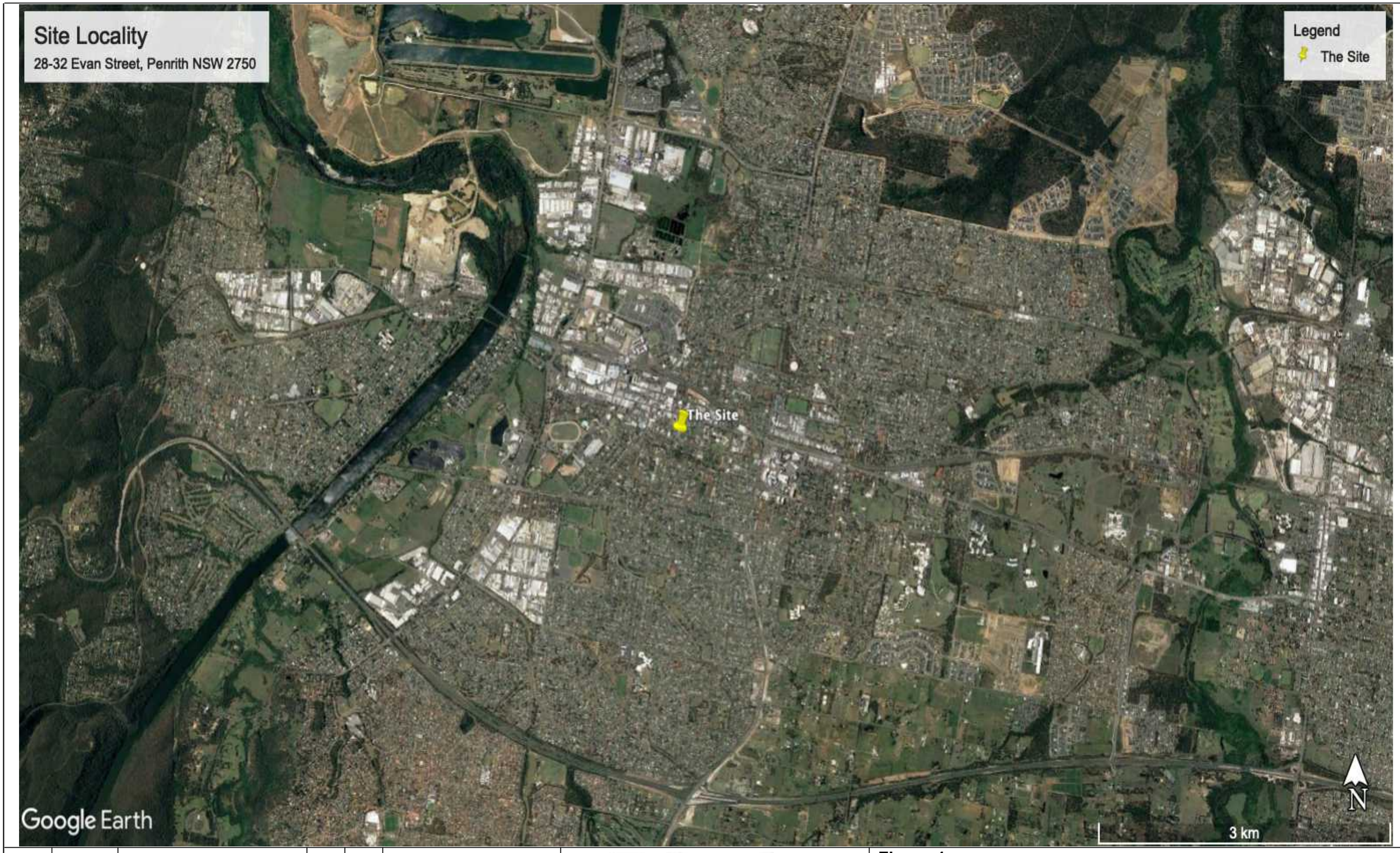
This report only covers the conditions observed at the time of investigation at the locations investigated. Should there be any variation in the conditions beyond this date, further assessment will be required.

This report is for the use of the client and any relevant authorities that rely on the information for development applications and approval processes. Any reliance on this report by third parties shall be at such parties' sole risk. This report shall only be presented in full and may not be used to support any other objective other than those set out in the report.

SESL's assessment is necessarily based on the result of limited site investigations and upon the restricted program of visual assessment of the surface and consultation of available records. Neither SESL, nor any other reputable consultant, can provide unqualified warranties nor does SESL assume any liabilities for site conditions not observed, or accessible during the time of investigations.

