Attachment 9 to Item 2.1.1.

Remedial Action Plan

Date of meeting: 21 November 2024
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Time: 10am

Sydney Environmental Group

Remedial Action Plan

457 Bells Line of Road, Kurmond NSW

Attard, Dawson & Ross Family

Report No: 1596-RAP-01-281022.v1f

Report Date: 7 November 2022

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DOCUMENT RECORD

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Document Title:	Remedial Action Plan, 457 Bells Line of Road, Kurmond NSW
Site Address:	457 Bells Line of Road, Kurmond NSW
Client Name:	Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates)
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EXECUTIVE SUMMARY

Sydney Environmental Group (SE) were engaged by Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates) (the client), to prepare a Remedial Action Plan (RAP) for the property located at 457 Bells Line of Road, Kurmond NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

SE has the following project appreciation:

- The entirety of the site covers an area of approximately 2.0 ha;
- The site is proposed for redevelopment, comprising demolition of existing structures, subdivision of the land, and future construction of low-density residential;
- A stage 1 preliminary site investigation was carried out for the site in June 2022 by SE;
- A stage 2 detailed site investigation was carried out for the site in October 2022 by SE, which identified eight (8) Areas of Environmental Concern (AECs); and
- A Remedial Action Plan (RAP) is required to address the identified AECs within the site.

The objectives of this project are to:

- Prepare a Remedial Action Plan (RAP) to address identified AECs within the site and to provide a strategy to mitigate the potential unacceptable human health and environmental risks from residual soil by exploring available remediation options that will effectively and efficiently provide this outcome; and
- Achieve an acceptable outcome that is technically, logistically and financially feasible.

The scope of the RAP has been established on the basis of findings from the previous contamination investigation completed, with the RAP aimed at providing:

- An appropriate remedial strategy and localised remedial actions so as to render the site suitable for the proposed urban residential land-use;
- Appropriate requirements for any further investigation requirements, the validation and verification of the successful implementation of the remediation strategy and the remediation acceptance criteria to be adopted;
- Appropriate environmental safeguards required to conduct the remediation works in an environmentally acceptable manner; and
- OH&S procedures required to conduct the remediation works in a manner that will not pose a threat to the health of site workers or users.

The available site data was assessed within the objectives of this investigation and in the context of the proposed development works. That assessment identified areas of environmental concern (AECs) and contaminants of potential concern (COPC) which have the potential to be present on site. The AECs identified are presented in attached **Figure 2** and associated COPC are presented in **Table 5.1** below.

Table 5.1 AECs and Contaminants of Concern

ID	Area of Environmental Concern	Land Use Activity	Contaminants of Potential Concern
AEC01	Building Structures	Hazardous Building Materials	Asbestos, Lead, PCBs, and SMF
AEC02	Surfical Non-friable Asbestos Fibre Cement Impacts	Uncontrolled filling and Demolition	Asbestos
AEC03	Shallow Fill Impacted by Non-friable Asbestos Fibre Cement Fragments	Uncontrolled filling and Demolition	Asbestos
AEC04	Cadnium Hot Spot Characterised by 'TP21'	Uncontrolled filling and Demolition	Cadmium
AEC05	BaP TEQ Hot Spot Characterised by 'TP11'	Uncontrolled filling and Demolition	BaP TEQ

ID	Area of Environmental Concern	Land Use Activity	Contaminants of Potential Concern
AEC06	SP01 - TRH and non-friable asbestos impacts	Uncontrolled Filling and Demolition	Asbestos and TRHs
AEC07	Septic Tank	Septic System	E.coli, Total Coliforms and Metals
AEC08	Building Materials and Waste Storage	Waste Storage	Aesthetic

The remedial goal for this site is to remediate potential contamination (where identified) to a level that does not present an unacceptable human health exposure and environmental risks, based on the proposed land use setting. SE notes that the client, would prefer that the remedial works be undertaken in a manner that does not result in the need for:

- Notation on a planning certificate for the site;
- A covenant registered on the title to the land; or
- A long-term environmental management plan (EMP).

The extent of contamination within the site is presented within **Table 7.1** below.

Table 7.1 Approximate Remedial Extents

ID	Area of Environmental Concern	Dimensions / Area	Depth / Height	Volume / Mass
AEC01	Building Structures	10 X 10 m / 100 m^2	NA	NA
AEC02	Surfical Non-friable Asbestos Fibre Cement Impacts	15 x 15 m / 225 m^2	NA	NA
AEC03	Shallow Fill Impacted by Non-friable Asbestos Fibre Cement Fragments	10 x 10 m / 100 m^2	1.0 m	100 m^3 / 200 tonnes
AEC04	Cadnium Hot Spot Characterised by 'TP21'	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC05	BaP TEQ Hot Spot Characterised by 'TP11'	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC06	SP01 - TRH and non-friable asbestos impacts	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC07	Septic Tank	5 x 5 m / 25 m^2	1.5 m	40 m^3 / 75 tonnes
AEC08	Building Materials and Waste Storage	15 x 5 m / 75 m^2	NA	NA

Refer to **Figure 2**, for an indication of the areas and lateral extents that will be subject to remediation.

It is noted that the lateral extent of remediation may be altered during remedial works based on site observations and validation soil sample analytical laboratory results.

Taking into consideration the client's objectives for the site, and the nature and extent of the proposed site redevelopment works, the preferred remedial options are outlined in **Table 6.1** below.

Table 6.1 Selected Remediation Strategies

Contamination Type	Preferred Remediation Strategy
Soil materials impacted with foreign materials and non-friable (bonded) asbestos	In-situ / ex-situ raking / picking or Excavation and disposal off-site
Soil materials impacted by friable asbestos. (*If identified during remedial works)*	Removal and disposal off-site
Direct contact risks (BTEX, Heavy Metals, PAH, PCBs, & TRH)	Removal and disposal off-site
Hazardous building materials (*if identified)*	Removal and disposal off-site
Septic system	Removal and Disposal Off-site

Based on the information presented in the historical contamination assessment reports, SE concludes that the remedial goal can be achieved, and the site made suitable for the proposed land use setting, subject to:

- Implementation of the strategies, methodologies and measures set out in this remedial action plan; and
- Should newly identified unacceptable land contamination risks be identified during supplementary assessment works, an addendum to this RAP may be required. The addendum should be prepared by a suitably experienced environmental consultant;
- Prior to any removal of soils from site for offsite disposal during remedial works, a waste classification for those soils should be prepared by a suitably experienced environmental consultant; and
- Future remedial works should be monitored and validated by a suitably experienced environmental consultant.

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LIST OF ABBREVIATIONS

A list of the common abbreviations used throughout this report is provided below:

AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Aboveground storage tank
Bgs	Below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CoC	Chain of Custody
CSM	Conceptual Site Model
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
GS	Geological Survey of NSW
HIL	Health Investigation Levels
HSL	Health Screening Levels
IL	Investigation Levels
LOR	[Laboratory] Limit of reporting
NATA	National Association of Testing Laboratories
N/A	Not applicable
ND	Not detected
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	NSW Environment Protection Authority
OCP	Organochlorine Pesticide
OPP	Organophosphorus Pesticide
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photo-ionisation detector
PSI	Preliminary Site Investigation
QA/QC	Quality assurance/Quality control
RPD	Relative percentage difference
SAQP	Sampling Analysis and Quality Plan
SE	Sydney Environmental Group Pty Ltd
SVOC	Semi-volatile organic compound
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
UST	Underground storage tank
VOC	Volatile organic compound

1 INTRODUCTION

1.1 Background

Sydney Environmental Group (SE) were engaged by Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates) (the client), to prepare a Remedial Action Plan (RAP) for the property located at 457 Bells Line of Road, Kurmond NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

SE has the following project appreciation:

- The entirety of the site covers an area of approximately 2.0 ha;
- The site is proposed for redevelopment, comprising demolition of existing structures, subdivision of the land, and future construction of low-density residential dwellings;
- A stage 1 preliminary site investigation was carried out for the site in June 2022 by SE;
- A stage 2 detailed site investigation was carried out for the site in October 2022 by SE, which identified eight (8) Areas of Environmental Concern (AECs); and
- A Remedial Action Plan (RAP) is required to address the identified AECs within the site.

1.2 Proposed Development

SE were not provided with detailed plans for the future development of the site and have made the conservative assumption that the development will be low-density residential with accessible soils.

The redevelopment scenario is consistent with the definition of 'HIL A – Low-density residential with garden/accessible soil' per ASC NEPM 2013.

Currently under the *State Environmental Planning Policy (SEPP) No. 55 – Remediation of Land*, a consent authority must not consent to the carrying out of any redevelopment unless it has considered whether the land is contaminated. This report has been prepared to satisfy Clause 7 (2) and (3) of SEPP No. 55 and local council planning policies.

1.3 Objectives

The objectives of this project are to:

- Prepare a Remedial Action Plan (RAP) to address the issues that have been identified on the site and to provide a strategy to mitigate the potential unacceptable human health and environmental risks from residual soil by exploring available remediation options that will effectively and efficiently provide this outcome; and
- Achieve an acceptable outcome that is technically, logistically and financially feasible.

1.4 Scope of Remedial Action Plan

The scope of the RAP has been established on the basis of findings from the previous contamination investigation, with the RAP aimed at providing:

- An appropriate draft remedial strategy (to be informed by the yet to be completed supplementary detailed site investigation) to render the site suitable for the proposed urban residential land-use;
- Appropriate requirements for the validation and verification of the successful implementation of the remediation strategy and the remediation acceptance criteria to be adopted;
- Appropriate environmental safeguards required to conduct the remediation works in an environmentally acceptable manner; and
- OH&S procedures required to conduct the remediation works in a manner that will not pose a threat to the health of site workers or users.

2 SITE IDENTIFICATION

The site identification details and associated information are presented in **Table 2.1**.

Table 2.1 Site Identification Information

Attribute	Description
Street Address	457 Bells Line of Road, Kurmond NSW
Lot and Deposited Plan (DP)	Lot 31 in DP7565
Geographical Coordinates	33°33'12.7"S 150°41'40.62"E (Centre of site)
Site Area	2.0 ha
Local Government Area (LGA)	Hawkesbury City Council
Parish	Kurrajong
County	Cook
Zoning	RU1 Primary Production *(Hawkesbury Local Environmental Plan 2012)*

The locality of the site is set out in **Figure 1**.

The general layout and boundary of the site is set out in **Figure 2**.

3 GEOLOGY, ACID SULPHATE SOILS, TOPOGRAPHY AND HYDROGEOLOGY

Regional geology, topography, soil landscape and hydrogeological information are presented in **Table 3.1.**

Table 3.1 Regional Setting Information

Attribute	Description
Meteorology	The following data was collected from the Bureau of Meteorology website (www.bom.gov.au) for the Richmond – UWS Hawkesbury weather station (station number 067021) located approximately 9 kilometres south-east of the site. The climate was found to be relatively mild with mean maximum temperatures between 29.4 and 17.3 degrees Celsius and mean minimum temperatures ranging between 16.8 and 3.2 degrees Celsius. The highest mean rainfall was observed to be in January 96.3 mm, and the lowest mean rain fall in August 18.9 mm.
Geology	A review of the Environment NSW 'eSpade V2.1' web application (environment.nsw.gov.au/eSpade2WebApp, accessed 25 October 2022), indicated that the site is likely to be underlain by Middle Triassic aged Wiannamatta Group Ashfield Shale and Bringelly Shale formations. The Ashfield Shale consists of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, and laminite. Between these two shale members is the Minchinbury Sandstone consisting of fine to medium-grained lithic quartz sandstone.
Acid Sulfate Soils (ASS)	A review of the Environment NSW 'eSpade V2.1' web application (environment.nsw.gov.au/eSpade2WebApp, accessed 25 October 2022), indicates that the site lies in an area mapped as ***'No Known Occurrence'*** with respect to acid sulfate soils. This infers that land management activities are not likely to be affected by acid sulfate soil materials. Further assessment of acid sulfate soils in the context of this investigation is considered by SE as not warranted.
Topography	Generally, the local landscape consists of low rolling to steep low hills. Local relief 50–120 m, slopes 5–20%. Convex narrow (20–300 m) ridges and hillcrests grade into moderately inclined side slopes with narrow concave drainage lines. The site topography slopes towards the southwestern corner of site. SE understands that the site is located at an elevation approximately 80 m to 116 m Australian Height Datum (AHD).
Hydrogeology	Surface water courses proximal to the site included an unnamed tributary to Red Bank Creek which runs 50 m south of the site's boundary, and dams on neighbouring properties. Based on distances to the nearest surface water course and the site topography, groundwater flow in the vicinity of the site is considered likely to be towards the south-east. A review of the NSW Office of Water groundwater database undertaken on 25 October 2022 indicated there weas one (1) registered groundwater features located within a 500m radius of the site: • GW034552 – Domestic water bore located 350 m north of site. This bore is located upgradient from site and functioning as a domestic water bore with a standing water level of 15.8 m, as such further consideration is not deemed warranted.
Adjacent Sensitive Receptors	A review of the Bureau of Meteorology Groundwater Dependent Ecosystem Map was undertaken to determine the closest sensitive ecological receptors. The closest ecological receptor is an unnamed tributary to Red Bank Creek which is located 50 m south of the site's boundary, as well as dams on neighbouring properties. The closest sensitive human receptors are the residential properties surrounding the site's boundary and any future onsite construction workers/ builders.

