Remediation Action Plan

34 Wyndella Road, Lochinvar NSW

NEW23P-0216-ACv1

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Executive Summary

Qualtest Laboratory NSW Pty Ltd (Qualtest) were engaged by AEP Developments Pty Ltd to prepare a Remediation Action Plan (RAP) for the site located at 34 Wyndella Road, Lochinvar NSW (the site).

The site is approximately 10 ha and comprises Lot 225 DP246447. The site is zoned RU2 Rural Landscape and currently contains a residential dwelling in the eastern portion of the site. It is understood that the site is proposed to be developed into Manufactured Homes Estate (MHE) and that this RAP is required to assist with the Development Application (DA).

Qualtest previously carried out a Preliminary and Detailed Site Investigation (PDSI) for the site in 2023, ref: NEW23P-0216-AA, dated 28 November 2023 (Qualtest, 2023a). The PDSI identified metal contamination in surface soils and asbestos (fibrous asbestos (FA) and asbestos containing materials (ACM)) within a stockpile (SP01) on the site. Further information on the previous assessment is provided in Section 4 below.

The identified contamination, and potential unexpected finds, will need to be either remediated and/or managed as part of the development. This RAP outlines the preferred remedial strategies required to render the site suitable for the development, from a contaminated land perspective.

The objective of the RAP is to provide guidance on the remediation and management activities to be undertaken in order to render the site suitable for the proposed development.

The proposed remedial plan for the site is to excavate contaminated soils and place within designated capping area (proposed pickle ball court). Contaminated soils in the capping area are to be covered with marker layer and minimum of 0.5m of 'clean' cap.

Implementation of the RAP by appropriately qualified earthworks contractor and environmental consultant, who would conform to the strategies and procedures outlined in this RAP, would mitigate the potential risk of environmental impacts during vegetation clearing and bulk earthworks.

Conformance with the remediation, material tracking and validation procedures would enable an appropriate validation assessment and Validation Report to be completed, to demonstrate that the site is suitable for the proposed development.

Based on the above, it is considered that appropriate implementation of the RAP would achieve the objective of rendering the site suitable for the proposed development.

This report was prepared in general accordance with the relevant sections of the NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013*, Canberra (referred to as ASC NEPM 2013). The report comprises a RAP in accordance with State Environmental Planning Policy (Resilience and Hazards) 2021, Chapter 4 Stage 3 assessment.

Table of Contents:

Attachments:

1.0 Introduction

1.1 General

Qualtest Laboratory NSW Pty Ltd (Qualtest) were engaged by AEP Developments Pty Ltd to prepare a Remediation Action Plan (RAP) for the site located at 34 Wyndella Road, Lochinvar NSW (the site). The location of the site is shown on Figure 1, Appendix A.

The site is approximately 10 ha and comprises Lot 225 DP246447. The site is zoned RU2 Rural Landscape and currently contains a residential dwelling in the eastern portion of the site. It is understood that the site is proposed to be developed into Manufactured Homes Estate (MHE) and that this RAP is required to assist with the Development Application (DA).

Qualtest previously carried out a Preliminary and Detailed Site Investigation (PDSI) for the site in 2023, ref: NEW23P-0216-AA, dated 28 November 2023 (Qualtest, 2023a). The PDSI identified metal contamination in surface soils and asbestos (fibrous asbestos (FA) and asbestos containing materials (ACM)) within a stockpile (SP01) on the site. Further information on the previous assessment is provided in Section 4 below.

The identified contamination, and potential unexpected finds, will need to be either remediated and/or managed as part of the development. This RAP outlines the preferred remedial strategies required to render the site suitable for the development, from a contaminated land perspective.

It is noted that Qualtest have prepared a preliminary geotechnical report for the site (ref: NEW23P-0216-AB, dated 6 December 2023 (Qualtest, 2023b)), and information from this report has been included where relevant.

This report was prepared in general accordance with the relevant sections of the NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land and the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013*, Canberra (referred to as ASC NEPM 2013). The report comprises a RAP in accordance with State Environmental Planning Policy (Resilience and Hazards) 2021, Chapter 4 Stage 3 assessment.

1.2 Objectives

The objective of the RAP is to provide guidance on the remediation and management activities to be undertaken in order to render the site suitable for the proposed development.

1.3 RAP Requirements

The NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Sites provides requirements that are to be considered in the preparation of RAPs. As such, this document addresses the following requirements:

- Summary of site identification, site history, site condition and surrounding environment;
- Summary of previous contamination assessments;
- The contamination requiring remediation and/or management;
- Remediation objectives;
- Remediation criteria;
- Discussion of possible remediation options;
- Rationale for selecting the preferred remedial option;

- Validation programme and Sampling, Analysis and Quality Plan (SAQP);
- Contingency plans for unexpected finds; and
- Health, Safety, and Environmental requirements.

1.4 Regulatory Control and Relevant Guidelines

Table 1.4.1 outlines the relevant legislation and guidelines for contamination and preparation of the RAP.

Table 1.4.1 – Relevant Legislation and Guidelines

Legislation	Contaminated Land Management Act 1997 Environmental Planning and Assessment Act 1979 Protection of the Environment Operations Act 1997 Maitland City Council Local Environmental Plan 2011
Plans and Policies	State Environmental Planning Policy (Resilience and Hazards) 2021
Guidelines	National Environmental Protection Measure (Assessment of Site Contamination) 1999 (as amended 2013) (National Environment Protection Council 2013) NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land NSW EPA (2022) Environment Protection Authority: Sampling design part 1 - application, Contaminated Land Guidelines NSW EPA (2022) Environment Protection Authority: Sampling design part 2 - interpretation, Contaminated Land Guidelines NSW EPA (2014) Waste Classification Guidelines WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia Resource Recovery Orders/Exemptions under Part 9, Clause 91 to 93 of the Protection of the Environment Operations (Waste) Regulation 2014 NSW EPA (2022) Preparing Environmental Management Plans for Contaminated Land NSW EPA (2015) Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, 3rd Edition

2.0 Roles and Responsibilities

Table 2.1 summarises the roles and responsibilities during remediation and validation.

Table 2.1: Role and Responsibilities

Role	Responsibilities
Principal – AEP Developments Pty Ltd	- To engage suitably qualified personnel/companies to carry out the works.
Contractor – TBA	- Only engaging suitably qualified and competent staff and contractors. - Enforcing the implementation of this plan on the site by staff, subcontractors and visitors. - Authorised to stop work as deemed necessary where unsafe activities are being carried out or where management plans are not being followed. - Overseeing the proper use and maintenance of site safety equipment, including staff Personal Protective Equipment (PPE) and first aid equipment.
Environmental Consultant – Qualtest	- To provide advice regarding the management of contaminated materials. - Carry out validation sampling and reporting. - Authorised to stop work as deemed necessary where unsafe activities are being carried out or where management plans related to contamination are not being followed.
Site Workers	- Taking reasonable care for their own safety and the safety of others. - Following site rules and work instructions. - Taking immediate action to rectify hazards that may arise during the course of the work. - Complying with management plans, relevant OHS legislation and industry standards. - Establish and maintain a positive safety climate on the project.

3.0 Site Description

3.1 Site Identification

General site information is provided below in Table 3.1. The site location is shown in Figure 1, Appendix A.

Table 3.1: Summary of Site Details

Site Address:	34 Wyndella Road, Lochinvar NSW
Approximate site area and dimensions:	Approx. 10 ha Approx. 130m wide (north to south) by 800m long (east to west) at its widest and longest points
Title Identification Details:	Lot 225 DP246447 within the Maitland local government area

Current Zoning	RU2 Rural Landscape
Current Ownership:	David Troy Heien Gail Alison Heien
Current Land Use:	Rural Residential
Previous Landuse:	Rural Residential, agricultural (grazing land)
Proposed Landuse:	Proposed Manufactured Homes Estate
Adjoining Site Uses:	North – Rural residential land East – Low density residential South – Rural residential land leading to New England Highway West – Rural residential land
Site Coordinates for approx. centre of site:	32°41'52.51"S 151°28'08.02"E

3.2 Proposed Development

The proposed development comprises a manufactured homes estate (MHE) with approximately 182 home sites, a central facility (including bowling green, swimming pool and pickle ball court), communal open space areas, stormwater detention basin, road ways and associated services.

The proposed development layout is included in Appendix A.

3.3 Topography and Drainage

Reference to the NSW Land and Property Information Spatial Information Exchange website (https://six.nsw.gov.au/wps/portal/) indicated the elevation of the site was approximately 40m AHD in the western portion with a gentle incline to 50m AHD in the eastern portion.

The site was observed to be on south to west facing gentle slopes of a locally prominent hill formation, rising to the north of the site.

The ground surface consisted of grass with a dwelling in the eastern portion of the site, and dams in the central and western portions of the site. Rain falling on the site would be expected to infiltrate into the site surface. Excess surface water is expected to flow west into the site dams. During high rainfall, excess surface water would flow into stormwater drains on Wyndella Road and then into Lochinvar Creek located about 1km west of the site.

3.4 Geology and Soils

The 1:100,000 Newcastle Hunter Area Coastal Quaternary Geological Maps indicates that the site is underlain Permian aged Dalwood Group: sandstone, lithic sandstone, conglomerate, siltstone, basalt.

The soils observed during the previous PDSI (Qualtest, 2023a) and Preliminary Geotechnical Investigation (Qualtest, 2023b) are summarised below in Table 3.4.

Table 3.4 – Summary of Geotechnical Units and Soil Types

Unit	Soil Type	Description
Unit 1A	TOPSOIL	CLAY – medium to high plasticity, dark grey, dark brown, grey-brown, brown, root affected.
Unit 1B	TOPSOIL - FILL	Sandy CLAY – low to medium plasticity, brown to grey-brown, fine grained sand, root affected.
Unit 2A	FILL	Gravelly Sandy CLAY – medium plasticity, brown to orange-brown, fine to coarse grained sand, fine to medium grained angular to sub-angular gravel.
Unit 2B	COLLUVIUM/ POSSIBLE FILL	Silty Sandy GRAVEL – fine to coarse grained, angular to sub-angular, grey-brown, fine to coarse grained (mostly fine to medium grained) sand, fines of low plasticity, trace angular cobbles.
Unit 3A	RESIDUAL SOIL/ COLLUVIUM	CLAY – medium to high plasticity, dark brown, dark grey, grey-brown, brown. Sandy CLAY – medium to high plasticity, dark grey to grey-brown. CLAY – medium to high plasticity, grey-brown
Unit 3B	RESIDUAL SOIL/ EXTREMELY WEATHERED ROCK	Sandy CLAY – low to medium plasticity, pale grey-white and pale orange, fine grained sand. Silty CLAY – low to medium plasticity, pale grey-white, pale brown, trace orange. Gravelly Clayey SAND – fine to coarse grained, orange, and pale grey, trace red-brown, fines of low plasticity.
Unit 4	EXTREMELY TO SLIGHTLY WEATHERED ROCK	Sandy SILTSTONE with soil properties: breaks down into Silty Sandy CLAY – low to medium plasticity, pale grey-white and pale orange, fine grained sand. ANDESITE: breaks down into Sandy Gravelly CLAY, Clayey Sandy GRAVEL, Sandy CLAY, Clayey Gravelly SAND, dark grey, brown, pale brown, red-brown, grey

Anthropogenic materials including: concrete, bricks, metal, wire, asphalt, and plastic were observed in SP01 to SP04 during excavation. Fragments of PACM were observed in SP01 during gravimetric asbestos testing.

No odours were observed during field investigations.

3.5 Hydrogeology

Groundwater beneath the site is anticipated to be present in a semi-confined aquifer within residual soils/weathered rock at depths greater than 5m below ground surface (bgs).

Groundwater flow direction is anticipated to flow to the north-west discharging to the Hunter River located about 3km north-west of the site.

It should be noted that groundwater conditions can vary due to rainfall and other influences including regional groundwater flow, temperature, permeability, recharge areas, surface condition, and subsoil drainage.