No site investigations can be thorough enough to provide absolute confirmation of the presence or absence of substances, which may be considered contaminating, hazardous or polluting. Similarly, the level of testing undertaken cannot be considered to unequivocally characterise the degree or extent of contamination on site. In addition, regulatory or guideline criteria for the evaluation of environmental soil and groundwater quality are frequently being reviewed and concentrations of contaminants which are considered acceptable at present may in the future be considered to exceed acceptance criteria. Similar changes over time may prevail regarding site remediation standards as different regulatory mechanisms are developed and implemented.

Figure 1



01	17/12/2019	First draft	SP	
VER	DATE	AMENDMENTS	DRW	CKD

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Environment & Soil Sciences

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Figure 1

Map 1: Site Locality

Project Ref:	J002300
Project:	Remediation Action Plan
Location:	28-32 Evan Street, Penrith NSW 2750
Client:	Morson Group Pty Ltd
GPS Coordinates:	30˚45'22.99" S 150˚42'08.12" E
PRINT:	A3 (P)

Figure 2

VER	DATE	AMENDMENTS	DRW	CKD
01	17/12/2019	First draft	SP	

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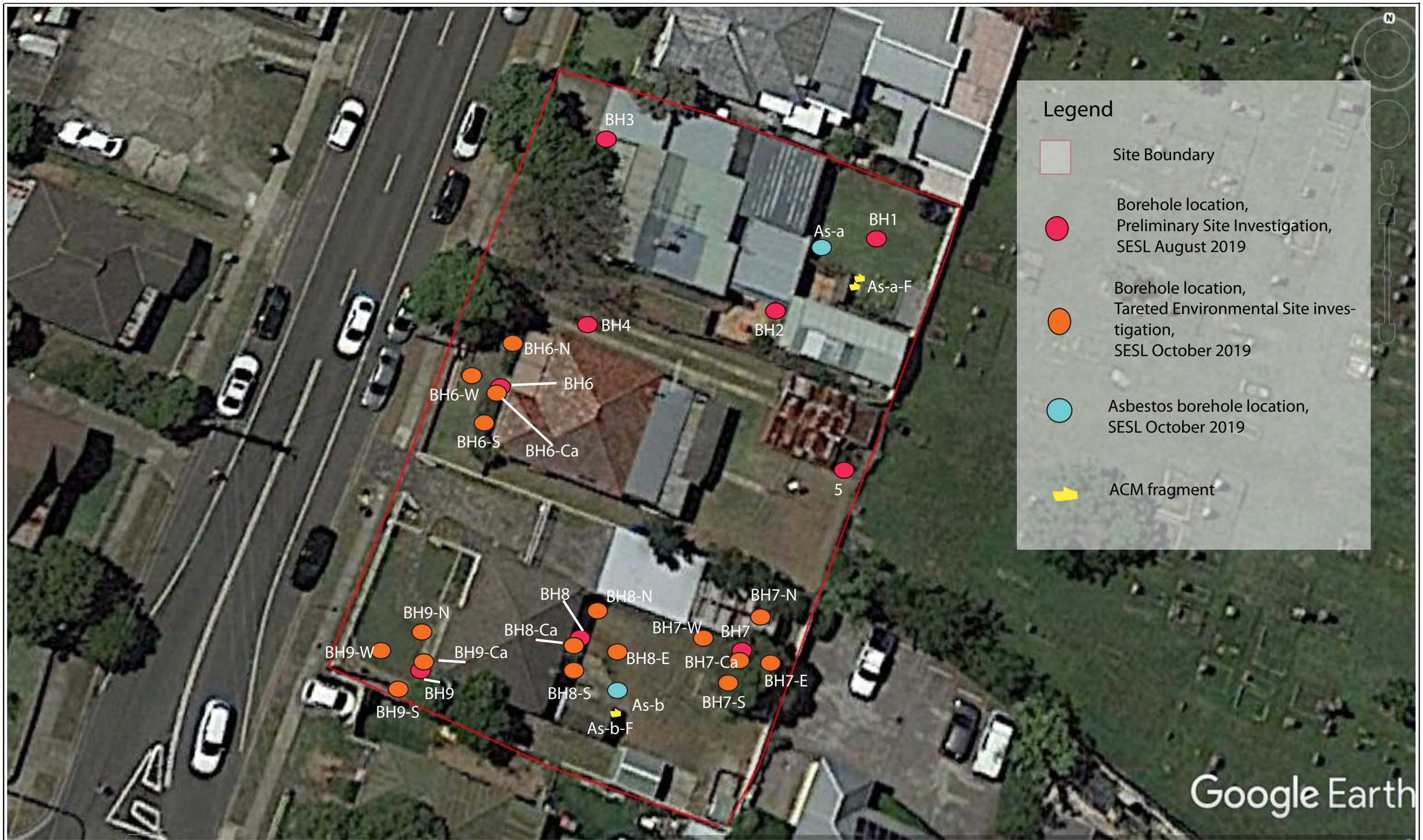
Figure 2