4 PREVIOUS CONTAMINATION ASSESSMENTS

The following reports were reviewed during the project:

- Sydney Environmental Group Pty Ltd (SE 2022a), 'Stage 1 Preliminary Site Investigation, 457 Bells Line of Road, Kurmond NSW, dated 30 June 2022, Ref No: 1596-PSI-01-300622.v1f; and

- Sydney Environmental Group Pty Ltd (SE 2022b), 'Stage 2 Detailed Site Investigation, 457 Bells Line of Road, Kurmond NSW, dated 28 October 2022, Ref No: 1596-DSI-01-281022.v1f.

4.1 SE 2022a

Sydney Environmental Group Pty Ltd (SE) was engaged by Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates) to undertake a Stage 1 Preliminary Site Investigation for the subject site located at 457 Bells Line of Road, Kurmond NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**)**.**

SE had the following project appreciation:

- The site covers an area of approximately 2.0 ha;
- The site is understood to be proposed for residential subdivision; and
- A contamination assessment of the site is required by the client as part of a development application for submission to council.

The objectives of the project were to:

- Assess the potential for contamination to be present on the site as a result of past and current land use activities;
- Provide advice on whether the site would be suitable (in the context of land contamination) for any proposed future land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

The scope of works undertaken to address the investigation objectives, included:

- A desktop review of relevant information pertaining to the site;
- A site walkover to understand current site conditions; and
- Data assessment and reporting.

Based on SE's assessment of the desktop review information and fieldwork data, in the context of the proposed redevelopment, SE made the following conclusions:

- Five (5) areas of environmental concern (AECs) have been identified for the site, albeit two (2) are considered to be areas with a very low potential for contamination to be present;
- The aesthetic risk associated with minor waste storage observed across the site will presumably be removed during redevelopment works; and
- Based on the assessment undertaken as part of the investigation, SE concluded that the site can be made suitable for the proposed land use setting, subject to a targeted detailed site investigation consisting of intrusive sampling across fill materials within the site (AEC01) and within the former locations of the southern and north-eastern dam (AEC03).

Based on these conclusions, SE made the following recommendations:

- The targeted Detailed Site Investigation (DSI) of the potential fill is warranted to characterise potential soil contamination;
- A Pre-Demolition Hazardous Building Materials Survey should be carried out prior to proposed demolition works;
- Any soils proposed for excavation and disposal off-site should be done so with the appropriate waste classification, and in accordance with relevant NSW EPA Waste Classification Guidelines (2014); and
- Records of the transport and disposal of any materials off-site should be maintained.

The report, including its conclusions and recommendations, must be read in conjunction with the limitations presented in **Section** Error! Reference source not found..

4.2 SE 2022b

Sydney Environmental Group (SE) was engaged by Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates) (the client), to undertake a Stage 2 Detailed Site Investigation for the site located at 457 Bells Line of Road, Kurmond NSW (refer **Figure 1** with the 'site' boundaries outlined in **Figure 2**).

SE had the following project appreciation:

- The entirety of the site covers an area of approximately 2.0 ha;
- The site is understood to be proposed for residential subdivision; and
- A Stage 1 Preliminary Site Investigation was carried out for the site in June 2022 by Sydney Environmental Group (SE); and
- A Stage 2 Detailed Site Investigation is required to investigate potential contamination across the site and within the identified area of environmental concern (AEC).

The objectives of the project were to:

- Assess the potential for contamination as a result of past and current land use activities to be present within areas of the site previously identified as areas of environmental concern (AECs);
- Provide advice on whether the site would be suitable (in the context of land contamination) for the proposed land use setting; and
- Provide recommendations for further investigation, management and/or remediation (if warranted).

SE undertook the following scope of works to achieve the project objective:

- Review of the previous contamination assessment report prepared by Sydney Environmental Group (SE) dated 30 June 2022, Ref: 1596-PSI-01-300622.v1f;
- The preparation of a Sampling and Analysis Quality Plan (SAQP);
- Undertake an intrusive site investigation, to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigation; and
- An assessment of the contamination status of the fill materials within the site and the recommendation of any further remedial requirements associated with the redevelopment of the site (if necessary).

Based on SE's assessment of the desktop review information, fieldwork data and laboratory analytical data, in the context of the proposed redevelopment scenario, SE made the following conclusions:

- Asbestos Containing Materials (ACM) in the form of fibre cement fragments identified within both surficial (AEC02) and shallow fill soils (AEC03) and are considered likely to pose an unacceptable human health exposure risk;
- The detected concentrations of cadmium identified in soils surrounding 'TP21' and identified as AEC04 are considered to present an unacceptable direct contact human health exposure risk;
- The detected concentrations of Benzo(a)pyrene identified in soils surrounding 'TP11' and identified as AEC05 are considered to present an unacceptable direct contact human health exposure risk;
- The detected concentrations of identified contaminants of potential concern in all other soils assessed are considered unlikely to present
    - An unacceptable direct contact human health exposure risk; or
    - An unacceptable inhalation / vapour intrusion human health exposure risk.
- The detected concentrations of identified contaminants of potential concern in the soils assessed are considered unlikely to present a petroleum hydrocarbon management limit risk with exception to soils surrounding 'SP01' characterised as AEC06 where TRH identified in the soils assessed was considered to present an unacceptable petroleum hydrocarbon management limit risk;
- The detected concentrations of identified contaminants of potential concern in the soils characterised by samples assessed are considered unlikely to present an unacceptable ecological contamination risk with the exception of soils in the vicinity of 'TP11-0.1-0.2' which had elevated levels of benzo(a)pyrene.
- No significant surface water / groundwater receptor risk was identified within the site;
- Residual building / demolition waste is unlikely to present an unacceptable aesthetics risk once redevelopment works have finished; and
- Based on the assessments undertaken as part of the investigation, SE concluded that the site can be made suitable for the proposed land use setting pending further characterisation and remediation of the identified contamination within the site.

Based on the conclusions stated above and the background data gathered during the course of the investigation, SE recommended:

- A Remedial Action Plan (RAP) is to be prepared by a suitably qualified environmental consultant detailing the steps required to further characterise and remediate the site to a level suitable for the proposed land use scenario;
- Undertake a hazardous building materials survey of the structures present on-site prior to demolition;
- Following removal of hazardous building materials (if identified) and subsequent demolition of the onsite structures, a clearance inspection should be carried out by an appropriately qualified occupational hygienist / NSW LAA; and
- A waste classification assessment should be carried out on any soil materials proposed for disposal off-site as per the NSW EPA Waste Classification Guidelines (2014).

5 PRELIMINARY CONCEPTUAL SITE MODEL

5.1 Areas of Environmental Concern and Contaminants of Concern

The available site data was assessed within the objectives of this investigation and in the context of the proposed development works. That assessment identified areas of environmental concern (AECs) and contaminants of concern which have the potential to be present on site. The AECs identified are presented in attached **Figure 2** and associated contaminants of concern are presented in **Table 5.1** below.

Table 5.1 AECs and Contaminants of Concern

ID	Area of Environmental Concern	Land Use Activity	Contaminants of Concern
AEC01	Building Structures	Hazardous Building Materials	Asbestos, Lead, PCBs, and SMF
AEC02	Surfical Non-friable Asbestos Fibre Cement Impacts	Uncontrolled filling and Demolition	Asbestos
AEC03	Shallow Fill Impacted by Non-friable Asbestos Fibre Cement Fragments	Uncontrolled filling and Demolition	Asbestos
AEC04	Cadmium Hot Spot Characterised by 'TP21'	Uncontrolled filling and Demolition	Cadmium
AEC05	BaP TEQ Hot Spot Characterised by 'TP11'	Uncontrolled filling and Demolition	BaP TEQ
AEC06	SP01 - TRH and non-friable asbestos impacts	Uncontrolled Filling and Demolition	Asbestos and TRHs
AEC07	Septic Tank	Septic System	E.coli, Total Coliforms and Metals
AEC08	Building Materials and Waste Storage	Waste Storage	Aesthetic

The potential contamination pathways are considered to be as follows:

- Inhalation/ingestion of contaminants released in dust during future development by site workers; and
- Inhalation of contaminants during future use by site occupiers.

Relevant potential receptors are considered to include:

- Onsite construction and maintenance workers;
- Third parties during construction (adjacent site users and adjacent residents);
- Future residents/end users; and
- Neighbouring residential land users.

5.2 Land Use Setting

SE were not provided with detailed plans for the future development of the site and have made the conservative assumption that the development will be low-density residential with accessible soils.

Based of assumptions around the proposed development works and guidance provided in NEPM ASC 2013, SE considers it reasonable to adopt the *'HIL A – urban residential'* land use setting for the purpose of assessing land contamination exposure risks. Urban residential land use includes residential premises with garden/accessible soil as well as children's day care centres, preschools and primary schools.

SE notes that the proposed development will likely includes a mix of hardstand, open space turfed areas and landscaped areas across the site.

5.3 Direct Contact – Human Health

SE notes that the proposed development likely includes building footprints and hardstand pavement areas across a portion of the site, which would act as a direct contact barrier between potential land contamination and onsite receptors during operation of the site. However, it is assumed that a large portion of the site will remain as open space / landscaping areas.

The open space turfed / landscaping areas would act as a direct contact barrier assuming intrusive disturbance of the physical barrier was not undertaken following installation. During construction, the public and construction employees, may complete the direct contact exposure pathway between potential contamination and receptors.

SE recommends a pragmatic approach during the course of any required intrusive / excavation works. If contamination is suspected, works should stop, an unexpected finds protocol should be followed, and further investigation of the fill materials should be carried out by a suitably qualified environmental consultant.

5.4 Inhalation / Vapour Intrusion – Human Health

In order for a potentially unacceptable inhalation / vapour intrusion human health exposure risk to exist, a primary vapour source (e.g. underground storage tank) or secondary vapour source (e.g. significantly contaminated soil or groundwater) must be present onsite. The historical evidence reviewed indicated a very low likelihood for a potential primary source to be present on the site.

Potential sources of groundwater contamination in the immediate vicinity of the site (e.g. service stations) were not observed. A groundwater source of vapours was considered not possible at the site.

Historical demolition of structures on site as well as significant importation and partial spreading of uncontrolled demolition waste presents a likely asbestos contamination source on the site. Based on SE 2022b site walkover, asbestos containing material fibre cement fragments are present on the site surface and within shallow fill soils in a number of locations across the site. Further consideration of this value is necessary.

5.5 Management Limits for Petroleum Hydrocarbon Compounds

NEPM ASC 2013 notes that there are a number of policy considerations which reflect the nature and properties of petroleum hydrocarbons:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosive hazards; and
- Effects on buried infrastructure (e.g. penetration of or damage to, in-ground services by hydrocarbons).

Schedule B1 of NEPM ASC 2013 includes ‘management limits’ to avoid or minimise these potential effects. Application of the management limits requires consideration of site-specific factors such as the depth of building basements and services and depth to groundwater, to determine the maximum depth to which the limits should apply. NEPM ASC 2013 also notes that management limits may have less relevance at operating industrial sites which have no or limited sensitive receptors in the area of potential impact, and when management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed.

5.6 Aesthetics

Section 3.6.3 of NEPM ASC 2013 advises that there are no specific numeric aesthetic guidelines, however site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

SE notes that the proposed development likely includes building footprints and hardstand pavement areas across some of the site, which would act as a direct contact barrier. The open space turfed areas would act as a direct contact barrier assuming intrusive disturbance of the physical barrier was not undertaken following installation.

During construction, the public and construction employees, may complete an aesthetics exposure pathway between potential contamination and receptors. Further consideration of this value is considered necessary.

5.7 Terrestrial Ecosystems – Ecological Health

Section 3.4.2 of Schedule B1 NEPM ASC 2013, advises a pragmatic risk-based approach should be taken when assessing ecological risks in residential and commercial / industrial land use settings.

SE notes that the proposed development would likely include landscaped areas on site as it is assumed the majority of the site will remain undeveloped.

Due to the presence of these areas further ecological assessment is considered warranted.

5.8 Aquatic Ecosystems (Ground and Surface Water)

Surface water courses proximal to the site included an unnamed tributary to Red Bank Creek which runs 50 m south of the site's boundary, and dams on neighbouring properties.

Expected poor regional water quality as a result of historical regional agricultural land use activities and disturbance, is considered likely to prevent groundwater from being a drinking water resource of value.

One (1) groundwater bore is located within a 500 m radius of the site registered for domestic water use. It is noted that a reticulated mains potable water supply is available in the area, however, SE cannot assume this bore is not used for drinking water.

There is potential, albeit low, that the usage of these surface water courses within proximity to the site would include swimming, fishing for consumption and/or water sports. As a precautionary measure, this pathway should be considered.

6 REMEDIATION STRATEGY OPTIONS DISCUSSION

A range of soil remediation options have been considered for the site. The options considered based solely on SE 2022a and SE 2022b site walkovers and include only those which are proven to be effective on past remediation or related projects. The following section comprises a review of each of the soil remediation options considered and outlines the selection process used.