A search of the NSW Department of Primary Industries (Office of Water) registered groundwater bores located within a 500m radius of the site was undertaken. The search revealed that there were three bores within this radius. A copy of the search was provided in the PDSI report (Qualtest, 2023a).

3.6 Acid Sulfate Soils

Reference to the Acid Sulfate Soil online database from State of NSW and Department of Planning, Industry and Environment, 2021(espade.environment.nsw.gov.au) the site is located in an area of 'no known occurrence' of acid sulfate soils.

4.0 Review of Previous Assessments/Identified Contamination

4.1 Qualtest (2023a) Preliminary and Detailed Site Investigation

Qualtest carried out a Preliminary and Detailed Site Investigation (PDSI) for the site in 2023.

The objectives of the PDSI were to:

- Assess former and current site uses and/or activities, that have the potential to cause contamination;
- Assess the location and extent of potential soil and surface water contamination on the site (if any); and,
- Provide recommendations on the need for further assessment, management and/or remediation (if required).

In order to achieve the above objectives, Qualtest carried out the following scope:

- Desktop and site history assessment;
- Collection of soil samples from 34 surface sample locations (SS01A, SS01 to SS29 and SS31 to SS34), 18 stockpile samples from 5 stockpiles (SP1-1 to SP1-10, SP2-1, SP3-1, SP4-1 to SP4-5, SS30), and a surface water sample (SW01);
- Observation of the soil profile from geotechnical test pits and boreholes (TP01 to TP05, TP09 to TP11, BH06 to BH08, BH12 to BH14). No environmental samples were collected from these test pits/boreholes;
- Laboratory analysis of selected soil samples for the Contaminants of Potential Concern (COPC); and
- Data assessment and preparation of a Preliminary and Detailed Site Investigation Report.

The site history review showed the site has been used for grazing farm land since the early 1900s until at least 1991. A residence and associated sheds and swimming pool were constructed on the site between 1991 and 2001. Five stockpiles of fill material were observed on the site, ranging in size from 5m^3 to 230m^3. Materials/equipment are stored on the site around the dwelling and associated sheds. Two dams are also present on the site.

Three Areas of Environmental Concern (AECs) were identified based on the site history and site observations:

1. Agricultural practices, potential use of pesticides – Potential for pesticide use and other farming related contamination;
2. Storage of vehicles, equipment and waste materials: Potential leaks and spills and flaking of metals etc; and
3. Filling on the site: Use of fill of unknown quality and origin.

To provide an assessment of potential soil contamination, 34 surface soil sampling locations, 18 stockpile soil samples, and one surface water sampling location were carried out across the site. The sampling locations targeted the AECs identified.

The laboratory results reported concentrations of arsenic and copper above the HIL/EIL in one surface soil sample location (SS01A), and asbestos (FA and ACM) above the HSL in one stockpile, SP01 (~230m^3). The surface soil sample was located under waste materials adjacent to a shed in the eastern portion of the site. Stockpile SP01 was also located in the eastern portion of the site.

Other than stockpiled materials, fill material was not identified on site in test pits excavated as part of the geotechnical assessment.

Based on the preliminary and detailed assessment completed, it was considered that the site can be made suitable for the proposed MHE development, provided the following recommendations were implemented:

- Preparation of a Remediation Action Plan (RAP) to outline the remediation for the soil contamination identified, including the arsenic and copper in surface soils, and asbestos (FA and ACM) in stockpile SP01, above the adopted criteria in the eastern portion of the site. The RAP will include assessment of remediation options, and information on what management plans are required;
- Preparation of an Asbestos Removal Control Plan to be implemented during remediation and earthworks. The plan should outline the procedures for the handling and removal of soils containing asbestos. Care must be taken to prevent spreading asbestos onto other areas of the site. It is envisaged that the ARCP would be prepared by the contractor undertaking the removal works; and
- Preparation of an Unexpected Finds Procedure to manage potential unexpected finds of contamination during earthworks and construction for the proposed development.

4.2 Conceptual Site Model

Based on the results of the PDSI, summarised in Section 4.1, a Conceptual Site Model (CSM), for pre-remediation conditions, has been developed, and is presented as Table 4.2.

Table 4.2 — Conceptual Site Model – Pre-Remediation

AEC	COPC	Mechanism of Contamination	Potentially Affected Media	Human & Ecological Receptors	Potential mechanisms of exposure	Sampling Completed	Potential & Complete Exposure Pathways
1. Agricultural practices, potential use of pesticides. • Potential for pesticide use and other farming related contamination	Metals, OCPs TRH, BTEX, PAH	• Top-down leaks/spills, flakes/fibres onto soil. • Leaching of soil contaminants to surface water and groundwater	• Soils • Groundwater • Surface water • Sediments	• Current site visitors • Future construction workers & site users • Soil biota/plants and transitory wildlife • Surface and ground water depended ecosystems • Offsite surface water and groundwater – Lochinvar Creek, located 200m to the south-west of the site.	• Direct dermal contact with contaminated soil or surface water • Ingestion of contaminated soil or surface water • Inhalation of contaminated soil (as dust) • Leaching of soil contaminants to surface water and/or groundwater • Surface water and groundwater discharge to Lochinvar Creek.	SS29, SS34, SW01	• Incomplete exposure pathway for current site visitors, future construction workers, site users, and ecological receptors, as no contamination identified. • Incomplete exposure pathway for soil contaminants to leach to surface water, as no contamination identified in soil or surface water. • Incomplete exposure pathway for soil contaminates to leach to groundwater due to depth of groundwater (>5m bgs), likely clayey subsoils, and no contamination identified.
2. Storage of vehicles, equipment, and waste materials. • Potential leaks and spills, flaking of metals etc	TRH, BTEX, PAH, Metals, Asbestos, OCP (CoPCs dependent on material/waste type)	• Top-down and to depth of fill • Leaching of contaminants from waste material into underlying soils • Leaching of soil contaminants to groundwater	• Surface soil • Fill soils • Underlying soils • Surface water • Groundwater	• Current site visitors • Future construction workers & site users • Soil biota/plants and transitory wildlife • Ecosystem in Lochinvar Creek, located 200m to the south-west of the site. • Offsite groundwater discharge point – Lochinvar Creek, located 200m to the south-west of the site.	• Direct dermal contact with contaminated soil • Ingestion of contaminated soil • Inhalation of asbestos fibres, or contaminated soil (as dust) • Inhalation of hydrocarbon vapours • Leaching of soil contaminants to surface water and/or groundwater • Groundwater discharge to Boatman Creek.	SS01A, SS01 to SS28	• Complete exposure pathway for current site visitors and users and, future construction workers due to arsenic contamination within surface soils at SS01A. • Complete exposure pathway for ecological receptors, due to arsenic and copper contamination within surface soils at SS01A. • Likely incomplete exposure pathway for soil contaminants to migrate to surface water via run-off, due to localised nature of contamination (around buildings), distance to onsite dams and Lochinvar Creek from contamination sources (>200m), and no contamination identified in surface water. • Likely incomplete exposure pathway for soil contaminants to migrate to groundwater due to top-down nature of contamination, depth of groundwater (>5m bgs), and clayey sub-soils.

AEC	COPC	Mechanism of Contamination	Potentially Affected Media	Human & Ecological Receptors	Potential mechanisms of exposure	Sampling Completed	Potential & Complete Exposure Pathways
3. Filling on the site. • Use of imported fill of unknown quality and origin.	Metals, TRH, BTEX, PAH, Asbestos, OCP	• Leaching of contaminants into underlying soils • Leaching of soil contaminants to groundwater	• Fill Soils • Underlying soils • Surface water • Groundwater	• Current site visitors • Future construction workers & site users • Soil biota/plants and transitory wildlife • Ecosystem in Lochinvar Creek, located 200m to the south-west of the site. • Offsite groundwater discharge point – Lochinvar Creek, located 200m to the south-west of the site.	• Direct dermal contact with contaminated soil • Ingestion of contaminated soil • Inhalation of hydrocarbon vapours • Leaching of soil contaminants to surface water and/or groundwater – Boatman Creek • Groundwater discharge to Boatman Creek.	SP01 to SP05/SS30, SW01, SS31 to SS33	• Complete exposure pathway for current site visitors and users, and future construction workers receptors due to asbestos (FA and ACM) contamination in stockpile SP01. • Incomplete exposure pathway for ecological receptors, due to no contamination identified in fill above adopted criteria. • Incomplete exposure pathway for soil contaminants to migrate to surface water via run-off, due to localised nature of contamination (SP01), and distance to onsite dams and Lochinvar Creek from contamination source (>100m) , and no contamination identified in surface water. • Incomplete exposure pathway for soil contaminants to leach to groundwater, due to no leachable contamination identified, likely depth of groundwater (>5m bgs), and clayey sub-soils.

4.3 Contamination Requiring Remediation

Based on the PDSI (Qualtest, 2023a), the following contamination requires remediation and/or clearance. The location of the areas requiring remediation are shown on Figure 4, Appendix A.

Table 4.3 – Contamination Requiring Remediation

AEC	Location	Contamination	Area / Volume
AEC 2	SS01A	Arsenic above human health criteria and copper above ecological criteria	~9m^2 to depth of ~0.2m ~1.8m^3
AEC 3	SP01	Asbestos (FA and ACM) detected above human health criteria.	SP01 estimated to be ~230m^3

Notes: Volumes do not include bulking factors.

5.0 Additional Assessment

5.1 Proposed Field & Laboratory Investigations

Qualtest propose to carry out delineation and leachability assessment of the identified copper and arsenic contamination. It is noted that delineation of the identified Asbestos contamination in SP01 is not proposed as part of the additional works, as the whole stockpile is considered to be impacted. Validation and an asbestos clearance letter will be provided following removal of identified asbestos contamination, refer to Section 7.0 for further information.

The following general scope of work will be carried out to assist in delineating the extent of the identified copper and arsenic contamination. The location of the proposed additional assessment samples is shown on Figure 4, Appendix A.

Table 5.1 – Additional Assessment Sampling Summary

GPS Co-Ords	Location	Fieldwork and Sampling	Proposed Laboratory Analysis
32°41'52.22"S 151°28'17.03"E	SS01A	Collection of samples in a 1.0m grid across the area and drilling of 1 borehole to 0.2m at 1-SS3. 25 samples	Arsenic/Copper – 9 primary samples. Additional samples to be analysed if first 'round' of testing does not meet adopted criteria. Toxicity Characteristic Leaching Procedure (TCLP)/ Australian Standard Leaching Procedure (ASLP) –Arsenic/Copper – 1 Primary sample

The soil samples will be placed into laboratory supplied glass jars. A clean pair of disposable gloves will be worn when collecting each sample.

Investigations would be carried out with the full-time presence of an experienced Environmental Scientist from Qualtest who would locate sampling locations, nominate the sampling and testing, and provide field logs/notes.

Samples obtained during the investigation would be despatched under chain of custody condition. Laboratory analysis would be completed by a NATA accredited laboratory for chemical testing.

5.2 Reporting

The data from the additional assessment would be used to assess the extent of the areas requiring remediation and confirm the leachability status of the material.

The data will also be incorporated into the Validation Report for the site, see Section 7.8 below.

6.0 Remediation Program

The remediation/management goal for the site, with respect to contamination is to remediate/manage the site to a condition such that it is suitable for the proposed development (residential land use).

6.1 Remediation Hierarchy

The NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (ASC NEPM 1999, 2013) provides a preferred hierarchy of options for site clean-up and/or management which is outlined as followed:

- If practicable, on -site treatment for the contamination so that it is destroyed and the concentrations are reduced below the adopted site clean-up criteria; or
- Offsite treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level.

If the above is not practicable:

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

6.2 Remediation Options

Options for the remedial strategies for the contamination that require remediation/management are outlined in Table 6.2, along with the advantages and disadvantages of each remedial option. Note, options that are not considered suitable/appropriate for the contamination types have not been included.