Project Ref:	J002300
Project:	Remediation Action Plan
Location:	28-32 Evan Street, Penrith NSW 2750
Client:	Morson Group Pty Ltd
GPS Coordinates:	30˚45'22.99" S 150˚42'08.12" E

PRINT: A3 (P)

Figure 3



VER	DATE	AMENDMENTS	DRW	CKD
01	17/12/2019	Final	SP	AG

COMMERCIAL IN CONFIDENCE

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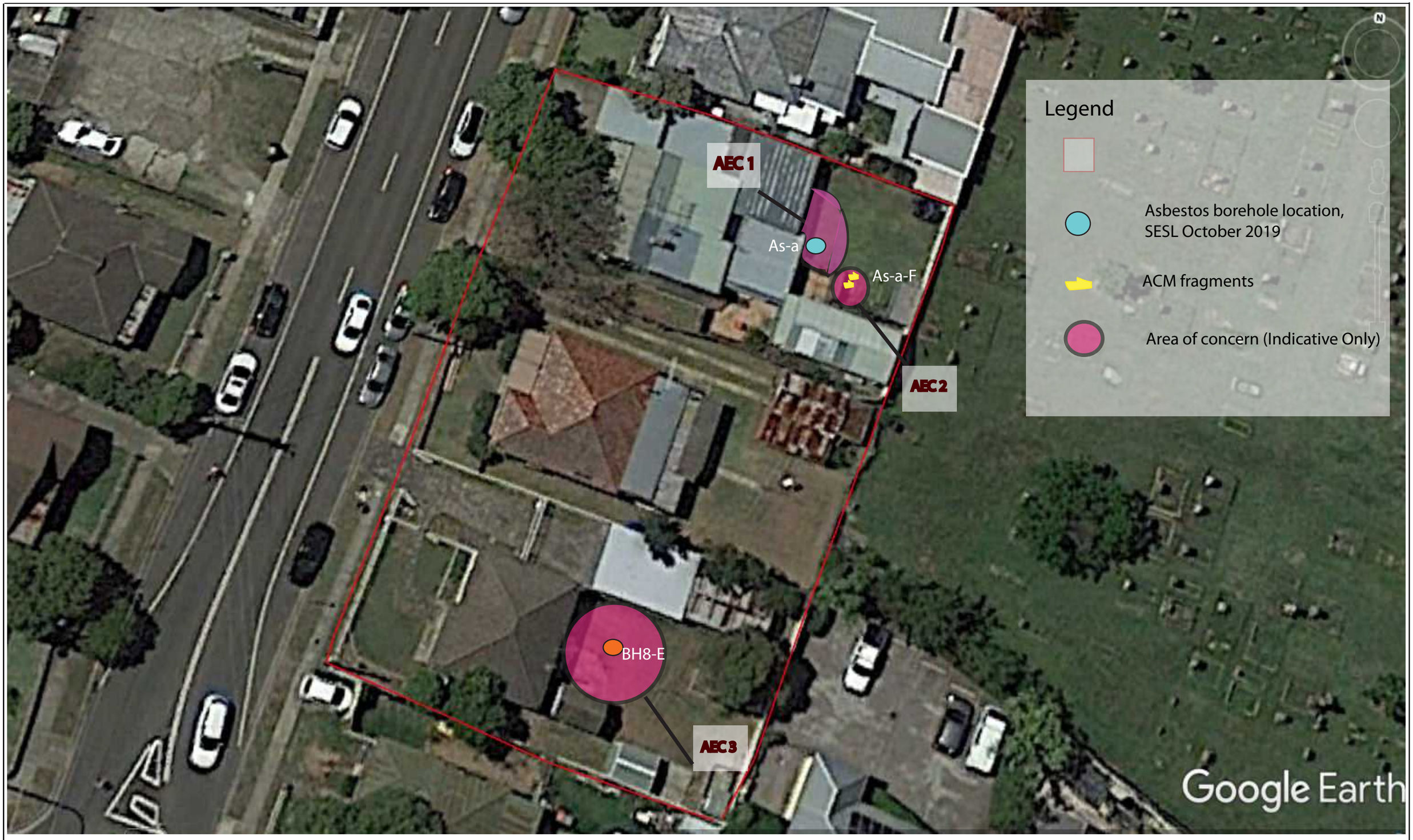
FIGURE 3: Sampling Locations

Project Ref:	J002300
Project:	Remediation Action Plan
Location:	28-32 Evan Street, Penrith NSW 2750
Client:	Morson Group Pty Ltd
GPS Coordinates: 33°52'27"S 151°10'31"E	