6.1 Remediation Strategy Development Rationale

Given the distribution of contamination is within defined areas and thus visually identifying and delineating the areas of contamination can be considered possible, it is recommended that various remediation options should be considered.

Due to the nature and distribution of the contaminants in the underlying soil matrix and building materials, an effective remediation approach for the site must be tailored towards the key impacted sources, which is the impacted / reworked / imported fill material and identified hazardous building materials within the site. A discussion of remediation options for these areas is provided in the below sections.

6.2 Remediation Options for Impacted Soil

The potential list of remediation options associated with impacted soil is extensive. Consequently, only relevant remediation strategies that have been considered which include the following:

- On-site treatment and beneficial reuse; and
- Off-site landfill disposal – excavation / removal and disposal.

A summary of the advantages and disadvantages to these remediation options is provided overleaf in **Table 6.2**.

6.3 Preferred Remediation Option

Based on SE's assessment detailed above, the most suitable remedial strategy will comprise of a combination of 'on-site treatment (in-situ / ex-situ raking / picking)' and 'off-site removal / disposal' as it will be consistent the ultimate end land use of the site. **Table 6.1** below summarises the preferred remediation strategies with regards to the identified contamination within the site.

Table 6.1 Selected Remediation Strategies

Contamination Type	Preferred Remediation Strategy
Soil materials impacted with foreign materials and non-friable (bonded) asbestos	In-situ / ex-situ raking / picking or Excavation and disposal off-site
Soil materials impacted by friable asbestos. (*If identified*)	Removal and disposal off-site
Direct contact risks (BTEX, Heavy Metals, PAH, PCBs, & TRH)	Removal and disposal off-site
Hazardous building materials (*if identified)*	Removal and disposal off-site
Septic system	Removal and Disposal Off-site

Areas subject to remediation are provided in **Figure 2**.

Table 6.2 Remedial Options Summary

Treatment Option	Description	Advantages			Disadvantages		
		Technical	Financial	Logistical	Technical	Financial	Logistical
On-site Treatment	Soil raked and picked of physical contaminants. Treated and validated materials beneficially reused within the site.	Direct access to soil will be restricted by local roadways, foot paths and park areas with the appropriate mitigation measures	Potentially lower costs through with efficient / strategical methodology	Moderate excavation is required to remove all the AECs across the entire site Limited environmental management required during the works (e.g. dust, noise)	Treated and validated materials would remain on-site. Materials to be beneficially re-used within limited access areas (beneath roadways, parks, and footpaths)	Moderate to high labour costs during raking / picking of soils	Treated and validated material would remain on-site indefinitely.
Excavation and Offsite Disposal	Removal of contaminated soil to an EPA licensed facility. Validation sampling to demonstrate the conditions of the residual soil impact. Reinstatement of excavated areas with material validated as suitable for the intended land use.	Protective of human health including future tenants and construction workers. Facilitate future development of the entire site. No long-term EMP will be required.	No onsite operation and maintenance required.	No ongoing management required as the impacted soil will have been removed offsite.	Based on the soil investigation results, for off-site disposal purposes, the impacted soil to be excavated and removed offsite would require waste classification in accordance with the NSW EPA *Waste Classification Guidelines 2014.*	High remedial cost incurred to remediate the entire site.	Major excavation is potentially required. Odour, vapour and dust management required during the excavation works. May increase truck traffic in area to transport contaminated soil for a short period of time.

7 REMEDIAL ACTION PLAN

7.1 Remedial Goal

The remedial goal for this site is to remediate potential soil contamination (where identified) to a level that does not present an unacceptable human health exposure and environmental risks, based on the proposed land use setting. SE notes that the client would prefer that the remedial works be undertaken in a manner that does not result in the need for:

- Notation on a planning certificate for the site;
- A covenant registered on the title to the land; or
- A long-term environmental management plan (EMP).

7.2 Remediation Extent

The extent of contamination within the site is considered to is outlined within **Table 7.1** below.

Table 7.1 Approximate Remedial Extents

ID	Area of Environmental Concern	Dimensions / Area	Depth / Height	Volume / Mass
AEC01	Building Structures	10 X 10 m / 100 m^2	NA	NA
AEC02	Surfical Non-friable Asbestos Fibre Cement Impacts	15 x 15 m / 225 m^2	NA	NA
AEC03	Shallow Fill Impacted by Non-friable Asbestos Fibre Cement Fragments	10 x 10 m / 100 m^2	1.0 m	100 m^3 / 200 tonnes
AEC04	Cadnium Hot Spot Characterised by 'TP21'	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC05	BaP TEQ Hot Spot Characterised by 'TP11'	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC06	SP01 - TRH and non-friable asbestos impacts	5 x 5 m / 25 m^2	0.5 m	15 m^3 / 30 tonnes
AEC07	Septic Tank	5 x 5 m / 25 m^2	1.5 m	40 m^3 / 75 tonnes
AEC08	Building Materials and Waste Storage	15 x 5 m / 75 m^2	NA	NA

Refer to **Figure 2**, which indicate the areas which will be subject to remediation.

It is noted that the lateral extent of remediation may be altered, during remedial works based on site observations and validation soil sample analytical laboratory results.

7.3 Sequence of Works for Remediation

7.3.1 Remediation Schedule

Based on the extent and complexity of soil materials treatment, an estimated time-frame for remedial works is considered to be 3 – 6 months following the commencement of works. Referral to a remediation contractor should be made to better estimate remediation timeframes. It is expected that remediation timeframes will be further refined following appointment of the remediation contractor, and the staging of the remediation tasks in the contractor's works program.

7.3.2 Notifications and Approvals

Notification of an intention to undertake remediation works on the site, will be submitted to the relevant planning consent authority, 30 days prior to remediation works commencing. The proposed remediation works would likely be classed as Category 2 under State Environmental Planning Policy (SEPP) 55, which do not require consent from the planning authority.

The following information will also be provided to the planning consent authority, 14 days prior to the commencement of remediation works:

- Copies of the contamination assessment report and this RAP; and
- Contact details of the contractor appointed to undertake the remediation works; and
- Contact details of the parties responsible (if not the remediation contractor) for ensuring remediation works comply with relevant regulatory requirements.

A notification will be submitted to SafeWork NSW prior to undertaking asbestos removal works (where applicable). The removal works will be undertaken by a suitably licensed contractor.

It should be noted that:

- Removal of friable asbestos will require the contractor to hold a Class A licence; and
- Removal of non-friable asbestos will require the contractor to hold a Class B licence.

Within one month of completion of remediation and validation works, a notification will be submitted to the planning consent authority.

7.3.3 Demolition

A pre-demolition hazardous building materials survey is to be undertaken prior to any demolition of on-site structures. Above ground structures and hardstand pavements will be demolished by a suitably licensed contractor, and associated wastes removed from site for recycling and/or disposal. The remediation contractor will retain transport and disposal records for all demolition wastes removed off site.

7.3.4 Remedial Works

Remedial works will be guided and monitored by the environmental consultant. The environmental consultant will assist the remediation contractor in setting out the inferred lateral extent of the identified AEC. The environmental consultant will monitor remedial works and provide guidance to the remedial contractor on:

- When to pause remedial works in an AEC, to allow validation works to be undertaken; and
- Where to extend remedial works in an AEC beyond the inferred extent (if observations or analytical results indicate a need for ‘chasing out’ additional contamination).

The following remediation works outlined in **Table 7.2**, is based on data available at the time of preparing this RAP.

The validation strategy for each identified AEC is outlined in **Section 8**.

Table 7.2 Proposed Remedial Works

Contamination Risk	Proposed Remedial Strategy
Non-friable (Bonded) ACM in fill or stockpiles	Fill soils will be excavated, spread out to a maximum thickness of 100mm on a suitably prepared pad (e.g. concrete slab, or a cleared area onsite with a suitable barrier layer between underlying soils and the spread soils) and subjected to raking (where practical) to a depth of 100mm below the surface, using a rake with teeth spaced ≤7mm apart and >100mm long, and fragments of bonded ACM handpicked. At least two passes of raking and picking shall be undertaken, with a 90° direction change between each pass, and using a grid pattern. Non-friable ACM fragments will be removed from site, for offsite disposal to a licensed receiving facility, in accordance with the relevant waste classification. SE notes that remediation of non-friable asbestos contaminated soils for re-use may not be suitable due to the high clay content observed within the fill materials. All reasonable attempts will be made to remediate the soils; however, if deemed unfeasible by the supervising environmental consultant with consideration to adequacy of remediation methodology and timing, consultation with the client will be made to discuss the requirement for off-site disposal. OR Excavation vertically to base of fill and laterally to the edge of fill or to the site boundary (whichever occurs first). Disposal off-site to a licensed waste receiving facility as per NSW EPA Waste Classification Guidelines. The remediation contractor will retain transport and disposal records for all wastes removed off site.
Direct Contact (Metals, PAHs, TRH, BTEX, PCBs, Pathogens)	Excavation vertically to base of fill (0.1 into natural) and laterally to edge of fill (or site boundary) and offsite disposal. The remediation contractor will retain transport and disposal records for all wastes removed off site to a licensed waste receiving facility as per NSW EPA Waste Classification Guidelines (2014).
Hazardous Building Materials	Removal of identified hazardous building materials and separately prior to main demolition works. Subsequent off-site disposal of identified hazardous building materials (if identified) to a licensed waste receiving facility. The remediation contractor will retain transport and disposal records for all wastes removed off site to a licensed waste receiving facility as per NSW EPA Waste Classification Guidelines (2014).
Aesthetic Impacts	Offsite disposal of rubbishes and wastes. The remediation contractor will retain transport and disposal records for all wastes removed off site to a licensed waste receiving facility as per NSW EPA Waste Classification Guidelines (2014).

7.3.5 Backfilling

Should remedial excavations require backfilling, then backfill soils will be limited to:

- Virgin excavated natural material (VENM);
- Excavated natural material (ENM);
- Other material that is the subject of a resource recovery exemption and the placement of that material is within the lawful constraints of the resource recovery exemption (and does not present an unacceptable exposure risk to human health or the environment, within the context of the proposed land use setting); or
- Site won natural soil materials. I.e. soil materials excavated from approximately 0.5 m bgs and deeper from within the site.

Consideration will be given to geotechnical engineering requirements associated with backfilling; however, those requirements will be specified by others elsewhere.

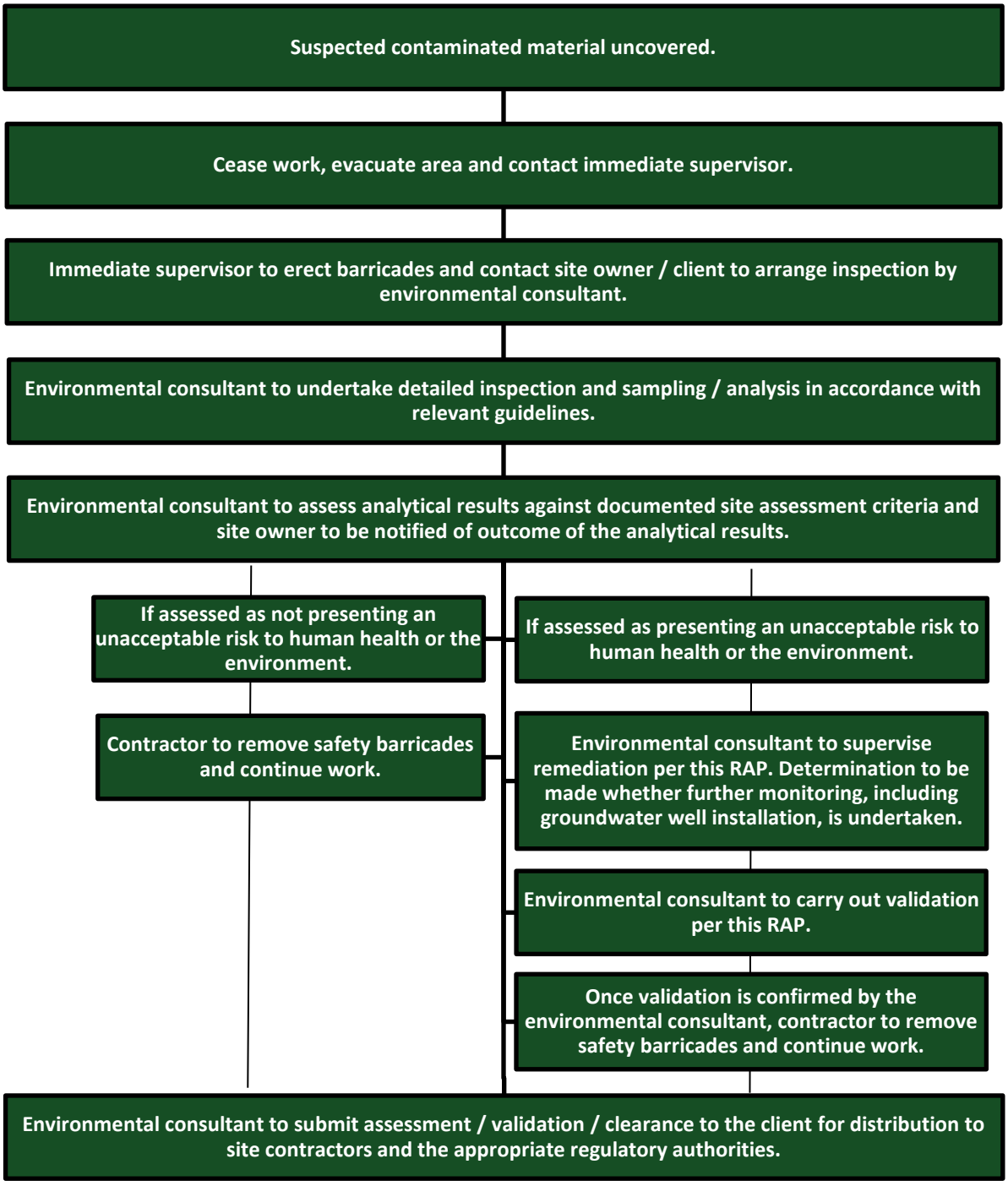
7.3.6 Unexpected Finds Protocol

The contamination assessments to date have not indicated the presence of significant soil and groundwater contamination that is unacceptable for the proposed land use beyond the area of remediation described in this RAP. However, it is possible that unexpected finds may be present within the fill material. To this end, an Unexpected Finds Protocol has been compiled, and is summarised herein. Unexpected finds could include, but are not limited to:

- Other underground storage tanks that are previously not identified;
- Buried containers and drums;
- Phase separated hydrocarbons;
- Powders and other suspicious buried material;
- Potentially hazardous materials; and
- Evidence of contamination including significant staining, odours and discolouration.