Table 6.2 – Remediation Options

Contamination/ Issue	Remediation Options	Advantages	Disadvantages
Asbestos (FA and ACM) above HSL in SP01 and arsenic and copper concentrations above HIL and EIL respectively in SS01A	Excavate and dispose to landfill	No ongoing management of impacted soil (i.e. no need for long-term EMP). Proven remediation method in NSW.	Generally, not in line with ESD principles. High cost for landfill disposal.
	Place greater than 5m below finished level, and cover with "clean" material	Generally, more in line with ESD principles than removing materials to landfill. Lower cost than disposal to landfill. No ongoing management of impacted soil (i.e. no need for long-term EMP), if placed at appropriate depth.	Will require assessment of proposed placement location(s), to assess that sufficient depth of placement can be achieved. Council approval required.
	Excavate, isolate and cap on site beneath proposed community centre (i.e Pickle Ball Court)	Generally more in line with ESD principles than removing materials to landfill. Lower cost than disposal to landfill. Proven remediation method in NSW.	Not suitable for contaminants that are leachable. Will require assessment of proposed cap construction and location(s) to assess if the contamination will pose risk to future site occupiers and maintenance workers. Will require assessment of proposed capping location(s), including depth, to assess if the contamination will pose risk to the environment (e.g. from leaching of contamination to groundwater). Will require assessment of proposed placement location in regards to potential geotechnical considerations if material is not geotechnically suitable. Council approval required.

Contamination/ Issue	Remediation Options	Advantages	Disadvantages
			Would require long term environmental management plan. Would require notification of location on Section 10.7 Certificate, and/or Section 88b title notation.
	Chemical immobilisation	Can be used for asbestos, and metals. Can be used to reduce the waste classification of soils with high concentrations (i.e. hazardous waste or restricted solid waste). In line with ESD principles (reducing waste, and/or reducing waste that requires specialist disposal).	Not suitable for residential landuse or for areas proposed for landscaping or gardens, as soils unlikely to support plant life following immobilisation. Will require assessment of proposed capping location(s), including depth. Would require excavation of a containment cell to place contaminated material in. Immobilised material would likely need to be placed away from surface water and groundwater, to prevent potential aggressivity and/or erosion impacts. Effectiveness can be hindered by moisture content, clay content, and particle sizes. The location and extent of immobilised contamination would require notification on title and Section 10.7 certificate. Council approval required.

Note: ESD = Environmentally Sustainable Development, EMP = Environmental Management Plan

6.3 Preferred Remedial Strategy

Based on the identified contamination, proposed development, and estimated costs of remediation options, the preferred remedial strategies for the site are:

Contamination	Preferred Remedial Strategy	Contingency Remediation Option
Asbestos (FA and ACM) above HSL in SP01 and arsenic and copper concentrations above HIL and EIL (respectively) in SS01A	Excavate contaminated soils and place within designated capping area (proposed pickle ball court). Contaminated soils in capping area are to be covered with marker layer and minimum of 0.5m of 'clean' cap.	Dispose to landfill

Following completion of the proposed remedial plan, a Long-Term Environmental Management Plan (LTEMP) will be prepared for on-going management of the contaminated material on site.

The location of the designated capping area is shown on Figure 6, Appendix A.

6.4 Contingency Remediation Options

Should the above remediation options not be practical or effective, then the following contingency remediation options would be considered:

- Excavation and disposal of contaminated soils to an appropriately licensed waste facility.

6.5 Proposed Remediation Plan

The following steps outline the remediation plan required to implement the preferred remedial strategy outlined in Section 6.3.

Step 1 – Carry out Delineation/TCLP of Arsenic and Copper

As discussed in Section 5.0 above, delineation and TCLP testing of the identified arsenic and copper contamination is required prior to remediation commencing.

Step 2 – Preparation of a Construction Environmental Management Plan Including Unexpected Finds Procedure and Asbestos Management Plan

An Unexpected Finds Procedure (UFP) has been developed for the site, and is attached in Appendix C. The UFP will be implemented during vegetation clearing, remediation works, and earthworks.

Due to the presence of asbestos, an Asbestos Management Plan (AMP) has been prepared and is attached in Appendix C. The AMP will be implemented during the excavation, loading and placement of asbestos (FA and ACM) impacted soils. For placement of known asbestos in the proposed capping area, the AMP will be implemented until the first layer (300mm) of "clean" material has been placed over the ACM.

The AMP identifies the potential risks associated with the excavation and placement of ACM and outlines the mitigation measures required.

Prior to remediation or earthworks commencing, a Construction Environmental Management Plan (CEMP) will be developed, for implementation during remediation, vegetation clearing and earthworks. The AMP and Unexpected Finds Procedure would also form part of the CEMP.

Step 3 – Disposal of Anthropogenic Waste

Anthropogenic waste was observed on the site surface and within fill materials (stockpiles). The materials comprised asphalt, concrete, timber, bricks, metals etc.

Prior to works commencing in an area, a walkover will be carried out to identify waste materials on the surface, and assess the classification, and the potential for the waste to have caused contamination of the underlying soils. The waste can then be tracked from location on site to its final destination, and validation sampling (where required) recorded.

Where the waste has the potential to cause soil contamination (i.e. tyres, oil drums etc), validation sampling may be required (see Section 7.7.1). If the validation results report elevated concentrations and/or the detection of asbestos, a minimum of 100mm of the soil profile will be excavated and re-located to the containment cell on-site or disposed off-site (as appropriate), in accordance with Step 4, below.

Dockets for the disposal of waste materials must be retained to demonstrate appropriate disposal, and will be included in the validation report.

Step 4 –Excavation and Placement of Known Contamination

The earth works will be carried out by a suitably qualified, licensed and experienced earth works contractor. The earthworks contractor handling stockpile SP01 will need to be licensed for works with friable asbestos, Class A.

The proposed area for placement of known contamination is beneath the proposed pickle ball court, as shown on Figure 6, Appendix A. The proposed pickle ball court covers an area of approximately 350m^2 and the contaminated material is proposed to be placed between 1.5m to 0.5m below the final design surface (minimum 0.5m cap required, including pickle ball court construction materials).

The contaminated materials are considered to be 'non leaching' (to be confirmed via additional assessment for SS01A). For the purpose of this RAP, it has been assumed that the TCLP/ASLP results from the additional testing of SS01A will show the material is non-leaching/will not pose a risk to surrounding environment once remediated. This is also supported by the clayey soils in the proposed placement area and depth to groundwater (considered to be greater than 5m bgs).

The excavation and placement of known contamination in the proposed capping area is anticipated to comprise the following:

- Excavation of SP01 (asbestos (FA and ACM) impacted soils) and SS01A (arsenic and copper impacted soils). Placement of the excavated contaminated soils between 1.5m and 0.5m below the proposed finished surface levels. Based on Section 4.3 above, approximately 235m^3 of contaminated material is estimated to require placement/capping. If additional contamination is identified deeper excavations may be required in the proposed placement location.
- Contaminated soils will require segregation of deleterious and oversize materials. Oversize material will be crushed on site, if practical, such that it is suitable for reuse onsite (following assessment) and or disposed off-site to appropriately licensed waste or recycling facilities (depending on the type of material and its classification).

- The contaminated soil and "clean" material will be placed and compacted in accordance with AS3798-2007 *Guidelines on earthworks for commercial and residential developments*. For materials containing asbestos, a method specification can be carried out to prevent handling of asbestos contaminated soils.
- An environmental scientist will be required during the excavation and placing of the contaminated soils. A record of the material being excavated will be kept, which will also include if "unexpected finds" are encountered.

Erosion and sedimentation controls will be implemented around temporary stockpiles as well as around the work area perimeter, throughout the works.

The "clean" fill material to be placed over the contaminated material in the proposed placement area will comprise:

- Soils sourced from the site (from areas assessed to not be contaminated); or,
- Fill soils imported to the site, that meet the definition of VENM as defined in NSW EPA (2014) Waste Classification Guidelines; or,
- Fill soils imported to the site, that meet an appropriate Resource Recovery Order/Exemption under Part 9, Clause 93 of the POEO (Waste) Regulation 2014 (i.e. Excavated Natural Material); or,
- Quarried materials sourced from a quarry operating under an Environment Protection Licence (EPL).

If material is imported and sourced from a local quarry, then a certificate from the source will be requested confirming the type of material.

If the proposed material is VENM sourced from local earthworks (or similar), then Qualtest will carry out an assessment of the source site, to ensure the material is VENM.

If the proposed fill material has a Resource Recovery exemption, then the material will need to have been assessed in accordance with the relevant Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The Resource Recovery material will also need to be suitable for the proposed use. Relevant information, required to be recorded by the generator under the Resource Recovery Order, will be reviewed by Qualtest, prior to importation of the material to site. If the material has not been assessed by others, then Qualtest may, if directed by the site owner/manager, carry out an assessment of the material in accordance with the Resource Recovery Order prior to importation of the material to site.

Observations will be made by Qualtest of the material as it is delivered to site on at least the first occasion, to check that the material is consistent with the source and that there is no apparent potential contamination such as chemical staining, odours or anthropogenic materials.

The earthworks contractor will be responsible for tracking of materials that are imported to the site. Copies of dockets pertaining to imported soils will be retained by the contractor to confirm the source, type and quantities of materials. A copy of these dockets will be provided to Qualtest for review.

Step 5 – Site Survey

Survey will be carried out to demonstrate that an adequate thickness of cover material (minimum 0.5m thickness, including pickle ball court construction materials) is placed over the contaminated soils. The survey will also include the corners/edges of the placed contaminated materials to mark the location for inclusion in the LTEMP. The survey will comprise:

- The base of the proposed placement area;
- The surface of the contaminated material after placement;
- The corners/edges of the contaminated material placement area; and,
- The surface of the "clean" cover material after placement.

Step 6 – Disposal of Other Materials Offsite

If other materials require offsite disposal during vegetation clearing, remediation and earthworks, these will be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines and disposed to an appropriately licensed facility.

Sampling and analysis will be needed to confirm the waste classification of soil/fill materials. Some materials, (i.e. concrete, mulch) are pre-classified.

If appropriate, materials may be assessed in accordance with a Resource Recovery Order under Part 9, Clause 91 to 93 of the POEO (Waste) Regulation 2014.

The waste classification or resource recovery order will be assessed on a case-by-case basis for each material requiring offsite disposal.

7.0 Validation Program and Reporting

In order to evaluate the data required to assess a site, ASC NEPM (2013) recommends the use of the seven-step DQO process. The seven-step DQO process is an iterative planning approach that is used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of a site.

The seven steps are:

- Step 1: State the Problem;
- Step 2: Identify the decision/goal of the study;
- Step 3: Identify the information inputs;
- Step 4: Define the boundaries of the study;
- Step 5: Develop the analytical approach;
- Step 6: Specify performance or acceptance criteria; and,
- Step 7: Develop the plan for obtaining data.

This DQO process has been adopted for the validation programme.

7.1 Step 1 - State the Problem

The site contains contaminated soils that require remediation to make the site suitable for the proposed development.

There are several issues to be addressed as part of the remediation/management:

- The leachability of the arsenic and copper contamination needs to be assessed via the additional assessment;
- The excavations resulting from removal of contaminated soil (arsenic, copper and asbestos contaminated soils) will require validation;
- Anthropogenic waste needs to be disposed to appropriately licensed waste facilities;
- The arsenic, copper and asbestos contaminated soils, will need to be placed into the designated capping area and capped with a minimum of 0.5m thick 'clean soil' cap; and
- The 'clean cap' material will require certification/validation prior to use (and importation for imported materials).

7.2 Step 2 – Identify the Decision/Goal of the Study

The decision to be made based on the results of the validation assessment is:

- Is the site suitable for the proposed development from a contamination perspective?
- Have risks to earthworks and construction workers associated with contaminated soils, been mitigated during the works (i.e. have appropriate procedures been followed)?