Figure 4



					COMMERCIAL IN CONFIDENCE	SESL AUSTRALIA Environment & Soil Sciences	**FIGURE 4: Areas of Concern**
							Project Ref: J002300
							Project: Remediation Action Plan
							Location: 28-32 Evan Street, Penrith NSW 2750
01	17/12/2019	Final	SP	AG		16 Chilvers Road, Thornleigh NSW 2120 www.sesl.com.au	Client: Morson Group Pty Ltd
VER	DATE	AMENDMENTS	DRW	CKD		ABN 70 106 810 708 L 1300 30 40 80 F 1300 64 46 89	GPS Coordinates: 33°52'27"S 151°10'31"E

Appendix A

			Metals	PAH				Asbestos				
			Lead	Total PAHs	Beno(a)Pyrene	PAHs (as BaP TEQ)	Napthalene	Organic fibre	Synthetic mineral Fibre	Asbestos Trace	Asbestos Detected	Asbestos Type
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g/kg	g/kg	Fibres	g/kg	
EQL			5	0.5	0.5	0.5	0.5	0.1	0.1	5	0.1	-
CRC Care HSL - A Public open Space				NL								
NEPM 2013 Table 1B(7) Management Limits Residential, Fine Soil												
NEPM 2013 Table 1B(5) Generic EIL - Residential							170					
NEPM 2013 Table 1B (6) Esls for Residential , Fine soil				NL	0.7							
NEPM 2013 Table 1A(1) HILs Residential			300	300		3						
Field ID	**Sample depth(mm)**	**Date**										
SESL 20/08/2019												
PSI Investigation												
BH6	100-200	20.08.19	-	10.2	**0.9**	1.4	<0.5	-	-	-	-	-
BH7	100-200	20.08.19	**490**	-	-	-	-	-	-	-	-	-
BH8	100-200	20.08.19	-	21.1	**2**	2.8	<0.5	-	-	-	-	-
BH9	100-200	20.08.19	-	10.6	**1.1**	1.6	<0.5	-	-	-	-	-
SESL 14/10/2019												
TESI Investigation												
BH6-Ca	0-100	14/10/19	-	2.8	<0.5	0.6	<0.5	-	-	-	-	-
BH6-N	0-100	14/10/19	-	6.3	0.6	1	<0.5	-	-	-	-	-
BH6-S	0-100	14/10/19	-	7.8	0.7	1.1	<0.5	-	-	-	-	-
BH6-W	0-100	14/10/19	-	3.8	<0.5	0.6	<0.5	-	-	-	-	-
BH7-Ca	0-100	14/10/19	283	-	-	-	-	-	-	-	-	-
BH7-N	0-100	14/10/19	212	-	-	-	-	-	-	-	-	-
BH7-S	0-100	14/10/19	148	-	-	-	-	-	-	-	-	-
D3	-	14/10/19	160	-	-	-	-	-	-	-	-	-
BH7-E	0-100	14/10/19	206	-	-	-	-	-	-	-	-	-
BH7-W	0-100	14/10/19	283	-	-	-	-	-	-	-	-	-
BH8-Ca	0-100	14/10/19	-	42.3	**3.4**	**4.7**	<0.5	-	-	-	-	-
BH8-N	0-100	14/10/19	-	11.2	**1**	1.5	<0.5	-	-	-	-	-
BH8-E	0-100	14/10/19	-	43.8	**3.6**	**5**	<0.5	-	-	-	-	-
BH8-W	0-100	14/10/19	-	15.3	**1.3**	2	<0.5	-	-	-	-	-
BH9-Ca	0-100	14/10/19	-	9.3	**0.8**	1.3	<0.5	-	-	-	-	-
BH9N	0-100	14/10/19	-	5.5	0.6	1	<0.5	-	-	-	-	-
BH9-S	0-100	14/10/19	-	6.1	0.6	1	<0.5	-	-	-	-	-
BH9-W	0-100	14/10/19	-	8	0.7	1.2	<0.5	-	-	-	-	-
AS-a	0-100	14/10/19	-	-	-	-	-	**Yes**	No	Fibres	**Yes**	**Chrysotile Asbestos**
AS-b	0-100	14/10/19	-	-	-	-	-	No	No	N/A	No	-
As-a fragment	-	14/10/19	-	-	-	-	-	**Yes**	No	N/A	Yes	**Chrysotile Asbestos**
As-b fragment	-	14/10/19	-	-	-	-	-	No	No	N/A	No	-
95% UCL Results for Lead & PAH												
Count			**6**			**12**						
Average			**215.33**			**1.75**						
UCL			**257.9**			**2.53**						