In the event that any material suspected of containing potentially hazardous substances is found during remediation works, the following Unexpected Finds Protocol is to be followed:

Unexpected Finds Protocol



8 VALIDATION DATA QUALITY OBJECTIVES

Appendix B of NEPM ASC 2013 provides guidance on the development of data quality objectives (DQO) using a seven-step process.

The DQO for this project are set out in **Sections 8.1** to **8.7** of this report.

8.1 Step 1: State the problem

The first step involves summarising the contamination problem that will require new data and identifying the resources available to resolve the problem.

The objective of this project is to assess whether the remedial goal has been achieved, and whether the site presents an unacceptable human health exposure risk, for the proposed land use setting.

This project is being undertaken because:

- The site is the subject of redevelopment works; and
- Historically identified areas of environmental concern on the site, have the potential to present an unacceptable human health and ecological exposure risk in the context of the proposed land use setting.

The project team identified for this project includes Sydney Environmental Group Pty Ltd, the client and the planning consent authority.

The regulatory authorities identified for this investigation include NSW EPA and the Local Council.

8.2 Step 2: Identify the decision/goal of the study

The second step involves identifying decisions that need to be made about the contamination problem and the new environmental data required to make them.

The decisions that need to be made during this investigation include:

- Is the environmental data collected for the project, suitable for assessing relevant land contamination exposure risks?
- Do concentrations of identified contaminants of potential concern (COPC) present an unacceptable exposure risk to identified receptors, for the proposed land use setting?
- Have the contaminated soils been effectively isolate by the remedial strategy?
- Is the site suitable for the proposed land use setting, in the context of land contamination as a result of the chosen remedial strategy?

8.3 Step 3: Identify the information inputs

The third step involves identifying the information needed to support decisions and whether new environmental data will be needed.

The inputs required to make the decisions set out in **Section 8.2** for this investigation, will include:

- Data obtained in previous contamination assessments;
- The nature and extent of sampling at the site, including both density and distribution;
- Samples of relevant site media;
- The measured physical and/or chemical parameters of the site media samples (including field screening and laboratory analysis, where relevant); and
- Assessment criteria adopted for each of the media sampled.

Taking into consideration the objectives of this project, and the conceptual site model and land use setting presented in **Section 0** of this project, the following assessment criteria relevant to the proposed land use setting have been adopted for this investigation:

- Human health direct contact – HILs in Table 1A (1) in NEPM ASC 2013 and HSLs in Table B4 of Friebel, E & Nadebaum, P (2011);
- Human health inhalation/vapour intrusion – HSLs in Table 1 (A) in NEPM ASC 2013;
- Human health (asbestos) – HSLs in Table 7 of NEPM ASC 2013;
- Petroleum hydrocarbon compounds (management limits) – Table 1 B(7) of NEPM ASC 2013; and
- Aesthetics – no highly malodorous site media (e.g. strong residual petroleum hydrocarbon odours, hydrogen sulphide in site media, organosulfur compounds), no hydrocarbon sheen on surface water, no discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature, no large monolithic deposits of otherwise low risk material (e.g. gypsum as powder or plasterboard, cement kiln dust), no presence of putrescible refuse.

8.4 Step 4: Define the boundaries of the study

The fourth step involves specifying the spatial and temporal aspects of the environmental media that the data must represent to support decisions.

The spatial extent of the project will be limited to the site as defined by its boundaries.

The temporal boundaries of the project include:

- The project timeframes by SE for this project, and subsequent remediation contractor works program;
- Unacceptable weather conditions at the time of undertaking fieldwork, including rainfall, cold and/or heat;
- Access availability of the site (to be defined by the site owner/representative); and
- Availability of SE field staff (typically normal daylight working hours, Monday to Friday).

The lateral extent that contamination is expected to be distributed across, based on the conceptual site model, is defined by the inferred boundaries of the areas of environmental concern (AEC) and may be altered based on the data collected during the supplementary contamination assessment.

The vertical extent that contamination is expected to be distributed across, based on the conceptual site model, is defined by the inferred boundaries of the previously identified areas of environmental concern (AEC) and may be altered based on the data collected during the supplementary contamination assessment.

The scale of the decisions required will be based on the entire site.

Constraints which may affect the carrying out of this investigation may include access limitations, presence of above and below ground infrastructure, and hazards creating health and safety risks.

8.5 Step 5: Develop the analytical approach (or decision rule)

The fifth step involves defining the parameter of interest, specifying the action level, and integrating information from Steps 1 to 4 into a single statement that gives a logical basis for choosing between alternative actions.

8.5.1 Trip Spikes and Trip Blank Samples

One trip spike and trip blank sample will be used and scheduled for analysis, for each day of sampling undertaken, if site samples being collected that day are being analysed for volatile contaminants of concern (typically BTEX and/or TRH C_6-C_{10}).

8.5.2 Intra-Laboratory and Inter-Laboratory Duplicates

Intra-laboratory and inter-laboratory field duplicates will be collected at a rate of one per twenty (5%) site samples collected. The duplicates collected will be analysed for at least one of the analytes that the parent sample of the duplicate/triplicate is being scheduled for analysis for (with the exception of asbestos).

The relevant percent difference (RPD) of concentrations of relevant analytes, between the parent sample and the duplicate will be calculated.

8.5.3 Laboratory Analysis Quality Assurance / Quality Control

The analytical laboratory QA/QC program will typically include laboratory method blank samples, matrix spike samples, surrogate spike samples, laboratory control samples, and laboratory duplicate samples.

8.5.4 If/Then Decision Rules

SE has adopted the following 'if/then' decision rules for this investigation:

- If the result of the assessment of field data and laboratory analytical data is considered acceptable, then that field data and laboratory analytical data is suitable for interpretation within the scope of this investigation; and
- If the field data and laboratory analytical data is within the constraints of the assessment criteria adopted for this investigation (refer **Section 8.3**), then the contamination exposure risks to identified receptors, are considered acceptable.

In the event the assessment of field data and/or laboratory analytical data results in the data being not suitable for interpretation, then SE will determine if additional data is required to allow interpretation to be undertaken.

In the event that field data and/or laboratory analytical data exceeds the assessment criteria adopted for this investigation (refer **Section 8.2**), SE will undertake an assessment of the exceedance in the context of the project objectives to determine if additional data is required and whether management and/or remediation is required.

8.6 Step 6: Specify the performance or acceptance criteria

The sixth step involves specifying the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data. When assessing contaminated land, there are generally two types of errors in decision making:

- Contamination exposure risks for a specific land use setting are acceptable, when they are not; and
- Contamination exposure risks for a specific land use setting are not acceptable, when they are.

SE will mitigate the risk of decision error by:

- Calculation of the 95% upper confidence limit (UCL) statistic to assess the mean concentration of relevant contaminants of potential concern (excluding asbestos);
- Assignment of fieldwork tasks to suitably experienced SE consulting staff, and suitably experienced contractors;
- Assignment of laboratory analytical tasks to reputable NATA accredited laboratories; and
- Assignment of data interpretation tasks to suitably experienced SE consulting staff, and outsourcing to technical experts where required.

SE will also adopt a range of data quality indicators (DQI) to facilitate assessment of the completeness, comparability, representativeness, precision and accuracy (bias).

Table 8.1 Performance and Acceptance Criteria Summary

Completeness			
Field Considerations	**Assessment Criterion**	**Laboratory Considerations**	**Assessment Criterion**
Critical locations sampled	Refer **Section 8.4**	Critical samples analysed according to DQO	Refer **Section 8.7.1**
Critical samples collected	Refer **Section 8.4**	Analytes analysed according to DQO	Refer **Section 8.7.1**
SOPs appropriate and complied with	100%	Appropriate laboratory analytical methods and LORs	Refer **Section 8.7.1**
Field documentation complete	All sampling point logs, calibration logs and chain of custody forms	Sample documentation complete	All sample receipt advices, all certificates of analysis
Sample Holding Times	Laboratory holding times provided by laboratory	Sample extraction and holding times complied with	Refer **8.7.8**
Comparability			
Field Considerations	**Assessment Criterion**	**Laboratory Considerations**	**Assessment Criterion**
Same SOPs used on each occasion	100%	Same analytical methods used by primary laboratory	Refer **Section 8.7.1**
Climatic conditions	Samples stored in 500ml zip-lock bags	Same LORs at primary laboratory	Refer **Section 8.7.1**
Same types of samples collected, and handled/preserved in same manner	All soil samples same size, all stored in 500ml zip-lock bags	Same laboratory for primary sample analysis	All primary samples to Eurofins | Environmental Testing
Analytical measurement units consistent	All measurement units the same between same analytes	Same analytical measurement units	Refer **Section 8.7.1**
Representativeness			
Field Considerations	**Assessment Criterion**	**Laboratory Considerations**	**Assessment Criterion**
Appropriate media sampled according to SAQP	Refer **Section 8.4**	Samples analysed according to SAQP	Refer **Section 8.7.1**
Media identified in SAQP sampled	Refer **Section 8.4**	Nil	Nil
Precision			
Field Considerations	**Assessment Criterion**	**Laboratory Considerations**	**Assessment Criterion**
Field duplicate / triplicate RPD (Metals & PAH only)	Minimum 5% duplicates and triplicates No limit for results <10 times LOR 50% for results 10-20 times LOR 30% for results >20 times LOR	Laboratory duplicates	No exceedances of laboratory acceptance criteria
SOPs appropriate and complied with	100%	Nil	Nil
Accuracy (bias)			
Field Considerations	**Assessment Criterion**	**Laboratory Considerations**	**Assessment Criterion**
Rinsate blanks	*Disposable sampling equipment used. No rinsate blanks required.*		
Field trip spikes (BTEX only)	Recoveries between 60% and 140%	Matrix spike recovery	No exceedances of acceptance criteria
Field trip blanks (BTEX only)	Analyte concentration <LOR None collected for asbestos.	Surrogate spike recovery	No exceedances of acceptance criteria

8.7 Step 7: Develop the plan for obtaining data

The seventh step involves identifying the most resource effective sampling and analysis design for generating the data that is required to satisfy the DQOs.

8.7.1 Validation Sampling

Validation should focus on collecting clear evidence to assess whether the key objectives have been met. Validation sampling programs should identify and delineate the lateral and vertical extent of contamination (if any) and arrive at a scientifically defensible and statistically valid data set which characterises the chemical concentrations and human health risk present at the site.

An appropriately experienced environmental consultant should be present onsite at all stages of the remediation works, to assess the extent of remediation required to render the site suitable for the proposed development. Site observations and field screening equipment can be used to assist in decision-making in relation to:

- The location and extent of any excavations to trace contamination or whether to remove additional soil;
- Create a more focused sample collection (number and location) and laboratory analysis; and
- The need to consider (or implement) any specific health and safety measures.

A judgemental validation sampling pattern will be carried out, with one soil sample collected from the floor (per 25 m^2) and one soil sample collected from each wall (per 5 lineal meters) of the remedial excavation area.