To achieve this, the validation program needs to demonstrate that:

- Excavations resulting from removal of contaminated soils have been validated;
- The contaminated soils (arsenic, copper and asbestos) have been placed into the designated capping area and capped with a minimum of 0.5m thick 'clean soil' cap;
- The site surface in areas where anthropogenic wastes have been removed have been validated;
- The capping material for the contaminated soils are appropriate for the use (i.e. comprises validated site sourced material, VENM, or appropriate Resource Recovery Exemption material);
- Dockets have been retained to demonstrate any waste requiring disposal offsite was disposed to appropriately licensed facilities (if any);
- The site surface in areas where asbestos impacted soils have been removed have been "cleared" and validated by a licenced asbestos assessor (for friable asbestos) or an appropriately qualified person (i.e. competent person as described by SafeWork NSW) for ACM; and
- Procedures in the AMP and UFP were implemented when required.

7.3 Step 3 - Identify the Information Inputs

Inputs into the decision are:

- Have validation samples been collected in the various materials and/or places as required?
- Have validation samples been collected at the required frequencies, and adequately represent the condition of the materials and/or places?
- Is the data set adequate to perform statistical analysis (i.e. calculate 95% UCL);
- Have validation samples been analysed for the COPCs identified?

- Have concentrations exceeding the adopted criteria been reported in the validation samples?
- If concentrations exceeding adopted criteria have been reported, have these areas been further remediated or otherwise managed?
- Is imported material classified as VENM or appropriate Resource Recovery Exempt material;
- Has survey of the contaminated material placement been undertaken?
- Does the survey show that the contaminated material has a minimum 0.5m thick 'clean' cap?

The informational inputs into the decision are:

- Field observations;
- Validation laboratory results;
- QA/QC documentation and data;
- Material tracking information:
  - Records for the excavation, stockpiling and placement of the contaminated material;
  - Waste dockets for anthropogenic waste and other materials disposed offsite;
  - Certificates for material imported to site;
  - Records of volumes exported and imported;
- Survey data; and
- Adopted remediation criteria, and relevant NSW EPA endorsed guidelines.

7.4 Step 4 - Define the Boundaries of the Study

The study boundary is defined laterally as the site boundaries, Lot 225 DP246447 within the Maitland local government area. The site is located at 34 Wyndella Road, Lochinvar NSW. The site area is about 10 ha. Vertically, the study boundary will be defined by the depth of soil contamination. It is anticipated the vertical boundary would be a maximum of 2m bgs. Temporarily, the study boundaries will be the dates of remediation and validation sampling.

The site boundary is shown on Figure 1, Appendix A.

7.5 Step 5 - Develop the Analytical Approach

The analytical approach can be defined as: -

- If the laboratory quality assurance/ quality control data are within the acceptable ranges, the data will be considered suitable for use;
- If the COPCs are reported above the adopted criteria and/or at elevated levels (where no criteria are available) then it will be considered whether further assessment, remediation and/or management measures are required;
- Where practical and/or appropriate, the 95% Upper Confidence Limit (UCL) of the validation samples will be calculated. If the 95% UCL is above the adopted criteria, then it will be considered whether further assessment, remediation and/or management measures are required; and,
- Where concentrations are below the assessment criteria, then no further assessment, remediation and/or management of that contaminant, in that area, in that media, is required. This is provided samples have been collected at the required frequencies (as per

NSW EPA guidelines) and adequately represent the conditions on site, if not, additional sampling may be required.

7.6 Step 6 - Specify Performance or Acceptance Criteria

There are two types of errors:

- Type 1 – finding that the site is contaminated, when it is not;
- Type 2 – finding that the site is uncontaminated, when it is.

To reduce the potential for errors, the following will be applied:

- Appropriate field sampling methodologies and collection of field data (including sampling frequency);
- Robust QA/QC assessment of field procedures and laboratory data;
- Appropriate sampling and analytical density;
- Use of statistics (i.e. 95% UCL) to assess arithmetic average of COPCs. Use of statistics will also take into account:
    - No sample should report a concentration more than 250% of the adopted criteria; and,
    - The standard deviation of a sample population should not exceed 50% of the adopted criteria.

The adopted criteria are shown in Section 7.6.1 below.

7.6.1 Validation Criteria

The health and ecological investigation levels for soil, presented in the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013*, Canberra (referred to as ASC NEPM 2013) are generally used in NSW when selecting investigation levels for chemical contaminants in soil.

ASC NEPM (2013) provides health and ecological investigation and screening levels for different exposure scenarios based on a proposed land use. Health and ecological investigation and screening levels are applicable to the first stage (Tier 1) of site assessment and are used to assist in the iterative development of a Conceptual Site Model (CSM). They are adopted as concentrations of a contaminant above which either further appropriate investigation and/or evaluation will be required, or development of an appropriate management strategy (including remediation).

Health Investigation & Screening Levels

Health Investigation Levels (HILs) and Health Screening levels (HSLs) are applicable for assessing human health risk via relevant exposure pathways.

The HILs were developed for a broad range of metals and organic substances. These are generic to all soil types.

The HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via inhalation and direct contact with soil and groundwater. The HSLs depend on specific soil physicochemical properties, building configurations, land use scenarios and the depth that groundwater is encountered.

Based on the above, the following criteria have been adopted for validation:

- Health Investigation Level for residential land use (HIL A); and
- Health Screening Level for residential land use (HSL A).

The HSLs were first published by Friebel & Nadebaum (2011) and included HSLs for intrusive maintenance workers in a shallow (not more than 1.5m deep) trench (inhalation of volatile vapours) and for risks to maintenance workers from dermal contact with contaminated soils. These HSLs are not reproduced in the ASC NEPM (2013). However, the HSLs for these exposure scenarios are higher than the ESLs for open space exposure scenarios adopted (see Section below), so do not require further consideration for soil.

Ecological Investigation and Screening Levels

Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) are applicable for assessing risk to terrestrial ecosystems under residential, open space and commercial/industrial land use scenarios. They apply to the top 2m of soil, which corresponds to the root zone and habitation zone of many species.

The EILs are associated with selected metals and organic compounds. The EILs are site specific and are determined by calculating an Ambient Background Concentration (ABC) and an Added Contaminant Limit (ACL) for the site, which are added together to get the EIL. In the absence of ambient background concentration data, a generic ACL, based on the soils pH, Cation Exchange Capacity (CEC) and clay content, has been adopted.

The ESLs are associated with petroleum compounds and fractions and are dependent on specific soil physical properties (i.e. coarse and fine-grained soil).

The following ecological criteria have been adopted for validation:

- Ecological Investigation Level (EIL) for urban residential / public open space (EIL A).
- Ecological Screening Level (ESL) for urban residential / public open space (ESL A).

Asbestos Materials in Soil

The assessment of known and suspected asbestos contamination in soil is based on:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (April 2013), ASC NEPC 2013, Canberra; and
- *WA DoH 2009 Guidelines of the assessment and management of asbestos contaminated sites in Western Australia, WA Department of Health and Department of Environment and Conservation.*

Schedule B1, Section 4 NEPM (2013) provides guidance on the assessment of both friable and non-friable forms of asbestos in soil. This guidance is based on the WA DoH (2009) Guidelines that presented risk-based screening levels for asbestos in soil under various land use scenarios.

For the purpose of assessing asbestos impacts in soil, three groups are recognised:

- Asbestos Containing Material (ACM) - which is in sound condition although possibly broken or fragmented and the asbestos is bound in a matrix. This is restricted to material that cannot pass through a 7mm x 7mm sieve;
- Fibrous asbestos (FA) - friable asbestos material, such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products;
- Asbestos fines (AF) - includes free fibres of asbestos, small fibre bundles and also ACM fragments that pass through a 7mm x 7mm sieve.

Health Screening Levels for asbestos contamination in soil have been adopted as validation criteria. The HSLs for residential land use have been adopted.

Adopted Validation Criteria

For validation purposes, the adopted remediation levels (for residential land use) are listed in Table 7.6 below, for current known contamination. If additional analytes require testing (from unexpected finds/anthropogenic wastes etc, refer to criteria outlined in ASC NEPM 2013.

Table 7.6 – Adopted Validation Criteria

Contaminant	HIL / HSL A	EIL A
Bonded ACM %	0.01	-
FA and AF %	0.001	-
All forms of asbestos	No visible evidence for surface soil (top 10cm)	-
Arsenic	100 mg/kg	100 mg/kg
Copper	7400 mg/kg	270 mg/kg*

* EIL based on pH of 8 and CEC of 71meq/100ml, and Clay content 40%, and using Ambient Background Concentration obtained from Olszowy et al (1995) using urban soils, old suburbs with low traffic, 50% percentile.

7.6.2 Waste Classification & Resource Recovery Criteria

Soils or materials proposed to be disposed off-site would be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines. The guidelines provide criteria for general solid waste, and restricted solid waste. Where concentrations exceed restricted solid waste, the material is classified as hazardous waste. Material containing asbestos (in any form or quantity) are classified as Special waste - Asbestos.

NSW EPA (2014) Waste Classification Guidelines also provide a definition for Virgin Excavated Natural Material (VENM), which may be applicable for some soils if they require offsite disposal. The definition of VENM is:

"Virgin excavated natural material means natural material (such as clay, gravel, sand, soil or rock fines):

- *that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities*
- *that does not contain sulfidic ores or soils, or any other waste,*

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette."

Resource Recovery Orders under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 may be applicable for some soils if they require offsite disposal. Resource Recovery Orders which may be appropriate for site materials include:

- Excavated natural material; and,
- Recovered aggregate.

7.7 Step 7 - Develop the Plan for Obtaining Data

Validation of the site will comprise:

- Validation of the excavations resulting from removal of contaminated soils from the site (refer to Figure 5) to demonstrate the remaining soils in the area are suitable for residential land use;
- Validation of surface soils underlying asbestos (FA and ACM) within soils (following removal of SP01), to demonstrate the surface soils are suitable for residential land use;
- Validation of surface soils underlying anthropogenic waste materials (following removal of the waste) where required, to demonstrate the surface soils are suitable for residential land use;
- Tracking of the contaminated material from excavation, temporary stockpiling, to final destination;
- Survey of the base, top of the placed contaminated material and surface of the capping material, to demonstrate it is at least 0.5m of 'clean' cap is present;
- Validation of site soils used as cover material, to demonstrate they are suitable for residential land use (from a contamination perspective);
- Certification that imported materials are VENM or appropriate Resource Recovery Exempt materials; and,
- Tracking of materials that are disposed offsite.

The validation sampling process is described in the sections below.

The location of identified contamination is shown on Figure 3B, Appendix A. The proposed remediation areas are shown on Figure 5, Appendix A.

7.7.1 Validation Sampling

Validation soil sampling will be completed in accordance with the following guidelines:

- Australian Standard AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds.
- ASC NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Measure.
- NSW EPA (2022) Sampling Design Part 1 - Application.
- WA DoH (2021) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, WA Department of Health and Department of Environment and Conservation.
- WA DoH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, WA Department of Health and Department of Environment and Conservation.

Surface Soils Underlying Abestos (AF and ACM) After Removal - SP01

In order to validate the site surface, or excavation walls/bases (if any), where asbestos has been removed:

- An asbestos clearance would be carried out. The clearance will comprise:
- Set-up of a 5m grid across the area;

- Each grid would be raked. If any ACM is identified, it would be picked up and bagged for removal;
- Following raking, each grid would be walked over in two directions (i.e. north-south, then east-west). If any ACM is identified, it would be picked up and bagged for removal; and
- The above steps would be repeated until no asbestos is visible;
- Validation soil samples will be collected at a rate of one sample per 5m grid;
- Asbestos validation samples will be collected using the gravimetric methods to assess ACM (bonded asbestos) concentrations, as well as laboratory analysis for Friable Asbestos (FA) or Asbestos Fines (AF).

Excavations After Removal of Arsenic and Copper Contaminated Soils – SS01A

- Validation soil samples will be collected from the excavation at the following frequencies:
  - One sample per 10 linear metres on the excavation walls; and
  - One sample per 25m^2 on the excavation base. Where excavations are larger than 300m^2, samples will be collected from the base at the sampling density outlined in Table 2 of NSW EPA (2022) Sampling Design Part 1 – Application, Contaminated Land Guidelines (minimum of 8 samples).
- Validation samples would be tested for arsenic and copper by a NATA-accredited laboratory.
- Where appropriate, delineation samples will also be used to validate the excavation.

