barnson.
DESIGN . PLAN . MANAGE

Remedial Action Plan

Client: Bourke Aboriginal Corporation Health Service (BACHS)

Site Address: 88-96 Mitchell Street,
Bourke NSW 2840

14 November 2024

Our Reference: 42571-ER02_A

DISCLAIMER

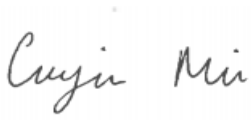
This report has been prepared solely for Bourke Aboriginal Corporation Health Service (BACHS) in accordance with the scope provided by the client and for the purpose(s) as outlined throughout this report. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report.

Barnson Pty Ltd accepts no liability or responsibility for or in respect of any use or reliance upon this report and its supporting material by anyone other than the client. Material may not be extracted, copied or altered from this report without the written permission of BARNSON. Barnson does not accept responsibility arising from modifications to this or previous reports.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

This report, including data contained and its findings and conclusions, remains the intellectual property of Barnson. A licence to use the report for the specific purpose identified is granted for the persons identified in that section after full payment for the services involved in preparation of the report. This report should not be used by persons or for purposes other than those stated and should not be reproduced without the permission of Barnson.

Project Name:	Remedial Action Plan
Client:	Bourke Aboriginal Corporation Health Service (BACHS)
Project Number:	42571
Report Reference:	42571-ER02_A
Date:	14/11/2024

Prepared by:	
	
Georgina Moir BEnvSc **Environmental Scientist**	**Leah Desborough** BNatRes (Hons) CEnvP **Senior Environmental Scientist**

Contents

Tables

Figures

Appendices

1.1 INTRODUCTION

1.2 Background

Barnson was engaged by Bourke Aboriginal Corporation Health Service to prepare a Remediation Action Plan for asbestos contamination at Lot 6, 7, 8, 9, 10 DP35797, 88-96 Mitchell Street, Bourke NSW 2840.

A Site Contamination Investigation undertaken by Barnson Pty Ltd in 2023 (Report number 42571-ER01_A) identified asbestos cement fragments and asbestos impacted soil at the site.

A Remedial Action Plan (RAP) was recommended to be prepared to make the site suitable for the proposed future development. The RAP is required to develop an effective plan to remediate the impacted areas to enable the future health care land use.

1.3 Objectives

The objectives of the Remedial Action Plan are:

- Set remediation goals based on land-use threshold,
- Propose a cost effective and workable remediation method,
- Establish a validation procedure for the site,
- Classify the excavated material for determination of disposal options,
- Ensure remediation works comply with:
  - *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020)
  - *Guidelines for NSW Site Auditor Scheme* (NSW EPA, 2017)
  - *The Contaminated Land Management Act (1997)*
  - *State Environmental Planning Policy (Resilience and Hazards) 2021*
  - *National Environment Protection (Assessment of Site Contamination) Measure 1999 NEPC (2013)*

1.4 Scope of Work

To meet the objectives, Barnson completed the following scope of work:

- Review of previous investigations
- Preparation of a report outlining the steps regarding engineering methods and management procedures to be adopted during remediation works.

2.0 SITE SETTING

2.1 Site Identification

Table 2.1 presents the information relevant to the identification of the site. The asbestos contamination is limited to 88-96 Mitchell Street, Bourke NSW (see Figure 2.1 and Figure 2.2).

Figure 2.3 presents an overview of the subject site that is supplemented with photographs showing the different elements of the site (Figure 2.4 and Figure 2.5). Figure 2.3 includes markers indicating the vantage point and direction of the photographs.

Table 2.1: Site Setting Summary

Information	Details
Site Address	88-96 Mitchell Street, Bourke, NSW 2840
Subject Site Area	4,601m^2 (as surveyed)
Impacted Area	4,601 m^2 (as surveyed)
Lot and Deposited Plan	Lots 6, 7, 8, 9, 10 DP35797
Zoning	R1: General Residential
County	Cowper
Parish	Bourke
Local Government Area	Bourke Shire Council
Current Land Use	Vacant
Proposed Future Land Use	Healthcare (residential)