The validation sampling arrangements for this project are presented in **Table 8.2.**

Table 8.2 Validation Methodology

Contamination Risk	Validation Methodology
Non-friable (Bonded) ACM in fill	Visual inspection of at least one pass of treated material, using a rake with teeth spaced ≤7mm apart and >100mm long. 1 x 10L sample per 30 m^3 of treated material, screened for fragments of ACM >7mm and a subsequent 500mL sample for quantitative asbestos analysis. Visual inspection of excavation footprint to confirm removal of fill. Following removal: 1 x 500mL soil sample per 5 lineal metres of excavation wall, with a minimum of 1 per wall and one 500mL soil sample per 25 m^2 of excavation footprint Photographic record of treated soils. Photographic record of excavation. SE notes that all reasonable attempts will be made to remediate the soils; however, if deemed unfeasible by the supervising environmental consultant with consideration to adequacy of remediation methodology and timing, consultation with the client will be made to discuss the requirement for off-site disposal.
Direct Contact Risks in Fill	Visual inspection of excavation footprint to confirm removal of fill. One 250mL soil jar sample per 25 m^2 of excavation footprint. 1 x 250mL jar sample per 10 lineal metres of excavation wall (if present), with a minimum of 1 per wall. Photographic record of excavation.
Imported Fill (VENM)	1 soil sample per 100 m^3 or 3 samples per stockpile / site.
Imported Fill (ENM)	Quantity dependent – refer to the NSW EPA 2014 *'Excavated Natural Material (ENM) exemption/order'* for further detail.

The quantity and movement of all waste materials excavated and removed offsite with be tracked by the remedial contractor. All waste disposal dockets issued by the suitably licensed waste receiving facility will be retained by the remedial contractor for reconciliation against the material tracking records, and for inclusion in the validation report. This will demonstrate that the waste was appropriately disposed to licensed facilities.

If visual or olfactory observations indicated a potential for soil contamination to be present, then collection of additional validation samples will be considered.

8.7.2 Validation Sampling Methodology

Grab soil samples will be collected at each required sampling point directly from the base and walls of the excavation. Depending on the depth of the excavation footprint, an excavator may be required to obtain samples. In these instances, samples will be collected from soils in the centre of the excavator bucket, to avoid cross contamination from the excavator bucket.

Sampling will be guided by a combination of visual evidence (e.g. visible ACM, staining, etc), olfactory evidence (hydrocarbon odours) and field analytical instrumentation (e.g. portable PID soil headspace screening) where applicable.

Observations of the materials encountered during sampling will be recorded on the relevant field observation log with photographic record.

8.7.3 Identification, Storage and Handling of Samples

Sample identifiers will be used for each sample collected, based on the AEC, the number of samples collected and the depth/interval the sample was collected from, e.g. a sample collected from AEC01 from the excavation footprint base, would be identified as AEC01-Base.

Project samples will be stored in laboratory prepared glass jars or zip-lock bags (if collected for asbestos).

Soil samples in glass jars will be placed in insulated container/s with ice.

Samples will be transported to the relevant analytical laboratory, with chain of custody (COC) documentation that includes the following information:

- SE project identification number
- Each sample identifier
- Date each sample was collected
- Sample type (e.g. soil or water)
- Container type/s for each sample collected
- Preservation method used for each sample (e.g. ice)
- Analytical requirements for each sample and turnaround times
- Date and time of dispatch and receipt of samples (including signatures)

8.7.4 Headspace Screening

Where the contaminants of potential concern include volatiles, project soil samples will be subjected to field screening for ionisable volatile organic compounds (VOC), using a photo-ionisation detector (PID). The results of field screening will be recorded on a field sampling point log and presented in test-pit logs.

8.7.5 Decontamination

In the unlikely event that non-disposable sampling equipment is used, that equipment will be decontaminated before and in between sampling events, to mitigate potential for cross contamination between samples collected. The decontamination methodology to be adopted for this project will include:

- Washing relevant sampling equipment using potable water with a phosphate free detergent (i.e. Decon 90 or similar) mixed into the water;
- Rinsing the washed non-disposable sampling equipment with distilled or de-ionised water; and
- Air drying as required.

8.7.6 Laboratory Selection

The analytical laboratories used for this project will be NATA accredited for the analysis undertaken.

8.7.7 Laboratory Analytical Schedule

Project samples will be scheduled for NATA accredited laboratory analysis, using a combination of:

- Observations made in the field of the media sampled;
- Headspace screening results (where available); and
- The contaminants of potential concern (COPC) identified for the area of environmental concern that the sample was collected from.

Based on the site history, SE has adopted the laboratory analytical schedule for validation sampling. Project specific information is presented in **Table 8.3** below.

Table 8.3 Laboratory Analytical Schedule (Validation Sampling)

AEC	Analytical Schedule	No. of samples
AEC01	Visual Assessment	Per **Section 8.7.1**
AEC02	Asbestos	Per **Section 8.7.1**
AEC03	Asbestos	Per **Section 8.7.1**
AEC04	Cadmium	Per **Section 8.7.1**
AEC05	BaP TEQ	Per **Section 8.7.1**
AEC06	Asbestos and TRHs	Per **Section 8.7.1**
AEC07	E.coli, Total Coliforms and Metals	Per **Section 8.7.1**
AEC08	Visual Assessment	Per **Section 8.7.1**
Treated Soil Materials	Asbestos [a]	1 / 30 m^3 treated stockpile (Per **Section 8.7.1**)
Imported Fill – VENM	TRH, BTEX, PAH, 8 metals, OCP and Asbestos Bulk ID.	1 / 500 tonnes
Imported Fill – ENM	Per ENM Order [b]	Per ENM Order [b]

Notes to Table: [a] *Quantitative asbestos (WA DOH 2021 / NEPM 2013)* [b] *NSW EPA 2014 'Excavated Natural Material Order / Exemption.*

8.7.8 Laboratory Holding Times, Analytical Methods and Limits of Reporting

The laboratory holding times, analytical methods and limits of reporting (LOR) being used for this project, are presented in **Table 8.4**.

Table 8.4 Laboratory Holding Times, Analytical Methods, and Limits of Reporting (Eurofins).

Analyte	Holding Time	Analytical Method	Limit of Reporting (mg/kg)
Asbestos Bulk ID	No limit	AS4964:2004	0.01% w/w
Asbestos Quantitative	No limit	WA DOH 2021 / NEPM 2013	0.001% w/w
BTEX and TRH C_6-C_{10}	14 days	NEPM Schedule B3	0.1-20
Metals	6 months	USEPA 6010, 6020	0.1-5
TRH >C_{10}-C_{40}	14 days	NEPM Schedule B3	20-100
OCP	14 days	USEPA 8081	0.2
PAH	14 days	USEPA 8270	0.1-0.5
VOC	14 days	USEPA 8260	0.1-0.5

9 REPORTING

9.1 Site Validation Report

At the completion of remediation works, a site validation report will be prepared with reference to the relevant sections of NSW EPA 2020, 'Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites'. The site validation report must include:

- An executive summary;
- The scope of reporting work undertaken;
- Site identification details;
- A summary of site history;
- A summary of site condition and the surrounding environment;
- A summary of geology and hydrogeology;
- Information on the remediation works undertaken;
- The results of field and laboratory work;
- An assessment of field and laboratory quality assurance / quality control data;
- A discussion on site validation;
- Information on ongoing site monitoring requirements (if any); and
- Conclusions and recommendations.

10 SITE MANAGEMENT PLAN

The following site management plan will apply during undertaking of the remediation tasks.

10.1 Soil and Stormwater Management

10.1.1 Site Access/Egress

Vehicle access and egress to the site will be stabilised to prevent tracking of sediment onto roads and footpaths. Soil, mud and other similar materials will be removed from the roadway adjacent the access/egress point by sweeping, shovelling or a means other than washing, on a daily basis, or as required.

Trucks will be loaded adjacent to the remediation excavation (where practical). Spills of excavated soil will be scraped / swept up and combined with the soil being disposed offsite.

Soil and sediment will be broomed or washed off vehicle/plant tyres and tracks, prior to vehicles/plant leaving the remediation works zone. This soil and sediment will be scraped / swept up and managed onsite or disposed of, depending on its contamination status.

A site-specific sediment and erosion control plan will be prepared and maintained by the remediation contractor, to suit staging of the remediation works. Erosion and sediment control measures will be maintained in a functional condition. Sediment laden stormwater runoff will be controlled using measures outlined in Landcom 2004, '*Managing Urban Stormwater - Soils and Construction*' (the Blue Book).

10.1.2 Stockpiles

Stockpiles of soil or other materials:

- Will not be placed on footpaths or nature strips, unless approved by Council;
- Will be placed away from gutters, stormwater pits and other drainage lines;
- Will be stored in a secure area and be covered if remaining on site for more than 24 hours; and
- Will generally be constructed as low elongated mounds on level surfaces.

10.1.3 Excavation Pump Out

Should excavations require pumping out, water will be analysed for total suspended solids, pH, metals and petroleum hydrocarbons. Should analytical results be less than relevant marine ecosystem groundwater investigation levels in ANZECC (2000), excavation water may be discharged to stormwater.

Should analytical results exceed ANZWQG (2019) criteria, other options for disposal will be considered, including:

- Discharge to sewer (with prior approval from Sydney Water with a Trade Waste Agreement); and
- Removal and offsite disposal by a liquid waste contractor.

10.1.4 Rehabilitation and Landscaping

Stabilisation of exposed areas on the site, where required, will be undertaken in a progressive manner, as stages of remediation works are completed. Stabilisation will be maintained until such time as site redevelopment works commence.

As site redevelopment works are expected to be undertaken in conjunction with remediation works, revegetation of the site is considered unlikely to be required.

10.2 Waste Management

Removal of materials from site for recycling and/or disposal, will be undertaken with reference to the relevant provisions of the *Protection of the Environment Operations Act* (1997) and NSW EPA *Waste Classification Guidelines* (2014).

If waste classification is required for site material, the following is required (as a minimum):

- Waste classification documentation;
- Material source and description;
- Sampling density, pattern, COPCs;
- Result summary, including appropriate table with comparison to acceptance criteria; and
- Waste classification.

If offsite disposal is required for site material, the following is required (as a minimum):

- Source location;
- Estimated volume (based on excavation size;
- Actual volume of disposal;
- Waste classification;
- Transporter;
- Final destination, POEO license;
- Reconciliation of waste dockets with actual disposal volume; and
- Reconciliation of actual disposal volume and the estimated volume of disposal (based on excavation size.

The remediation contractor will maintain detailed records of materials removed from the site, including date/time of removal, quantities of materials, transport company details and vehicle registration details.

The remediation contractor will retain records verifying lawful disposal of the materials, including date / time the waste left site, approximate volume per load, the classified of the waste contained in each individual load, transport vehicle registration details, weighbridge / tipping dockets with receipt dates / times and tipped waste classification from the waste receiving facility.

Material placed onsite (stockpiles or moved to other location) must be tracked so that the source of material can be identified should unexpected finds be encountered.

10.3 Groundwater Management

Should dewatering of the site be required, development consent may be required from the planning consent authority. Dewatering may also require approvals from the NSW Department of Planning and Infrastructure, and the NSW Department of Primary Industry – Water.

Further, should unexpected significant contamination be encountered during remediation that may affect groundwater (e.g. the presence of unknown underground storage tanks), additional groundwater assessment will be required.

10.4 Noise Control

Noise levels from the site during the project will not exceed the limits indicated in AS2436-1981.

No ‘offensive noise’ as defined under the Protection of the Environment Operations Act 1997 will be created during remediation works/activities.

Plant and equipment will be fitted with noise attenuation devices (e.g. mufflers on exhausts). Consideration will be given to use of reversing alarms other than the standard pulsed tonal alarms.

Vehicle access roads will be designed in such a way to minimise the need for plant and vehicles to reverse (e.g. provision of a turning circle adjacent to the remediation works zone).

10.5 Dust Control

Dust may be generated during remediation works and associated tasks. To mitigate risk of dust emissions migrating beyond the site boundary, consideration will be given to implementing the following procedures:

- Erection of dust screens around the perimeter of the site (e.g. fencing with shade cloth attached);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Covering stockpiles of contaminated soil remaining on site for more than 24 hours;
- Keeping excavation surfaces moist;
- Wetting down of placed fill material during spreading;
- Sweeping of hardstand surfaces;
- Minimising soil disturbance works during windy days; and
- Retaining stabilised site access/egress points for vehicles.

Airborne fibre monitoring will be implemented during all remedial works involving friable asbestos at the site, and will be carried out in accordance with SafeWork NSW (2019) *Code of Practice – How to Safely Remove Asbestos*. SE recommend that airborne fibre monitoring be implemented during works involving non-friable asbestos within the site, this however is not explicitly required but is highly recommended by SafeWork NSW.

Portable battery-operated air monitors are to be placed within static positions approximately 1.5m above the ground surrounding the work/removal area. The air sample analysis shall be carried out by a NATA-accredited laboratory. The results of asbestos air monitoring should be provided to the Site Project Management Representative the day following the removal or handling works. Project management will display results of air monitoring on the site's safety notice board for a period of 24hr.

Concentrations of asbestos fibres shall be dealt with as follows:

Table 10.1 Airborne Asbestos Fibre Concentration Action Levels

Action Level (airborne asbestos fibres/ml)	Action
< 0.01 fibres/ml	Continue with control measures
≥ 0.01 fibres/ml **< 0.02 fibres/ml**	Review control measures, Investigate the cause, Implement new controls to prevent further release.
≥ 0.02 fibres/mL	Stop removal works, Notify the relevant regulator that work has ceased, Investigate the cause, Extend the isolation area and implement controls to minimise further exposure, Do not recommence work until fibre levels are at or below 0.01 fibres/ml.

10.6 Odour Control

Generation of significant odours during the remediation works is considered to be unlikely.