Validation Sampling Methodology

The following steps will be undertaken in order to obtain representative validation samples for laboratory analysis:

- Samples will be collected using hand tools (stainless steel shovels or trowels), or directly from the excavator bucket.
- Gravimetric asbestos testing will comprise collection of a 10L sample, sieving the sample through a 7mm sieve, and weighing of potential ACM fragments (if any).
- Samples will be placed into laboratory-supplied containers.
- Hand tools used during sample collection will be decontaminated between samples by rinsing with phosphate-free detergent and potable water.
- A clean pair of disposable nitrile gloves will be worn when handling samples.
- Samples will be placed into ice chilled eskies after collection.
- Samples will be submitted to a NATA-accredited laboratory under chain of custody conditions.

Quality Assurance / Quality Control

In order to assess field quality assurance / quality control (QA/QC) procedures, the following QC samples would be collected:

- One field duplicate and one field triplicate sample will be collected and analysed with every 20 primary validation samples; and,

- One equipment rinsate sample would be collected per day of sampling where re-usable equipment is used.

Due to the nature of the asbestos contamination, no field quality assurance / quality control samples are proposed to be collected from SP01.

7.7.2 Validation Survey

Survey will be carried out prior to, and on completion of, placement of the capping material over the placed contaminated soils. The survey will mark out the following:

- The base of the proposed placement area;
- The surface of the placed material (after compaction), prior to placement of the capping material;
- The corners/edges of the contaminated material placement area;
- The surface of the capping material following completion of placement of the cap; and
- The survey should enable assessment that the contaminated soil has been covered with a minimum 0.5m thick 'clean' cap.

7.7.3 Validation of Imported Materials

Materials imported to the site will comprise:

- Fill soils imported to the site, that meet the definition of VENM as defined in NSW EPA (2014) Waste Classification Guidelines;
- Fill soils imported to the site, that meet an appropriate Resource Recovery Order/Exemption under Part 9, Clause 93 of the POEO (Waste) Regulation 2014 (i.e. Excavated Natural Material); or
- Materials sourced from a quarry operating under an Environment Protection License (EPL).

If VENM is imported a certificate/letter from the source/supplier will be requested confirming the type of material, and that it meets the definition of VENM in NSW EPA (2014) Waste Classification Guidelines. The VENM certificate/letter will be reviewed by Qualtest, or an appropriately experienced contractor representative, prior to importation of the material.

If the proposed material has a Resource Recovery exemption, then the material will need to have been assessed in accordance with the relevant Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The Resource Recovery material will also need to be suitable for the proposed use.

Relevant information, required to be recorded by the generator under the Resource Recovery Order, will be reviewed by Qualtest prior to importation of the material to site. If the material has not been assessed by others, then Qualtest may, if directed by the client, carry out an assessment of the material in accordance with the Resource Recovery Order prior to importation of the material to site.

Observations will be made by Qualtest, or an appropriately experienced contractor representative, of the material as it is delivered to site on at least the first occasion, to check that the material is consistent with the source and that there is no apparent potential contamination such as chemical staining, odours or anthropogenic materials.

The earthworks site contractor will be responsible for tracking of materials that are imported to the site. Copies of dockets pertaining to imported soils will be retained by the contractor to

confirm the source, type and quantities of materials. A copy of these dockets will be provided to Qualtest for review and inclusion in the validation report.

7.7.4 Material Tracking

Material tracking will be undertaken to demonstrate the appropriate capping, re-use and/or disposal of materials. A material tracking system will be implemented during remediation works, up until the contaminated soils (and/or other identified materials requiring remediation) have been disposed, remediated, and/or capped as required in this RAP. The tracking will include the following information:

- Date and time;
- Description of the material (i.e. asbestos, arsenic/copper impacted soil);
- Volume of material;
- Temporary stockpile ID and location;
- Notable observations: ACM, stained/odorous soils;
- Final destination (i.e. placed onsite (including location) or disposal offsite (including location).

Materials tracking forms will be developed by the contractor and the environmental consultant.

7.8 Validation Reporting

7.8.1 Validation Report

A validation report will be prepared, following completion of remediation works, and will include:

- Description of remediation works completed.
- Unexpected Finds identified during vegetation clearing and bulk earthworks (if any), and how these were managed/remediated.
- Material tracking documentation, including waste dockets, and tracking of materials.
- Results of asbestos clearances.
- Results of validation samples, compared to relevant criteria.
- Survey date and plans showing location of the capped contaminated material;
- A statement of whether the site is suitable for the prosed development (residential land use), from a contamination perspective.

The Validation Report will be written by an experienced and appropriately accredited contaminated land consultant, in accordance with relevant sections of the NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land.

7.8.2 Long-Term Environmental Management Plan

Following completion of the validation report, a Long-Term Environmental Management Plan (LTEMP) will be prepared for on-going management of the contaminated material on site. The LTEMP will include:

- Guidance on the ongoing management of the contaminated material, and that breaches to the cap are not permitted unless necessary (i.e. for maintenance of underground services);

- The presence of contaminated soil, its nature, extent, and how it is to be managed;
- The capping used to control exposure to contamination;
- Monitoring of the performance of the cap through regular inspections by the site owner/manager;
- Procedures for the control of excavations in the event the cap requires breaching for maintenance work (or similar);
- Requirements for record keeping related to maintenance of the capped areas by the site owner/manager; and
- Responsibilities and control measures for implementation of this LTEMP

8.0 Site Management Plan

The management strategies for environmental issues that may arise during site works are discussed in the sections below. These strategies are considered a minimum requirement to be followed by the remediation contractor before and during remediation activities. It is envisaged that the remediation contractor will develop site specific environmental work plans for soil excavation, stockpiling, and disposal.

8.1 Asbestos

As discussed in Section 4.0 above, asbestos fibres (FA) and ACM was identified in SP01. An Asbestos Management Plan (AMP) has been prepared, and is attached in Appendix B. The AMP will be implemented during the excavation, loading and placement of asbestos (FA and ACM) impacted materials. For placement of known ACM/fibres, the AMP will be implemented until the first layer (300mm) of "clean" material has been placed over the ACM/fibres.

A Class A licensed asbestos removalist will be required during excavation, handling and placement of the material in SP01.

8.2 Air Emissions and Odours

The Contractors will properly maintain and operate machinery to reduce engine emissions and exhaust.

No volatile contamination, likely to generate odours, has been identified on the site. If volatile contamination is encountered as an unexpected find (considered unlikely to occur), then the following would be carried out:

- Qualtest would monitor the air quality using a PID and olfactory observations, in the vicinity of the volatile contamination during handling of the material, within worker's breathing zones, and down-wind at the site boundary. If PID readings within the site exceed 10ppm then site personnel should wear half face respirators with organic vapour cartridges. If the PID readings within the site exceed 50ppm the works should temporarily cease and workers should move upwind of the excavation until the PID readings decrease. If PID readings above 50ppm persist then odour/vapour control measures should be implemented.
- If PID reading at the site boundary exceed 10ppm or persistent odours are observed, then works should cease and odour/vapour control measured should be implemented.
- Odour control measures could include spraying of a surfactant such as Biosolve or covering of the excavation and/or contaminated material.

8.3 Dust

The remediation works are anticipated to be carried out in conjunction with vegetation clearing. As such, dust generation is considered a potential environmental impact to the surrounding environment and the public.

The following management measures should be implemented to prevent dust impacts:

- A communications and complaints register should be kept on site to ensure that concerns of local residents and workers are recorded and addressed;
- If dust migration from cleared and/or excavated areas is considered excessive due to high winds, the works should be delayed or limited during these periods;
- Trucks removing material from the site should have loads covered;
- Vehicular movements entering and exiting the site should be kept to a minimum;
- Machinery should be floated onto and off the site
- Machinery and vehicle tyre should be washed down prior to leaving the site; and
- Works should be limited during times of high winds.

8.4 Noise controls

The remediation works are not anticipated to generate noise that would be considered an environmental issue. The noise that will be generated is anticipated to be mainly derived from excavation activities. It is anticipated that the level of noise generated will not exceed that of a typical construction site.

Noise limitations imposed by Maitland City Council are to be adhered to. This may include restrictions on working days and hours, and acceptable noise levels.

8.5 Stormwater and Soil Management

Adequate storm water run-off, run-on and sediment control measures will be put in place for the works.

Where temporary stockpiling of material is required, the stockpiles will need to be managed in a way to prevent movement of material beyond the site boundaries. The following recommendations provide guidance on managing stockpiled material:

- Access to the stockpiled material should be limited, keeping the stockpile within site fences;
- Stockpiles should be placed on level ground or ground with slopes of <5˚ from the horizontal;
- Placed at least 40m away from drainage lines and creeks; and,
- Adequate straw bales and/or silt fences should be placed around the perimeter of the stockpile area to filter runoff from the stockpiles and prevent overland storm water flow affecting the base of the stockpile.
- Stockpiles should be covered to prevent dust migration, and infiltration of rainwater leading to sediment run-off.

8.6 Traffic

Traffic may be a concern to local residents during export and import of material on and off site.

For the remediation component, based on the volumes of material currently requiring disposal (anthropogenic waste), it is considered that traffic disruptions would be minimal and short term.

It is expected that traffic management plans, or a Construction Environmental Management Plan, will be prepared for the larger development earthworks.

8.7 Working hours

The working hours for the remediation works will be consistent with Maitland City Council requirements.

8.8 Access restrictions

As the site will be classified as a construction area, it is necessary to restrict access solely to authorised staff and contractors who have appropriate levels of personal protective equipment. Site fencing should be maintained, and unauthorised personnel are to be kept outside.

9.0 Occupational Health and Safety

Prior to the commencement of site works, the remediation contractor will prepare Safe Work Method Statements (SWMS), or equivalent, for their activities.

Qualtest will prepare SWMS for their works associated with the remediation works and validation programme. The SWMS will include the following information:

- Likely hazards and control measures;
- Emergency assembly areas;
- Emergency contact numbers;
- Site security procedures;
- First aid wardens on the site; and
- Procedures for the safe handling of chemicals and contaminated soil.

The SWMS will be reviewed when new tasks are undertaken. The SWMS will be updated as required to cover the tasks undertaken.

10.0 Licenses and Approvals

In accordance with State Environmental Planning Policy (Resilience and Hazards) 2021, the works are considered to comprise Category 2 remediation works, therefore, Development consent is not required for the remediation works. However, Development Consent is required from Maitland City Council for the proposed development, and it is anticipated that the remediation works would be included in that Development Consent.

Removal of friable asbestos or greater than 10m^2 / 100kg of ACM offsite would require notification to SafeWork NSW. At least 7 days should be allowed for the notification. A Class A licensed removalist is required for the excavation, handling, and placement of the material in SP01 due to the presence of friable asbestos. Currently, it is not proposed to remove asbestos offsite.

The volume of material being removed from the site should be documented by the contractor, supported by material tracking sheets and waste disposal dockets.

11.0 Contact Details and Community Relations

11.1. Contact details

Contact details for the principal contractor and environmental consultant are provided in Table 11.1.

Table 11.1 – Contact details

Contact Name	Contact Number
Principal – AEP Developments Pty Ltd	0420 975 622
Principal Contractor – TBA	
Environmental Consultant – Qualtest Libby Betz (Contamination Project Manager)	(02) 4968 4468

11.2. Community Relations

The community will be aware of the project through exhibition of the DA, and notification of intent given to the works to nearby neighbours. Community consultation will occur through the DA process.

The procedures outlined in the RAP and the contractors CEMP, should lower the potential impact that remediation works will have on the surrounding community. Enquiries regarding environmental and communication issues from members of the local community and neighbouring properties should be documented and referred to the client.

12.0 Contingency Plan / Unexpected Finds

A contingency plan is provided below in Table 12.1, for the management of unexpected finds, in addition to the Unexpected Finds Procedure included in Appendix B.