If odours are generated, odours will be monitored at the site boundary. Should unacceptable odours be detected at the site boundary, consideration will be given to implementing the following procedures:

- Use of appropriate covering techniques such as plastic sheeting to cover excavation faces or stockpiles;
- Use of fine mist sprays (which may incorporate deodorizing agents);
- Use of hydrocarbon mitigating agents on impacted areas/materials; and
- Adequate maintenance of equipment and machinery to minimise exhaust emissions.

A record of unacceptable odours and corrective/preventative action taken, will be maintained by the remediation contractor.

10.7 Traffic Management

Haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site will be selected by the remediation contractor and will meet the following objectives:

- Compliance with all traffic road rules;
- Minimisation of noise, vibration and odour to adjacent premises; and
- Utilisation of state roads and minimisation of use of local roads.

The remediation contractor will ensure that site vehicles:

- Conduct deliveries of soil, materials, equipment or machinery during the hours of remediation work identified in **Section 10.13**;
- Securely cover all loads to prevent dust or odour emissions during transportation;
- Exit the site in a forward direction; and
- Do not track soil, mud or sediment onto the road.

10.8 Vibration Management

Vibration emissions during remediation works will be controlled to mitigate risk of potential damage to assets on adjacent properties, and to mitigate unreasonable loss of amenity to nearby residents.

10.9 Fill Importation

Material proposed to be imported to site as engineered fill, will be limited to materials certified as:

- Virgin Excavated Natural Material (VENM); or
- Excavated Natural Material (ENM).

VENM certification will be undertaken with reference to NSW EPA (1995). ENM certification will be undertaken with reference to NSW EPA Excavated Natural Material Exemption (2014).

The concentrations of potential contaminants in VENM and ENM proposed to be imported to site, will be less than the human health assessment criteria adopted for the site.

The remediation contractor will maintain detailed records of all fill imported to the site, including details of the supplier, the source of the fill, the quantities of the fill, vehicle registration numbers and the dates/times the fill was received on site.

The remediation contractor will inspect every load of material imported to site, to check the material is consistent with the material described in the VENM/ENM certification and each load is free of visual anthropogenic materials, staining or odours. The remediation contractor will maintain a documented record of each inspection.

10.10 Work Health and Safety

10.10.1 Safe Work Method Statement

Each contractor and sub-contractor undertaking remediation works, or working within a remediation works zone, will prepare a project specific safe work method statement (SWMS), which will include, but not be limited to:

- The tasks to be undertaken;
- Hazards identified for each of the tasks to be undertaken;
- An assessment of risk for each hazard, considering likelihood and consequence; and
- Control measures to eliminate or mitigate risks associated with each identified hazard.

10.10.2 Personal Protective Equipment

The following minimum personal protective equipment (PPE) should be worn by all persons working in or visiting the remediation works zone:

- Long sleeves and long pants;
- High visibility vests (or clothing);
- Safety boots;
- Hard hats;
- Gloves; and
- Eye protection (e.g. safety glasses).

Additional PPE may be required in accordance with task specific control measures in SWMS (refer **Section 10.10.1**) for asbestos handling and removal works.

The following minimum personal protective equipment (PPE) are be worn by any persons entering a non-friable asbestos impacted remediation works zone:

- Disposable coveralls;
- Minimum P2 respirator;
- Disposable boot covers; and
- Disposable gloves.

Should friable asbestos be identified during the works, the following minimum PPE are to be worn by any persons entering a friable asbestos impacted remediation works zone:

- Disposable coveralls;
- Minimum P3 half-face respirator (Higher protection may be required during works. Refer to the licensed asbestos assessor on-site for further details);
- Disposable boot covers; and
- Disposable gloves.

Additionally, a 3 stage (minimum) decontamination unit must be present at the egress point to the friable asbestos works area and used by all personnel entering and exiting the area.

10.10.3 Decontamination of Personnel, Plant and Equipment

Personnel undertaking remediation tasks, or entering the remediation works zone, will be required to decontaminate upon exiting the remediation works zone. Decontamination of plant and equipment used to remediate will also need to be decontaminated upon exiting the remediation work zones. Decontamination procedures will include:

- Removal of all disposable PPE;
- Cleaning down of protective footwear (including removal of soil from the soles);
- Washing of hands and exposed dermal areas; and
- Decontamination of plant and equipment (as applicable).

10.11 Site Signage

A sign will be posted on the boundary of the site, adjacent to the site access point, which will include 24-hour contact details of the remediation contractor and appropriate notification of asbestos contamination/remediation works (in progress).

10.12 Site Security

Site security will be maintained throughout the duration of the remediation works, with appropriate boundary fencing and gate locks. Other security measures may be implemented, if the need arises.

10.13 Site Hours of Operation

Remediation works will be undertaken on Monday to Friday between the hours of 7:00am to 5:00pm, and Saturday between the hours of 8:00am and 1:00pm.

Remediation works will not be undertaken outside the hours stated above, or on Sundays or public holidays.

10.14 Community Relations and Complaints

Owners, occupants and tenants of properties adjoining the site and across the road from the site, will be provided with notification of remediation works, at least two days prior to those works commencing.

Personnel undertaking remediation works on the site, will direct all third-party communications and/or complaints to the Project Manager. The Project Manager will arrange for the communication/complaint to be assessed, a response prepared, corrective/preventative actions implemented (if necessary).

A register will be maintained on site for the recording of communications / complaints from third parties, including but not limited to, local residents and local businesses.

10.15 Emergency Preparedness

An emergency assembly point will be established at the site egress point. This point will be communicated to all site workers and visitors, during relevant site induction processes.

In the event of an emergency, site workers and visitors will assemble here and await further instructions from the site supervisor, project manager or emergency services.

Spill control kits and fire extinguishers will be located on site, as and where required.

Contact details to be used in the event of an emergency, are presented in **Section 10.16**.

10.16 Register of Contacts

A register of contacts for the project is presented in **Table 10.16** below.

Table 10.16 Register of Contacts

Project Role	Person	Organisation	Contact
Emergency Services	-	Fire / Police / Ambulance	000
Site Owner	TBC	No. 3 Low Cost Housing	TBC
Project Manager	TBC	Burton & Field	TBC
Planning Consent Authority	TBC	Hawkesbury City Council	TBC
WHS Regulatory Authority	-	SafeWork NSW	131 050
Environmental Regulatory Authority	-	NSW EPA	131 500
Remediation Contractor	TBC	TBC	TBC
Environmental Consultant	Steven Wallace	Sydney Environmental Group	0434 215 998

10.17 Interim Site Management Plan

Prior to the implementation of the remedial action plan, the following site management activities will be enforced to reduce the contamination risk to human health and the environment:

- Site Isolation:
  - Site access and egress will be limited to nil (if possible) to prevent the tracking of contaminants outside of the site boundaries.
  - Appropriate boundary fencing with locked gates will be installed (if not already present), regularly maintained and remained locked when site is not in use.
  - Signage will be posted on the boundary of the site, adjacent to the site access point, which will include 'keep out, asbestos contamination' (or similar).

- Safe Work Method Statement:
  - Each contractor and sub-contractor gaining access to the site, will prepare a project specific safe work method statement (SWMS), which will include, but not be limited to:
    - The tasks to be undertaken;
    - Hazards identified for each of the tasks to be undertaken;
    - An assessment of risk for each hazard, considering likelihood and consequence; and
    - Control measures to eliminate or mitigate risks associated with each identified hazard.

- Personal Protective Equipment:
  - The following minimum personal protective equipment (PPE) should be worn by all persons working in or visiting the remediation works zone:
    - Hard hat;
    - Long sleeves and long pants;
    - High visibility vest (clothing);
    - Safety boots;
    - Gloves;
    - Eye protection (safety glasses); and
    - Respiratory protection (Only within asbestos impacted remediation areas).

- Decontamination of Personnel equipment:
  - Cleaning down of protective footwear (including removal of soil from the soles); and
  - Washing of hands.

11 CONCLUSIONS

Based on the information presented in the historical contamination assessment reports, SE concludes that the remedial goal can be achieved, and the site made suitable for the proposed land use setting, subject to:

- Implementation of the strategies, methodologies and measures set out in this remedial action plan;
- Should newly identified unacceptable land contamination risks be identified during remediation works, an addendum or modification and revision to this RAP will be required. Any amendments are to be prepared by a suitably experienced environmental consultant;
- Prior to any removal of soils from site for offsite disposal during remedial works, a waste classification for those soils should be prepared by a suitably experienced environmental consultant; and
- Future remedial works should be monitored and validated by a suitably experienced environmental consultant.

This report must be read in conjunction with the limitations set out in **Section 12**.

12 STATEMENT OF LIMITATIONS

The findings presented in this report are based on specific searches of relevant, government historical databases and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

This report has been prepared solely for the use of the client to whom it is addressed and no other party is entitled to rely on its findings.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Sydney Environmental Group Pty Ltd. Should information become available regarding conditions at the site including previously unknown sources of contamination, SE reserves the right to review the report in the context of the additional information.

This report must be reviewed in its entirety and in conjunction with the objectives, scope and terms applicable to SE's engagement. The report must not be used for any purpose other than the purpose specified at the time SE was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual SE consultant interpretations of nominated data, as well as observations made at the time site walkover/s were completed.

Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

Should additional information that may impact on the findings of this report be encountered or site conditions change, SE reserves the right to review and amend this report.

13 REFERENCES

Sydney Environmental Group Pty Ltd (SE 2022a), 'Stage 1 Preliminary Site Investigation, 457 Bells Line of Road, Kurmond NSW, dated 30 June 2022, Ref No: 1596-PSI-01-300622.v1f;

Sydney Environmental Group Pty Ltd (SE 2022b), 'Stage 2 Detailed Site Investigation, 457 Bells Line of Road, Kurmond NSW, dated 28 October 2022, Ref No: 1596-DSI-01-281022.v1f;

Australian and New Zealand (ANZWQG), '*Guidelines for Fresh and Marine Water Quality*';

Landcom 2004, '*Managing Urban Stormwater - Soils and Construction'* (the Blue Book);

National Environment Protection Council (NEPC), '*Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure (NEPM) as amended in May 2013'*;

National Environment Protection Council (NEPC), '*Schedule B(2) Guideline on Site Characterisation, National Environment Protection (Assessment of Site Contamination) Measure (NEPM) as amended in May 2013'*;

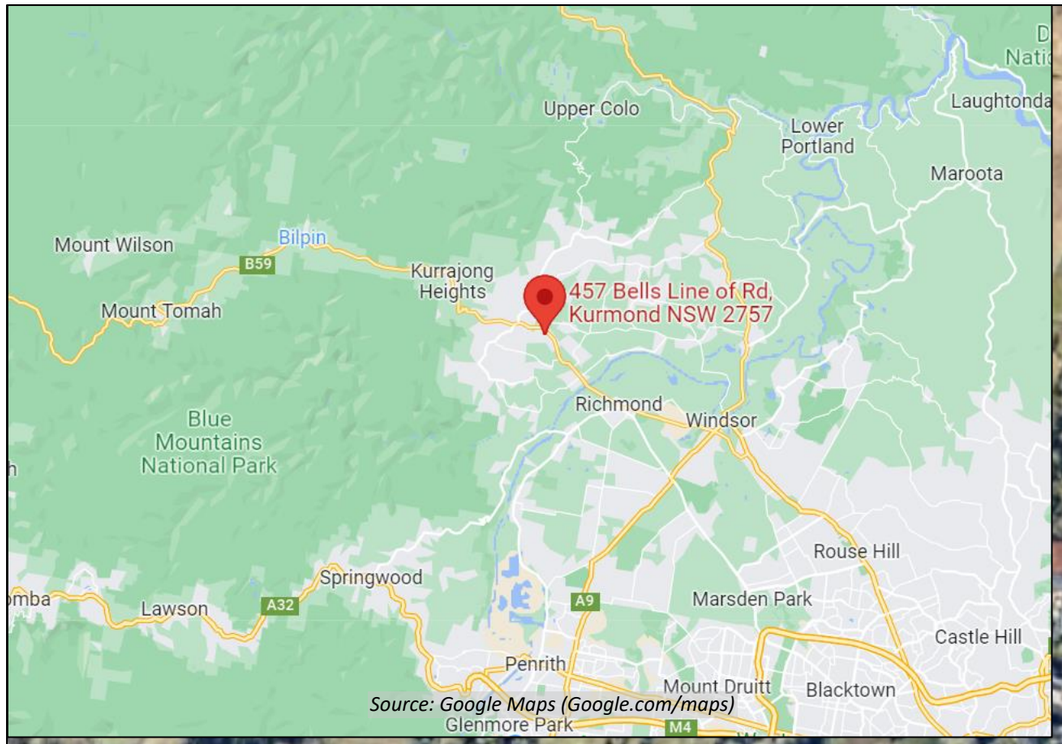
NSW EPA 1995, '*Contaminated Sites: Sampling Design Guidelines'*;

NSW EPA 2017, '*Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)*';

NSW EPA 2020, '*Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites'*; and

WA DOH 2021, *'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia'* dated 2021