Table 12.1 – Contingency Plan and Unexpected Finds

Unexpected Conditions	Proposed Action
During vegetation clearing and/or earthworks, material is encountered which appears to be potentially contaminated and appears different from contamination, fill or soils described in previous assessment reports.	1. Suspicious material/soils which has already been excavated should be bunded, placed in a skip bin and/or stockpiled on low-density polyethylene plastic sheeting and protected from erosion and seepage. 2. Excavation works at that part of the site where the suspicious material (soil) was encountered should cease until observations are carried out by Qualtest. 3. Based on the observations, Qualtest will provide interim advice on health and safety of remedial

Unexpected Conditions	Proposed Action
	works, soil storage and soil disposal to allow remediation to proceed if possible. 4. Based on sampling and analysis of the material, Qualtest will provide advice as to remedial requirements for the material. 5. Suspicious material/soils may include fibrous, oily or odours materials/soil, drums, metal or plastic chemical containers or brightly coloured material.
During the remediation work, additional volumes of contaminated materials exceed the anticipated volume and will not fit in the proposed placement cell.	Extend the contaminated soil placement cell to allow for additional contaminated material and/or dispose offsite.
Survey indicates the thickness of the cover material for contaminated soil is less than 0.5m.	Placement of additional cover material in area(s) such that the thickness is greater than required. If placement of additional material is not practical, assess other options such as risk assessment.
Validation samples exceed the adopted validation criteria.	Continue excavations and re-sample. Assess other remediation options if further excavation is not practical.
Complaints from residents regarding noise pollution, dust and odours.	Increased monitoring, revision of management plans. Investigate and manage source of complaint.

13.0 Conclusions

Implementation of the RAP by appropriately qualified earthworks contractor and environmental consultant, who would conform to the strategies and procedures outlined in this RAP, would mitigate the potential risk of environmental impacts during vegetation clearing and bulk earthworks.

Conformance with the remediation, material tracking and validation procedures would enable an appropriate validation assessment and Validation Report to be completed, to demonstrate that the site is suitable for the proposed development.

Based on the above, it is considered that appropriate implementation of the RAP would achieve the objective of rendering the site suitable for the proposed development.

14.0 References

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

NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land.

NSW EPA (2022) Sampling Design Part 1 - Application

NSW EPA (2014) Waste Classification Guidelines.

WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

Olszowy et al (1995) Trace Element Concentrations in Soils from Rural and Urban Areas of Australia

State Environmental Planning Policy 2021 Resilience and Hazards.

NSW Department of Urban Affairs and Planning and NSW EPA (1998) Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land.

Contaminated Land Management Act, 1997.

Protection of the Environment Operations Regulation, 2014.

Resource Recovery Orders/Exemptions under Part 9, Clause 91 to 93 of the Protection of the Environment Operations (Waste) Regulation 2014.

Qualtest (2023a) Preliminary and Detailed Site Investigation (PDSI), ref: NEW23P-0216-AA, dated 28 November 2023.

Qualtest (2023b) Preliminary Geotechnical Assessment, ref: NEW23P-0216-AB, dated 6 December 2023.

APPENDIX A:

Figures

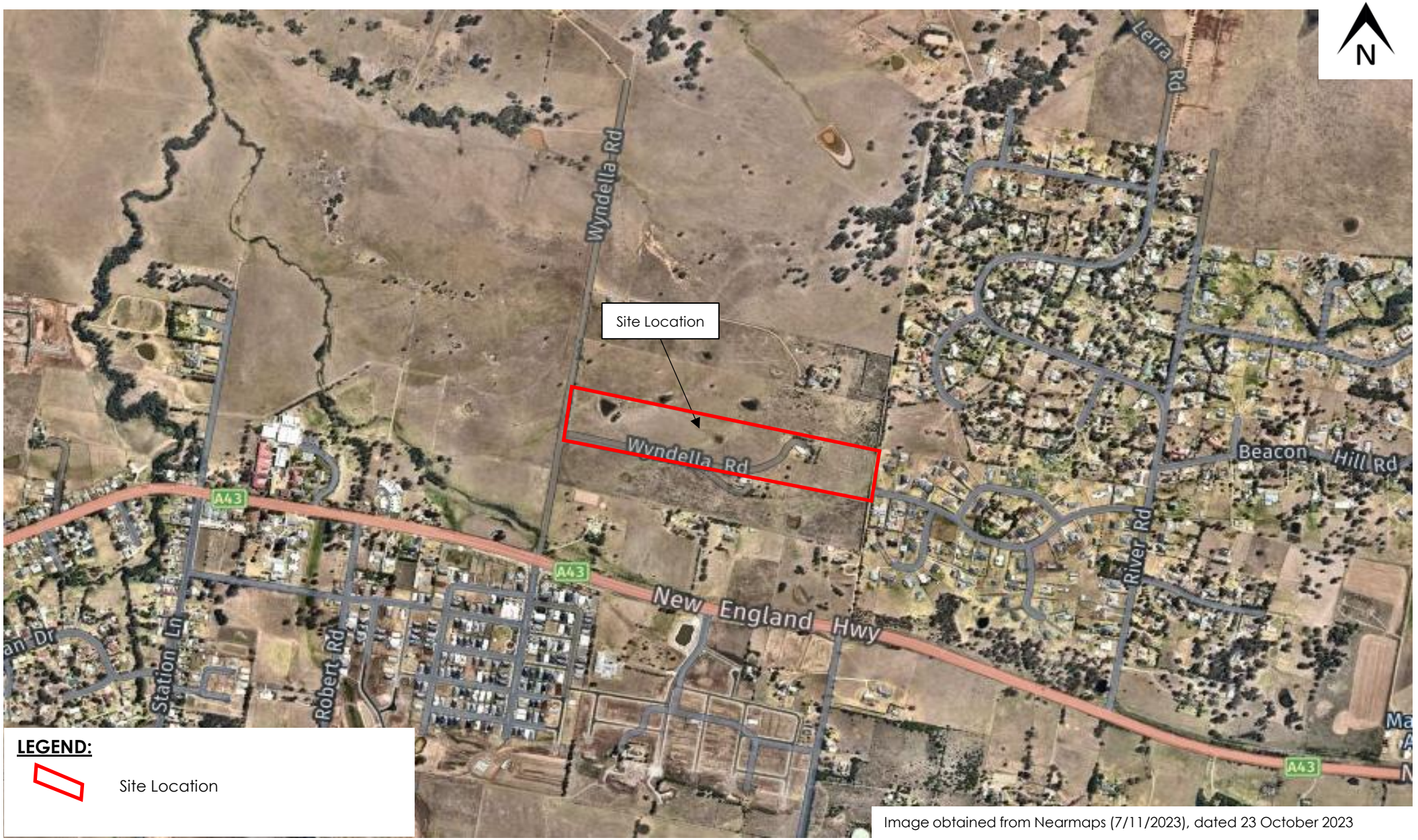
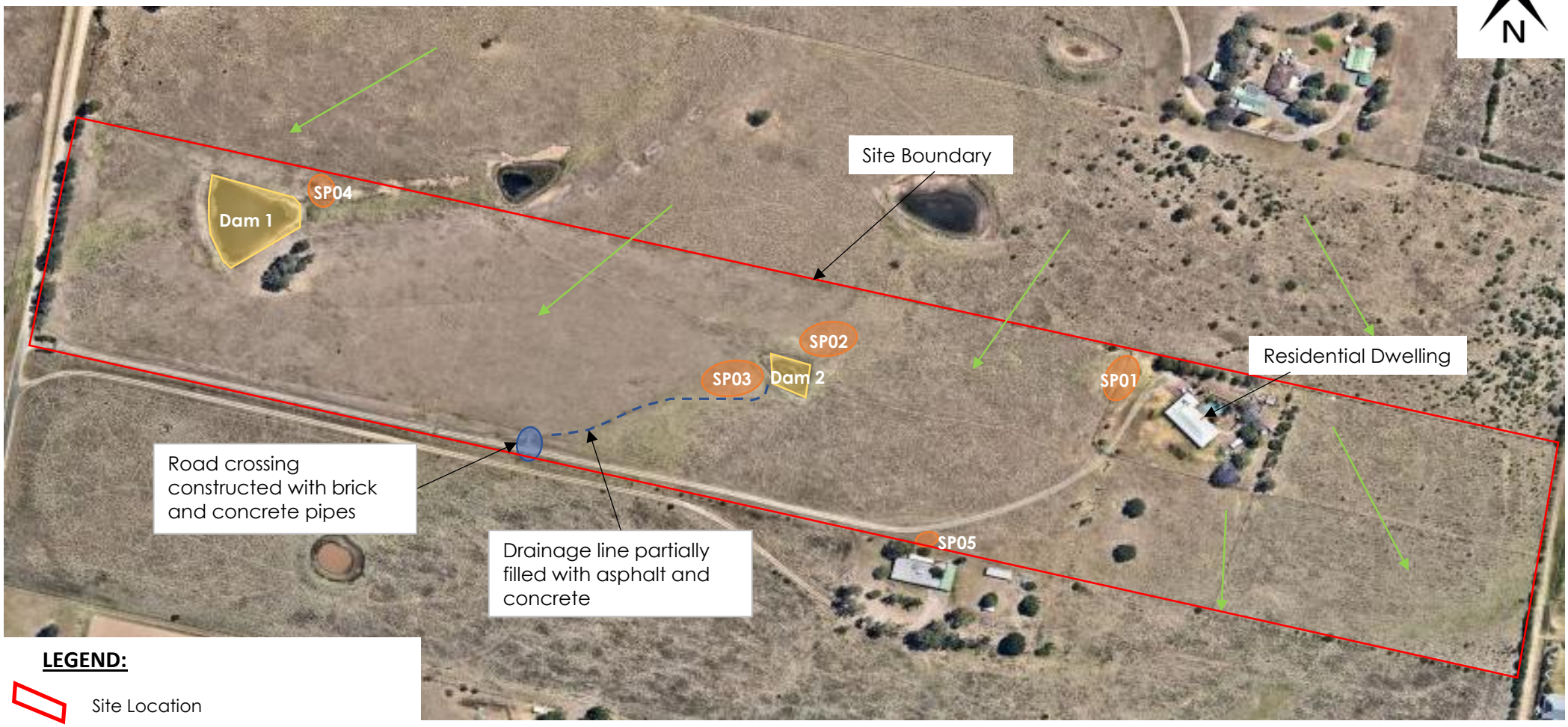


Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 1
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Site Location Plan	Date:	26/11/2024

Qualtest LABORATORY (NSW) PTY LTD



LEGEND:

- Site Location
- Slope Direction
- Dam Locations
- Approx. Stockpile location

Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Qualtest LABORATORY (NSW) PTY LTD

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 2A
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Site Features Plan - Full Site	Date:	7/11/2023

LEGEND:

Site Location

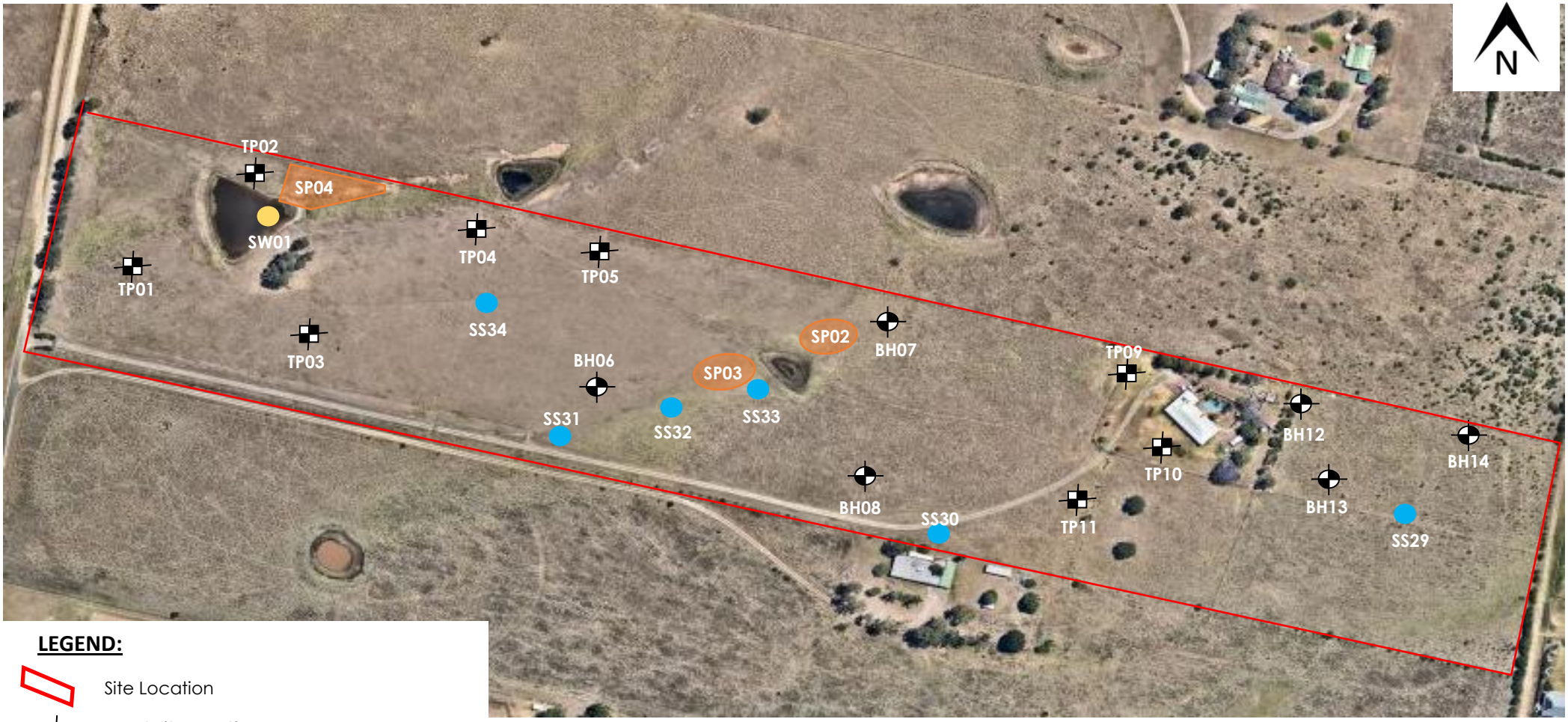
Fill / material storage

Approx. Stockpile location

Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Qualtest LABORATORY (NSW) PTY LTD

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 2B
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Site Features Plan - Residential Area	Date:	7/11/2023



LEGEND:

- Site Location
- Testpit Locations
- Surface Water Sample Location
- Approx. Stockpile location
- Surface Soil Sample Location

Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Qualtest LABORATORY (NSW) PTY LTD

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 3A
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Sample Location Plan & Identified Contamination - Full Site	Date:	7/11/2023

SP1	SP1-2	SP1-6	SP1-7	SP1-8
Asbestos ACM	0.19%w/w	0.06%w/w	ND	0.02%w/w
Asbestos FA/AF	<0.001%w/w	<0.001%w/w	0.13%w/w	<0.001%w/w

SS01A	0.0-0.1m
Arsenic	760mg/kg
Copper	570mg/kg

LEGEND:

- Site Location
- Testpit Location
- Surface Soil Sample Location
- Approx. Stockpile location

Sample ID / Stockpile	Depth (m) / Stockpile Sample ID
Contaminant	Concentration exceeds HIL/HSL
Contaminant	Concentration exceeds EIL/ESL

Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Qualtest LABORATORY (NSW) PTY LTD

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 3B
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Sample Location Plan & Identified Contamination - Residential Area	Date:	27/11/2023

LEGEND:

- Surface Soil Sample Location - SS01A
- Approx. Proposed Sample Location
- Approx. Proposed Sample Location (Second Round, if required)

Image obtained from Nearmaps,dated 6 October 2024

Qualtest LABORATORY (NSW) PTY LTD	Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 4
	Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
	Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
	Title:	Proposed Additional Assessment	Date:	26/11/2024

SP1	SP1-2	SP1-6	SP1-7	SP1-8
Asbestos ACM	0.19%w/w	0.06%w/w	ND	0.02%w/w
Asbestos FA/AF	<0.001%w/w	<0.001%w/w	0.13%w/w	<0.001%w/w

SS01A	0.0-0.1m
Arsenic	760mg/kg
Copper	570mg/kg

LEGEND:

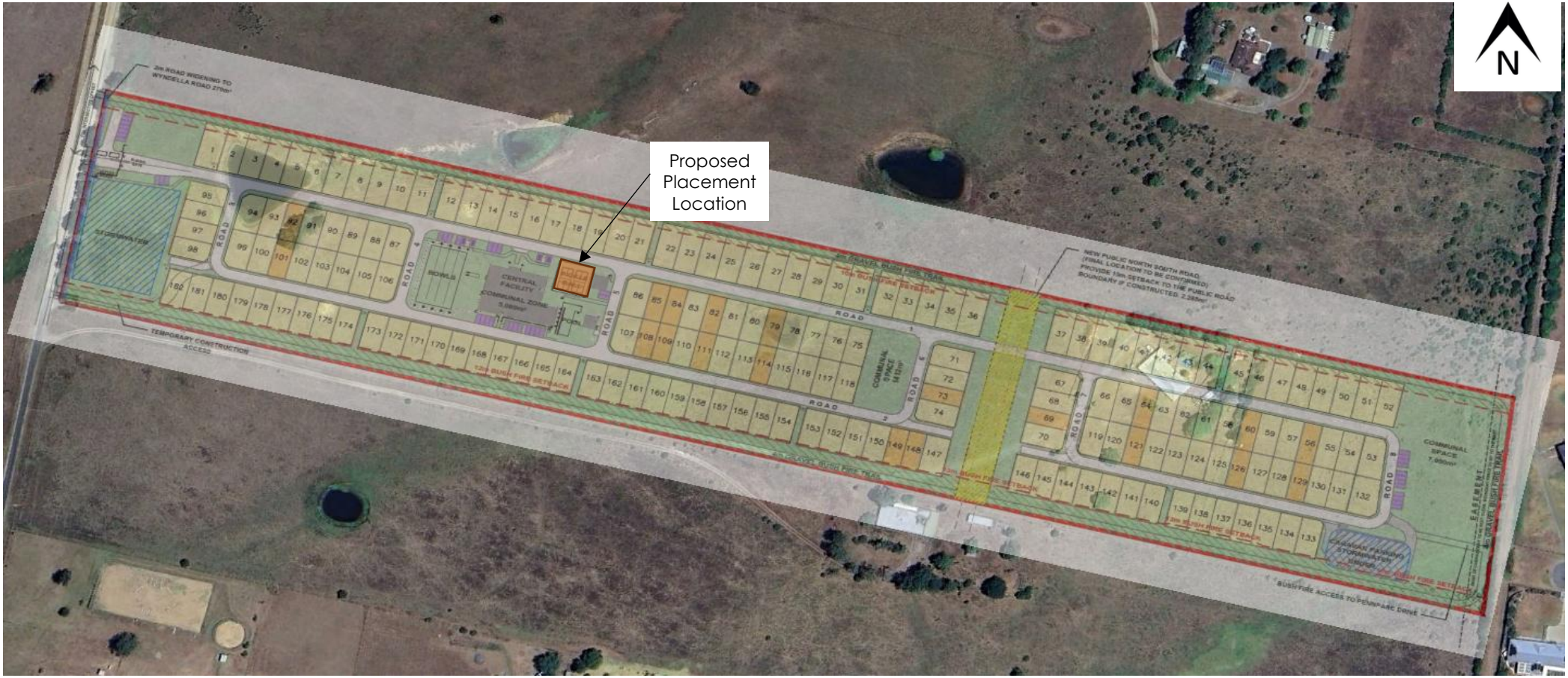
- Site Location
- Testpit Location
- Surface Soil Sample Location
- Approx. Proposed Remediation Areas

Sample ID / Stockpile	Depth (m) / Stockpile Sample ID
Contaminant	Concentration exceeds HIL/HSL
Contaminant	Concentration exceeds EIL/ESL

Image obtained from Nearmaps (7/11/2023), dated 23 October 2023

Qualtest LABORATORY (NSW) PTY LTD

Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 5
Project:	Remediation Action Plan	Project No:	NEW23P-0216-AC
Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
Title:	Proposed Remediation Areas	Date:	26/11/2024



LEGEND:

Proposed Placement Location

Image obtained from Google Earth, dated 2022. Overlay Provided by client.

Qualtest LABORATORY (NSW) PTY LTD	Client:	AEP Developments Pty Ltd	Drawing No:	FIGURE 6
	Project:	Remediation Action Plan	Project No:	NEW23P-0216-ACv1
	Location:	34 Wyndella Road, Lochinvar NSW	Scale:	N.T.S.
	Title:	Proposed Placement/Capping Location	Date:	23/04/2025

APPENDIX B:

Unexpected Finds Procedure

APPENDIX B – UNEXPECTED FINDS PROCEDURE

B1.1 Management of Unexpected Finds

Due to the previous uses of the site, there is a potential for unexpected finds to be encountered during works on the site. Unexpected finds could include services constructed from ACM, ACM and illegally dumped waste, and potentially contaminated fill from former site uses.

Should an unexpected find be encountered during remediation, vegetation removal or earthworks, works will stop in the affected part of the site. This area will be isolated to minimise potential for disturbance to the affected soil/material, and prevent contact with the potentially contaminated material. The Contractor will notify the environmental consultant as soon as practical of the Unexpected Find.

B1.2 Training and Induction of Personnel

Personnel involved in remediation, vegetation removal or earthworks on site are to be inducted on the identification of unexpected finds. The induction can be undertaken at the time of general site induction and refreshed periodically at toolbox meetings.

The induction will cover the types of 'Unexpected Finds' that may be encountered, and provide awareness of the general approach when 'Unexpected Finds' are encountered. Personnel involved in remediation, vegetation removal or earthworks on site are to be made aware of the 'Unexpected Finds Procedure' (this document), and a copy must be readily available on site.

Additionally, it is noted that some forms of potential contamination may not be associated with visual or olfactory indications in the field. The unexpected finds procedure would not provide protection against such impacts. Therefore, the CEMP should include requirements for workers in contact with soils to wear appropriate Personal Protection Equipment (PPE), including:

- Long sleeves and pants;
- Chemical resistant gloves, such as nitrile gloves;
- If there are strong odours, respirators with appropriate cartridges; and,
- If there are indicators of potential asbestos containing materials, P2 (bonded ACM) or P3 (friable asbestos) rated face mask and Tyvek suit.

It is noted that workers will also be required to wear PPE associated with working on construction sites, that are not listed above (i.e. hard hats, steel capped boots, and high visibility clothing).

B1.3 Potential Unexpected Finds

Based on findings of previous investigations and site history, potential 'Unexpected Finds' which could reasonably be expected within the site are summarised in Table B1.