FIGURES

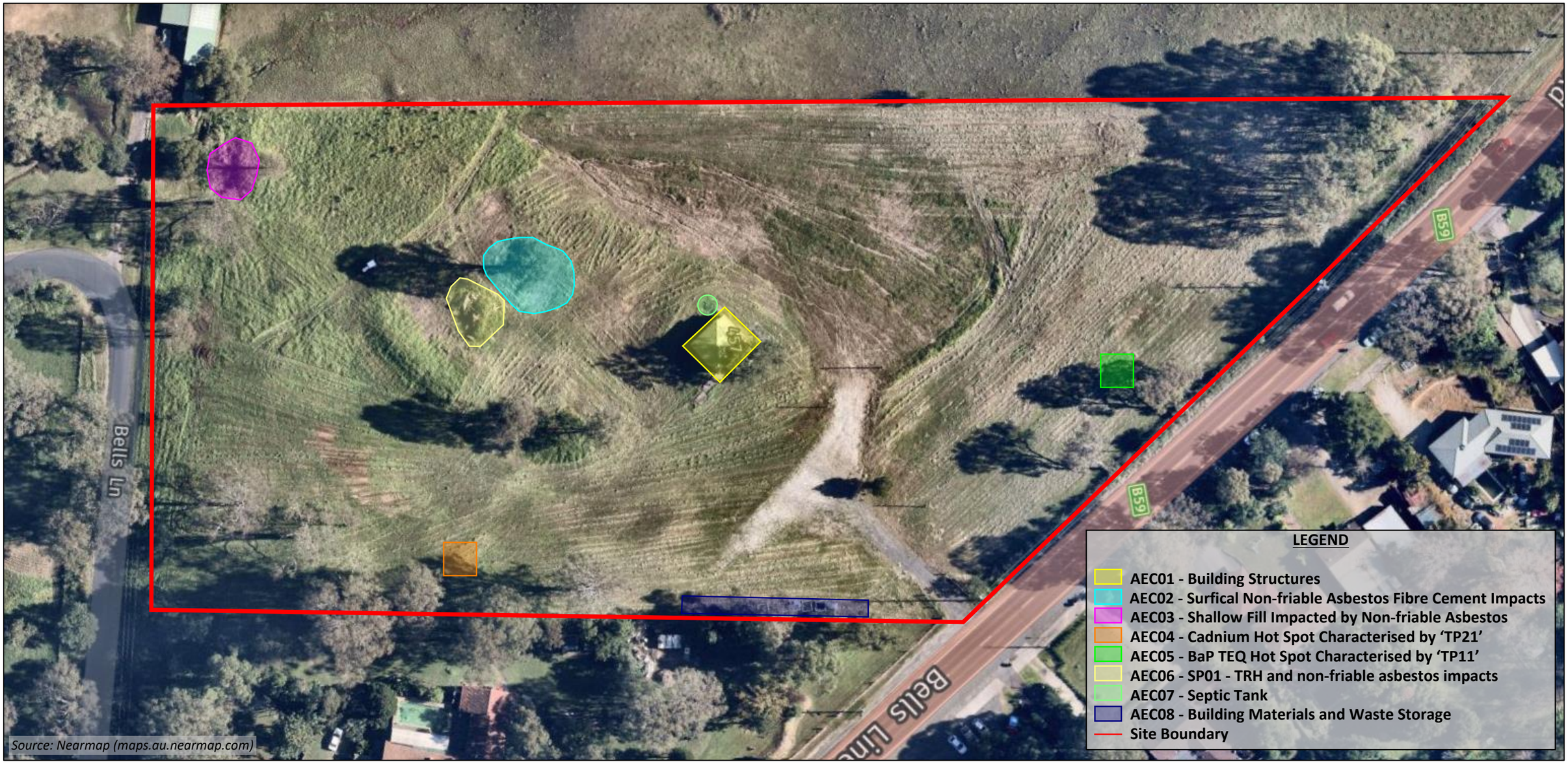


Source: Google Maps (Google.com/maps)

Source: Nearmap (maps.au.nearmap.com)

Sydney Environmental Group

Scale :	125 m	Site Location		
Client Name:	Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates)	N	Figure Number:	1
Project Name:	Remedial Action Plan		Figure Date:	5 November 2022
Project Location:	457 Bells Line of Road, Kurmond NSW		Report Number:	1596-RAP-01-281022.v1f



Sydney Environmental Group

Scale : 25 m	Site Layout and Remedial Extents		
Client Name:	Attard, Dawson & Ross Family (c/- McKinlay Morgan & Associates)	Figure Number:	2
Project Name:	Remedial Action Plan	Figure Date:	5 November 2022
Project Location:	457 Bells Line of Road, Kurmond NSW	Report Number:	1596-RAP-01-281022.v1f

APPENDIX A

LABORATORY SUMMARY TABLES

Site Adopted Criteria
Residential A
0 m to <1 m | CLAY

Group	Analyte	Units	PQL	Health Investigation / Screening Level (HIL / HSL)	Environmental Investigation / Screening Level (EIL / ESL)	Petroleum Hydrocarbon Management Level (PHML)	# Samples	# Detects	Minimum	Average	Standard Deviation	95% UCL	Maximum	TP01_0.1-0.2	TP02_0.1-0.2	TP03_0.1-0.2	TP04_0.1-0.2	TP05_0.1-0.2	TP06_0.1-0.2	TP07_0.1-0.2	TP08_0.1-0.2	TP09_0.1-0.2	TP10_0.1-0.2	TP11_0.1-0.2	TP12_0.1-0.2	TP13_0.1-0.2	TP14_0.1-0.2	TP16_0.1-0.2	TP17_0.1-0.2	TP18_0.05-0.1	TP19_0.1-0.2	TP20_0.1-0.2	TP21_0.1-0.2	TP22_0.1-0.2	TP23_0.1-0.2	TP24_0.1-0.2	TP25_0.1-0.2	TP01_0.3-0.4-EIL	SP01	DUP01	DUP02
	Reference / Sample Date													S22-Oc0013225 07/10/22	S22-Oc0013226 07/10/22	S22-Oc0013227 07/10/22	S22-Oc0013228 07/10/22	S22-Oc0013229 07/10/22	S22-Oc0013230 07/10/22	S22-Oc0013231 07/10/22	S22-Oc0013232 07/10/22	S22-Oc0013233 07/10/22	S22-Oc0013234 07/10/22	S22-Oc0013235 07/10/22	S22-Oc0013236 07/10/22	S22-Oc0013237 07/10/22	S22-Oc0013238 07/10/22	S22-Oc0013239 07/10/22	S22-Oc0013240 07/10/22	S22-Oc0013241 07/10/22	S22-Oc0013242 07/10/22	S22-Oc0013243 07/10/22	S22-Oc0013244 07/10/22	S22-Oc0013245 07/10/22	S22-Oc0013246 07/10/22	S22-Oc0013247 07/10/22	S22-Oc0013248 07/10/22	S22-Oc0013251 07/10/22	S22-Oc0013257 07/10/22	S22-Oc0013253 07/10/22	S22-Oc0013259 07/10/22
Metals	Arsenic	mg/kg	2	100	100	-	26	26	3	7	2	-	14	11	6.6	9.5	7.4	4.2	8.7	4.6	8.2	6.4	6.3	10	6.7	7.6	2.9	5.7	6.7	14	7.3	5.1	5.2	7.7	8.4	5.7	4.3	7.6	7.8	17	7.8
	Cadmium	mg/kg	0.4	20	-	-	26	1	ND	1	4.2	4.9	22	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	22	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
	Chromium (Total)[1]	mg/kg	5	100	423	-	26	26	7	15	4	-	25	19	23	19	15	11	17	9.9	14	11	11	14	16	13	6.8	13	18	9.9	14	12	14	16	16	16	9.7	18	25	51	11
	Copper	mg/kg	5	6000	144	-	26	26	18	25	5	-	39	23	23	31	24	18	24	23	25	31	30	31	20	18	21	20	22	39	22	23	20	20	23	24	23	25	35	14	23
	Lead	mg/kg	5	300	1100	-	26	26	12	31	16	-	92	39	23	23	35	29	34	12	34	21	24	47	22	42	19	25	24	38	20	24	52	20	27	23	32	15	92	37	46
	Mercury (Inorganic)	mg/kg	0.1	40	-	-	26	0	ND	NC	NC	-	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nickel	mg/kg	5	400	176	-	26	23	ND	9	3	-	20	8	13	9.3	9.3	5.7	9.9	8.1	10	12	11	9.2	8.1	6.5	<5	6.6	20	9.3	11	8.2	10	9.9	11	7.7	<5	<5	11	<5	6.1
	Zinc	mg/kg	5	7400	298	-	26	26	17	70	34	-	190	58	51	130	84	62	72	79	78	64	65	72	27	41	72	39	83	72	74	87	86	49	45	94	26	17	190	36	56
PAH	Acenaphthene	mg/kg	0.5	-	-	-	25	1	ND	0.0	NC	-	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.9	-	<0.5
	Acenaphthylene	mg/kg	0.5	-	-	-	25	0	ND	NC	NC	-	ND	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	<0.5
	Anthracene	mg/kg	0.5	-	-	-	25	1	ND	0.0	NC	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	4.4
	Benzo(a)anthracene	mg/kg	0.5	-	-	-	25	1	ND	0.1	NC	-	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	1.7
	Benzo(a)pyrene	mg/kg	0.5	-	0.7	-	25	1	ND	0.1	NC	-	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	2.1
	BaP TEQ - Low[2]	mg/kg	0.5	3	-	-	25	1	ND	0.1	NC	-	2.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	2.8
	BaP TEQ - Medium[2]	mg/kg	0.6	3	-	-	25	25	0.6	0.7	0.5	-	3.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	3.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	-	0.6	-	3.1
	BaP TEQ - High[2]	mg/kg	1.2	3	-	-	25	25	1.2	1.3	0.4	-	3.4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	3.4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	-	1.2	-	3.3
	Benzo(b&j)fluoranthene	mg/kg	0.5	-	-	-	25	2	ND	0.1	0.8	-	1.7	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	1.8
	Benzo(ghi)perylene	mg/kg	0.5	-	-	-	25	1	ND	0.1	NC	-	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	1.8
	Benzo(k)fluoranthene	mg/kg	0.5	-	-	-	25	1	ND	0.1	NC	-	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	1.8
	Chrysene	mg/kg	0.5	-	-	-	25	1	ND	0.1	NC	-	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	3
	Dibenzo(ah)anthracene	mg/kg	0.5	-	-	-	25	0	ND	NC	NC	-	ND	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	<0.5
	Fluoranthene	mg/kg	0.5	-	-	-	25	2	ND	0.2	3.4	-	5.4	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	7.1
	Fluorene	mg/kg	0.5	-	-	-	25	1	ND	0.2	NC	-	4.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	4.4	-	<0.5
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	-	-	-	25	1	ND	0.1	NC	-	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	1.7
	Naphthalene	mg/kg	0.5	-	170	-	25	0	ND	NC	NC	-	ND	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	<0.5
	Phenanthrene	mg/kg	0.5	-	-	-	25	2	ND	0.2	1.5	-	3.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	1.3	-	<0.5
	Pyrene	mg/kg	0.5	-	-	-	25	3	ND	0.3	2.2	-	4.9	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	1.7	-	5.8
	Total PAH (18)	mg/kg	0.5	300	-	-	25	3	ND	1.5	13.1	-	27	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	27	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	8.3	-	31
TRH	TRH C10-C36 Total	mg/kg	50	-	-	-	25	4	ND	901	11032	-	22180	<50	<50	<50	<50	<50	52	177	<50	<50	<50	121	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	22180	-	-
	TRH C10-C14	mg/kg	20	-	-	-	25	2	ND	81	1399	-	2000	<20	<20	<20	<20	<20	<20	22	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	2000	-	-
	TRH C15-C28	mg/kg	50	-	-	-	25	3	ND	805	11507	-	20000	<50	<50	<50	<50	<50	<50	69	<50	<50	<50	68	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	20000	-	-
	TRH C29-C36	mg/kg	50	-	-	-	25	4	ND	15	60	-	180	<50	<50	<50	<50	<50	52	86	<50	<50	<50	53	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	180	-	-
	TRH C6-C9	mg/kg	20	-	-	-	25	0	ND	NC	NC	-	ND	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	-	-
	Naphthalene	mg/kg	0.5	-	170	-	25	0	ND	NC	NC	-	ND	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	-
	TRH >C10-C16 (F2)	mg/kg	50	-	120	1000	25	1	ND	288	NC	-	7200	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	7200	-	-
	TRH >C10-C16 (F2) - Naphthalene	mg/kg	50	280	-	-	25	1	ND	288	NC	-	7200	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-	7200	-	-
	TRH C10-C40 Total (F bands)	mg/kg	100	-	-	-	25	3	ND	937	13328	-	23200	<100	<100	<100	<100	<100	<100	120	<100	<100	<100	110	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	23200	-	-
	TRH >C16-C34 (F3)	mg/kg	100	-	1300	3500	25	3	ND	649	9171	-	16000	<100	<100	<100	<100	<100	<100	120	<100	<100	<100	110	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	16000	-	-
	TRH >C34-C40 (F4)	mg/kg	100	-	5600	10000	25	0	ND	NC	NC	-	ND	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	<100	-	-
	TRH C6-C10	mg/kg	20	-	180	800	25	0	ND	NC	NC	-	ND	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	-	-
	TRH C6-C10 minus BTEX (F1)	mg/kg	20	50	-	-	25	0	ND	NC	NC	-	ND	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	-	-
BTEX	Benzene	mg/kg	0.1	0.7	65	-	25	0	ND	NC	NC	-	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-
	Ethylbenzene	mg/kg	0.1	NL	125	-	25	0	ND	NC	NC	-	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-
	m/p-xylene	mg/kg	0.2	-	-	-	25	0	ND	NC	NC	-	ND	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	-
	o-xylene	mg/kg	0.1	-	-	-	25	0	ND	NC	NC	-	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-
	Toluene	mg/kg	0.1	480	105	-	25	0	ND	NC	NC	-	ND	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-
	Total Xylenes	mg/kg	0.3	110	45	-	25	0	ND	NC	NC	-	ND	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	-	-
OCP	4.4 - DDD	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	4.4 - DDE	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	4.4 - DDT	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	a-HCH	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Aldrin	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Aldrin + Dieldrin (total)	mg/kg	0.5	6	-	-	12	0	0.00	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	b-HCH	mg/kg	0.5	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Chlordanes (total)	mg/kg	0.1	50	-	-	12	0	ND	NC	NC	-	ND	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-
	d-HCH	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	DDT + DDE + DDD (total)	mg/kg	0.1	240	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Dieldrin	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endosulfan 1	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endosulfan 2	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endosulfan sulphate	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endosulfan (Total)	mg/kg	0.1	270	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endrin	mg/kg	0.1	10	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endrin Aldehyde	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Endrin Ketone	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	g-HCH (Lindane)	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Heptachlor	mg/kg	0.1	6	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Heptachlor epoxide	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Hexachlorobenzene	mg/kg	0.1	10	-	-	12	0	ND	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Methoxychlor	mg/kg	0.2	300	-	-	12	0	0.0	NC	NC	-	ND	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-
	Vic EPA IWRG 621 OCP (total)	mg/kg	0.1	-	-	-	12	0	ND	NC	NC	-	ND	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-
	Vic EPA IWRG 621 Other OCP (total)	mg/kg	0.2	-	-	-	12	0	0.0	NC	NC	-	ND	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-
PCBs	Total PCBs	mg/kg	0.5	1	-	-	12	0	0.0	NC	NC	-	ND	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-

General Notes to Table: | - = Not Analysed | BTEX = Benzene, Toluene, Ethylbenzene, and Xylene | OCP = Organochlorine Pesticides | NC = Not Calculated | ND = Non-Detect | NL = Not Limiting | PAH = Polyaromatic Hydrocarbon |

| PCBs = Polychlorinated Biphenyls | PQL = Practical Quantification Limit | TRH = Total Recoverable Hydrocarbons | TEQ = Toxicity Equivalence Quotient | UCL = Upper Confidence Limit |

Notes to Statistical Calculations: The average and Standard Deviation are calculated with non-detects replaced with a null (0) proxy value. Where all values are non-detect, a "NC" value is ouputted.

Additional Notes: [1] HIL limits are for Chromuium (VI) only, and EIL limits are for Chromium (III) only, total Chromium measured for initial screening [2] Non-detect values are replaced with a proxy value with the proxy value being, Low: 0, Medium: 1/2 PQL, and High: PQL

Value	Highlighted concentration exceeds the site adopted criteria (HIL/HSL)
Value	Highlighted concentration exceeds the site adopted criteria (EIL/ESL)
Value	Highlight concentration exceeds the site adopted criteria (Petroleum Management Limit)
Value	Highlighted concentration exceeds multiple site adopted criterion

		Group	Asbestos		
		Analyte	Asbestos Sample Mass/Dimensions	Asbestos Sample Description	ACM
		Units	-	-	% w/w
		PQL	-	-	0.01
		Health Sceening Level (HSL)	-	-	0.01
	Site Adopted Criteria Residential A				
Sample ID	Reference / Sample Date			# Samples	28
				# Detects	0
				Minimum	ND
				Average	NC
				Standard Deviation	NC
				Maximum	ND
TP01_0.1-0.2	S22-Oc0013225 07/10/22		232g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP02_0.1-0.2	S22-Oc0013226 07/10/22		219g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP03_0.1-0.2	S22-Oc0013227 07/10/22		300g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP04_0.1-0.2	S22-Oc0013228 07/10/22		177g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP05_0.1-0.2	S22-Oc0013229 07/10/22		142g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP06_0.1-0.2	S22-Oc0013230 07/10/22		125g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP07_0.1-0.2	S22-Oc0013231 07/10/22		106g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP08_0.1-0.2	S22-Oc0013232 07/10/22		107g	Brown coarse-grained clayey soil and rocks	< 0.01
TP09_0.1-0.2	S22-Oc0013233 07/10/22		177g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP10_0.1-0.2	S22-Oc0013234 07/10/22		194g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP11_0.1-0.2	S22-Oc0013235 07/10/22		185g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP12_0.1-0.2	S22-Oc0013236 07/10/22		189g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP13_0.1-0.2	S22-Oc0013237 07/10/22		169g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP14_0.1-0.2	S22-Oc0013238 07/10/22		105g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP16_0.1-0.2	S22-Oc0013239 07/10/22		101g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP17_0.1-0.2	S22-Oc0013240 07/10/22		179g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP18_0.05-0.1	S22-Oc0013241 07/10/22		253g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP19_0.1-0.2	S22-Oc0013242 07/10/22		133g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP20_0.1-0.2	S22-Oc0013243 07/10/22		120g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP21_0.1-0.2	S22-Oc0013244 07/10/22		220g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP22_0.1-0.2	S22-Oc0013245 07/10/22		84g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP23_0.1-0.2	S22-Oc0013246 07/10/22		150g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP24_0.1-0.2	S22-Oc0013247 07/10/22		122g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
TP25_0.1-0.2	S22-Oc0013248 07/10/22		157g	Brown coarse-grained clayey sandy soil and rocks	< 0.01
FC01	S22-Oc0013254 07/10/22		21g / 70x40x4mm	Grey compressed fibre cement material	**Chrysotile asbestos detected.**
FC02	S22-Oc0013255 07/10/22		28g / 100x40x4mm	Off-white layered fibre cement material	**Chrysotile asbestos detected.**
FC03	S22-Oc0013256 07/10/22		33g / 50x50x4mm	Grey compressed fibre cement material	**Chrysotile asbestos detected.**
SP01	S22-Oc0013257 07/10/22		203g	Brown coarse-grained clayey sandy soil and rocks	< 0.01

General Notes to Table: | - = Not Analysed | ACM = Asbestos Containing Material | AF = Asbestos Fines | FA = Fibrous Asbestos | NC = Not Calculated | ND = Non-Detect |

| NL = Not Limiting |PQL = Practical Quantification Limit

Notes to Statistical Calculations: The Average and Standard Deviation are calculated with non-detects replaced with a null (0) proxy value. Where all values are non-detect, a "NC" value is ouputted.

Value Highlighted concentration exceeds the site adopted criteria (HIL)

Group	Analyte	Units	Eurofins PQL	SGS PQL	Sample ID	TP01_0.1-0.2	DUP01	RPD Limit	RPD	TP01_0.1-0.2	DUP01A	RPD Limit	RPD	TP11_0.1-0.2	DUP02	RPD Limit	RPD	TP11_0.1-0.2	DUP02A	RPD Limit	RPD
					Reference /Sample Date	S22-Oc0013225 07/10/22	S22-Oc0013249 07/10/22			S22-Oc0013225 07/10/22	SE237659.001 07/10/22			S22-Oc0013235 07/10/22	S22-Oc0013250 07/10/22			SE237659.002 07/10/22			
Metals	Arsenic	mg/kg	2	1		11	17	NL	43	11	7	NL	44	10	7.8	NL	25	10	7	NL	35
	Cadmium	mg/kg	0.4	0.3		< 0.4	< 0.4	NL	NC	< 0.4	<0.3	NL	NC	< 0.4	< 0.4	NL	NC	< 0.4	<0.3	NL	NC
	Chromium (Total)	mg/kg	5	1		19	51	NL	91	19	27	NL	35	14	11	NL	24	14	8.7	NL	47
	Copper	mg/kg	5	1		23	14	NL	49	23	13	NL	56	31	23	NL	30	31	22	NL	34
	Lead	mg/kg	5	1		39	37	NL	5	39	43	NL	10	47	46	NL	2	47	44	NL	7
	Mercury (Inorganic)	mg/kg	0.1	0.05		< 0.1	< 0.1	NL	NC	< 0.1	<0.05	NL	NC	< 0.1	< 0.1	NL	NC	< 0.1	<0.05	NL	NC
	Nickel	mg/kg	5	1		8	< 5	NL	NC	8	3.8	NL	71	9.2	6.1	NL	41	9.2	5.5	NL	50
	Zinc	mg/kg	5	2		58	36	50	47	58	41	50	34	72	56	50	25	72	58	50	22
PAH	Acenaphthene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	0.3	NL	NC	< 0.5	< 0.5	NL	NC	< 0.5	0.2	NL	NC
	Acenaphthylene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	0.2	NL	NC	< 0.5	< 0.5	NL	NC	< 0.5	0.2	NL	NC
	Anthracene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	1.4	NL	NC	0.5	4.4	NL	159	0.5	0.7	NL	33
	Benzo(a)anthracene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	2.5	NL	NC	1.8	1.7	NL	6	1.8	2.4	NL	29
	Benzo(a)pyrene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	2.2	NL	NC	2.2	2.1	NL	5	2.2	2.4	NL	9
	BaP TEQ - Low[2]	mg/kg	0.5	0.2		< 0.5	< 0.5	NL	NC	< 0.5	3.3	NL	NC	2.9	2.8	NL	4	2.9	3.5	NL	19
	BaP TEQ - Medium[2]	mg/kg	0.6	0.3		0.6	0.6	NL	0	0.6	3.3	NL	138	3.1	3.1	NL	0	3.1	3.5	NL	12
	BaP TEQ - High[2]	mg/kg	1.2	0.2		1.2	1.2	NL	0	1.2	3.3	NL	93	3.4	3.3	NL	3	3.4	3.5	NL	3
	Benzo(b&j)fluoranthene	mg/kg	0.5	0.1		0.5	< 0.5	NL	NC	0.5	2.4	NL	131	1.7	1.8	NL	6	1.7	2.6	NL	42
	Benzo(ghi)perylene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	1.5	NL	NC	1.5	1.8	NL	18	1.5	1.7	NL	13
	Benzo(k)fluoranthene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	1.1	NL	NC	1.7	1.8	NL	6	1.7	1.1	NL	43
	Chrysene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	2	NL	NC	2.2	3	NL	31	2.2	2.1	NL	5
	Dibenzo(ah)anthracene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	0.3	NL	NC	< 0.5	< 0.5	NL	NC	< 0.5	0.3	NL	NC
	Fluoranthene	mg/kg	0.5	0.1		0.6	0.6	NL	0	0.6	7.3	NL	170	5.4	7.1	NL	27	5.4	6.4	NL	17
	Fluorene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	0.7	NL	NC	< 0.5	< 0.5	NL	NC	< 0.5	0.2	NL	NC
	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	1.6	NL	NC	1.3	1.7	NL	27	1.3	1.7	NL	27
	Naphthalene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	0.2	NL	NC	< 0.5	< 0.5	NL	NC	< 0.5	<0.1	NL	NC
	Phenanthrene	mg/kg	0.5	0.1		< 0.5	< 0.5	NL	NC	< 0.5	6.6	NL	NC	3.4	< 0.5	NL	NC	3.4	3.5	NL	3
	Pyrene	mg/kg	0.5	0.1		0.6	0.6	NL	0	0.6	6.4	NL	166	4.9	5.8	NL	17	4.9	5.9	NL	19
	Total PAH (18)	mg/kg	0.5	0.8		1.7	1.2	NL	34	1.7	37	NL	182	27	31	30	14	27	32	30	17

General Notes to Table: | - = Not Analysed | NC = Not Calculated | ND = Non-Detect | PAH = Polyaromatic Hydrocarbon |

| PQL = Practical Quantification Limit | RPD = Relative Percentage Difference | TEQ = Toxicity Equivalence Quotient |

Notes to RPD limits: Limits vary according based on a comparison of the parent sample concentration and the PQL for each analyte.

The following RPD limits apply: analyte concentration < 10x PQL: No RPD limit; > 10x < 20x PQL, 50% RPD limit; > 20x PQL, 30% RPD limit.

Value Highlighted value exceeds the site adopted RPD criteria

	TRIP SPIKE	TRIP BLANK
	S22-Oc0013252	S22-Oc0013253
	7/10/2022	7/10/2022
	Soil	Soil
	Recovery (%)	Concentration
Analyte	%	mg/kg
Benzene	110	<0.01
Ethylbenzene	100	<0.01
m&p-Xylenes	110	<0.02
o-Xylene	95	<0.01
Toluene	110	<0.01
Xylenes - Total	100	<0.03

Value **Value outside assessment criteria**