APPENDIX B – UNEXPECTED FINDS PROCEDURE

Table B1: Summary of Reasonably Expected 'Unexpected Finds'

Unexpected Find	Characteristics	Contaminants of Potential Concern
Anthropogenic materials	Can include a variety of materials such as metal pieces, tyres, plastic, asphalt, wood, building materials (i.e. bricks, concrete, asbestos containing materials etc), chemical containers, and metals drums.	TRH, PAH, Metals, Asbestos, phenols
Structures containing potentially contaminated materials	These could include: • Pipework constructed of asbestos containing materials, or coated in asbestos lagging. • Buried sumps, potentially used for storage of waste oils. • Structures containing lead paints.	TRH, PAH, Metals, Asbestos
Asbestos Containing Materials	Typically found as fragments of asbestos cement sheeting on this site. Generally, asbestos sheeting is identified as being white/grey in colour (often brown due to dirt) with dimples on one side and is a fibrous type of material. It is extremely difficult to tell by visual appearance if a material contains asbestos. Asbestos can be also be found in friable form. Friable asbestos provides a greater threat to human health than bonded asbestos as it has been weathered or degraded to the point where the asbestos fibres can more easily become airborne, increasing the risk of inhalation. Friable asbestos is typically found as small fragments of asbestos sheeting (<7mm diameter), lagging around pipes, insulation products and the like. To date these have not been identified on the site. In the event that an Unexpected Find is suspected to potentially contain asbestos then precautions should be taken immediately.	Asbestos
Soil/material with hydrocarbon odour and/or oily stain or sheen	Generally identifiable by slight to strong odours normally associated with diesel, oil, or petrol. Hydrocarbon stained soils are typically stained grey to black, and may have a sheen. Hydrocarbon sheens may be observed on seepage water.	TRH, BTEX, PAH, Lead

APPENDIX B – UNEXPECTED FINDS PROCEDURE

Notes: TRH – Total Recoverable Hydrocarbons; BTEX – Benzene, Toluene, Ethylbenzene, Xylenes; PAH – Polycyclic Aromatic Hydrocarbons; VOCs – Volatile Organic Compounds; OCPs – Organochlorine Pesticides

B1.4 Unexpected Finds Procedure

Should new, or potential, unexpected finds be encountered during remediation, earthworks or vegetation removal, the following procedure applies:

1. Stop work in the potentially hazardous area as soon as it is safe to do so and move away from the area. If strong odours are associated with the find, move to the upwind side of the area.
2. Assess the potential immediate risk to human health posed by the unexpected find. The environmental consultant can help make this assessment, if required.
3. Delineate an exclusion zone around the affected area using appropriate barriers and signage. Odour suppression is not considered likely to be required, based on the potential contaminants identified for "unexpected finds".
4. Contact the Environmental Consultant for advice. The Environmental Consultant will assess the unexpected find and provide advice on:
   a) Preliminary assessment of the contamination and need for immediate management controls;
   b) Carry out further assessment and provide advice on what remediation/management works are required and how such works are to be undertaken in accordance with the RAP (and contaminated site regulations and guidelines):
      i. Assess the remediation/management required for the find;
      ii. If material is not suitable for reuse on site, waste classify the material and dispose to a licensed landfill;
      iii. If material is suitable for onsite remediation/management, carry out remediation/management (if required).
   c) Remediation/management works required (if required);
   d) Validation works required following remediation works (if required).
5. Works are not to recommence in the affected area until appropriate advice has been obtained from the Environmental Consultant, and the Environmental Consultant has provided relevant information to the Contractor.
6. If it is deemed safe to do so by the Environmental Consultant and/or the Contractor, works can resume in the affected area.

APPENDIX C:

AMP

APPENDIX C - ASBESTOS MANAGEMENT PLAN

C1 INTRODUCTION

This Asbestos Management Plan (AMP) has been prepared by Qualtest for use during remediation activities at 34 Wyndella Road, Lochinvar NSW (the site). . The location of the site is shown on Figure 1, Appendix A of the Remediation Action Plan (RAP). The RAP should be read in conjunction with the AMP.

Previous contamination assessments have been completed for the site (refer to Section 4 of the RAP). Fibrous Asbestos (FA) and Asbestos Containing Materials (ACM) was identified in SP01.

The preferred remediation strategy for the ACM and FA, as identified in the RAP, is:

- Excavation and placement within the proposed capping area;
- Placement of at least 0.5m of cover material "clean" fill either sourced from onsite, or imported) over the asbestos (and other contaminated soils as outlined in the RAP).

As FA and ACM has been identified on the site, this AMP has been developed and will be implemented during excavation, loading and placement of asbestos materials. For placement of known FA and ACM impacted material in the proposed placement area, the AMP will be implemented until the first layer (300mm) of "clean" material has been placed over the asbestos.

C3 OBJECTIVES

The objectives of the AMP are to:

- Identify potential risks associated with the excavation, stockpiling, movement and placement of FA and ACM;
- Outline appropriate risk mitigation methods to reduce potential exposure to FA and ACM to the environment, workers and the public; and,
- Outline air monitoring requirements.

C4 ASBESTOS MANAGEMENT PLAN

As FA and ACM has been identified on the site, the RAP recommended that this AMP be developed and implemented for the proposed excavation, stockpiling (if required), movement and placement of asbestos impacted material identified on the site.

The controls within the AMP must be implemented during excavation, loading and placement of asbestos impacted materials. For placement of known FA and ACM in the proposed placement area, the AMP will be implemented until the first layer (300mm) of "clean" material has been placed over the ACM.

The AMP has been prepared based on relevant sections of *How to Safely Remove Asbestos - Code of Practice* (Safe Work Australia 2020) and Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), NEPC 2013, Canberra (referred to as ASC NEPM 2013);

C4.1 Recommended Control Measures for FA/ACM

"*How to Safely Remove Asbestos - Code of Practice*" (Safe Work Australia, 2020) recommends the following control measures for the removal of asbestos in fill/soil:

- Preparation of an asbestos management plan for the site (this document);

APPENDIX C - ASBESTOS MANAGEMENT PLAN

- Setting the boundaries of the contamination as assessed by an independent licensed asbestos assessor or competent person;
- Ensuring there is minimal disturbance of the contaminated fill/soil until the asbestos management procedures have been implemented;
- Isolating and securing the removal/excavation work site using signs and barriers;
- Controlling dust with dust suppression techniques (such as water and wetting agents);
- Providing Personal Protection Equipment (PPE) based on the level of contamination and the control measures implemented;
- Sampling and/or air monitoring;
- Providing education and training for workers on hazards and safe work practices to minimise airborne dust exposure; and
- Implementing decontamination procedures for workers and equipment.

C4.2 Works Boundaries and Exclusion Zone

Work boundaries and exclusion zones will be set up during earthworks required to remove and place the FA and ACM impacted material. This will include the excavation area, the stockpiling area, and the fill placement area. The exclusion zone will extend a minimum of 10m beyond the actual works area (or site boundary) and will be marked with minimum 1.5m high temporary fence lined with shade cloth (or similar), and asbestos warning signage.

Personnel involved in the works will receive induction to the hazards and risks associated with the asbestos work as well as the mitigation controls and methodology contained in this AMP. Only inducted personnel will be permitted inside the exclusion zone until the area has been validated.

A decontamination and vehicle wash down area will be set up at the boundary of the exclusion zone. The decontamination area will be set up to allow personnel to wash after works as required. The wash down area will be set up to wash down vehicles before they exit the site. The decontamination and wash down areas will require collection of wash water for appropriate disposal.

C4.3 Dust Minimisation

The remediation works will involve excavation, potential stockpiling, loading and placement of FA and ACM impacted soils. This type of activity could potentially create and mobilise asbestos fibres, posing a contamination hazards to the surrounding environment, the workers and to the public.

The following management measures must be implemented to prevent dust impacts:

- A communications and complaints register is to be kept on site to ensure that concerns of local residents and workers are recorded and addressed;
- General vehicular and personnel movements on the site must remain outside the exclusion zone;
- Excavated and stockpiling of FA and ACM impacted material must be watered as required to minimise the potential for dust generation;

- Works will slow or be delayed during periods of high winds (>40km/h), to minimise the possibility of asbestos containing dust migrating from the exclusion area;
- This AMP must be revised if asbestos and asbestos impacted materials are to be taken off site;
- Vehicular movements entering and exiting the exclusion zone must be kept to a minimum;
- Machinery must be floated onto and off the site; and,
- Machinery and vehicle tracks and tyres must be washed down, and free of debris, prior to entering and exiting the exclusion zone.

C4.4 Air Monitoring

Air monitoring involves sampling airborne asbestos fibres to assist in assessing exposure to asbestos and the effectiveness of implemented control measures.

According to Safe Work Australia *How to safely remove asbestos* - Code of Practice (2020), an air-monitoring program must be implemented where friable asbestos is being removed.

Friable asbestos (fibrous asbestos (FA) was identified in SP01. Based on this is considered that air monitoring is required during excavation, stockpiling and placement of asbestos impacted material from SP01.

When required, air-monitoring would be carried out, as per the following:

- Asbestos fibre in air monitoring pumps will be set up and operated surrounding the exclusion zone, and on boundaries adjacent to residents on the site. The number of pumps required will be assessed depending on the size of the area being worked, the size of the exclusion zone, the proximity of the exclusion zone to residential properties, and the weather conditions (i.e. more pumps would be required on windy days).
- The pumps will be set up in accordance with *Guidance Note: The Membrane Filter Method For Estimating Airborne Asbestos Fibres,* 2nd Edition [NOHSC:3003(2005)]. The pumps will be set up before the start of works each day (6:45am-700am). The pump filters will be collected at the end of the day (no later than 3:30pm to ensure delivery to the laboratory).
- Results should be requested next working day from the laboratory. The monitoring locations will be established at the beginning of the works, and will comprise the exclusion zone boundaries.

C4.5 Personal Protective Equipment and Disposal

During earthworks within areas of known FA and ACM impacted soil, all personal working within exclusion zone are required to use the following PPE as a minimum:

- Disposable coveralls (suitable for asbestos contamination);
- Latex or nitrile gloves;
- Minimum P2 rated dust mask for ACM (non-friable)
- Minimum P3 rated dust mask for material containing asbestos fibres (Friable);
- Protective footwear. Any laces must be covered with boot covers, or shoes with no laces worn; and,
- Protective eyewear.

APPENDIX C - ASBESTOS MANAGEMENT PLAN

Personal protective clothing will be made from materials that provide protection against fibre penetration and not from wool or other materials that attract fibrous dusts. Plant operators are not required to wear the PPE in the exclusion zone if the cabin's air conditioning is fitted with a HEPA filter and the operator remains in the cabin at all times with the doors and windows closed.

At the end of the work and upon leaving the exclusion zone, all PPE must be disposed of as asbestos waste and stored in sealed double bags before being removed from the site and appropriately disposed. PPE should be thoroughly wet before being placed in bags. A decontamination area for personnel will be set up to allow personnel to wash after works if required, this would require collection of wash water for appropriate disposal.

C5 ASBESTOS REMEDIATION VALIDATION PLAN

The validation requirements are outlined in Section 7 of the RAP.

C6 REPORTING

Records of asbestos air monitoring, and validation undertaken, will be included within the Validation Report Prepared for the site, as outlined in the RAP.

C7 UNEXPECTED FINDS PROTOCOL

A contingency plan is provided below in Table C7, for the management of unexpected finds. A contingency plan is also provided in Section 12.0 of the RAP, and should be referred to in conjunction with the below.

Table C7 –Unexpected Finds Associated with Asbestos

Unexpected Conditions	Proposed Action
During the remediation works, ACM is encountered in areas not previously identified on the site (based on previous assessment reports).	Stop works and implement Section C4.3 to C4.5 of the AMP
During remediation works it becomes apparent that the volume of asbestos impacted material is greater than anticipated.	Stop works. Review Section 4 the AMP and revise procedures so that risks to public and workers health and safety are appropriately managed.
Decontamination/control measures prove inadequate due to increase in volume of FA.	1. Stop work in the area as soon as it is safe to do so and move away from the area. 2. Review and amend (if required) current control measures. 3. Review and amend (if required) existing delineation an exclusion zone around the affected area using appropriate barriers and signage. 4. Seek advice from Licensed Asbestos Assessor to provide guidance on the handing and management of the friable asbestos.

APPENDIX C - ASBESTOS MANAGEMENT PLAN

Unexpected Conditions	Proposed Action
	5. Review air-monitoring procedures.

C8 COMMUNITY RELATIONS

The community will be aware of the project through exhibition of the DA, and notification of intent given to the works to nearby neighbours. Community consultation will occur through the DA process.

The procedures outlined in the AMP (and RAP) should ensure that works on the site have minimal impact on the surrounding community. Enquiries regarding environmental and communication issues from members of the local community and neighbouring properties should be documented and referred to the client.

C9 LIMITATIONS

This AMP was prepared with the objective of managing the excavation, stockpiling, movement, and placing of FA and ACM impacted soil on the site, and is not suitable to be used for the removal of asbestos from the site.

No warranty, expressed or implied, is made as to the information and professional advice included in this AMP. Anyone using this document does so at their own risk and should satisfy themselves concerning its applicability and, where necessary, should seek expert advice in relation to the particular situation.