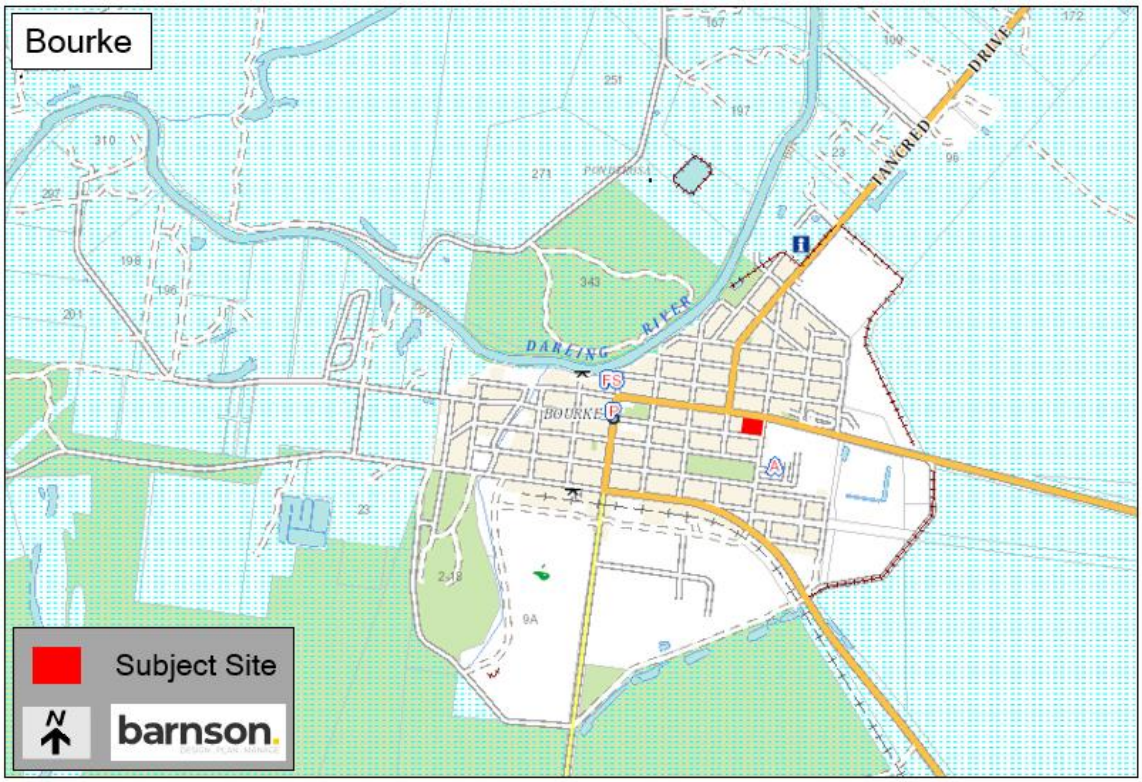


Figure 2.1: Locality Map

Figure 2.2: Surrounding Land Use of Site

Figure 2.3: Aerial Photograph of the Site

Figure 2.4: Photograph A - Looking East Across the Site

Figure 2.5: Photograph B - Looking West Across the Site

2.2 Environmental Setting

Information describing the environmental setting of the site was presented in the Site Contamination Investigation prepared by Barnson Pty Ltd (Barnson Pty Ltd, 2023). Table 2.2 presents a summary of the information for ease of reference.

Table 2.2: Summary of Site Environmental Setting

Information	Details
Previous land use	The site has historically been used for residential purposes with dwellings on each of the lots. All five dwelling structures on the site and the inter-lot fencing were demolished post 1994. The site appeared to have been levelled once demolition was complete. Historical aerial photographs indicate an industrial development on the site adjoining the western section of the site prior to 1994.
Existing land use	The site is currently vacant
Surrounding land uses	The site is bounded by Mitchell Street to the north, Tarcoon Street to the east and an unnamed laneway to the south. The site adjoins an occupied residential lot to the west. Other adjoining land uses include residential to the north and south with a church building also located to the south of the site. Bourke High School is located to the east across Tarcoon Street.
Topography	Topographic data indicates the subject site is relatively flat (<1%) and has a natural slope to the north-west towards the Darling River.
Geology	The 1:250,000 Geological Map of Bourke presented on the NSW MinView geospatial database depicts the site being underlain with Canozoic aged floodplains of clayey silt, sand, and gravel. The Geological Survey of NSW maps of Naturally Occurring Asbestos (accessed November 2024), shows that the geological units underlaying the subject site have no asbestos potential and the site is not located within or near any naturally occurring asbestos areas.

2.3 Site History

A review of historical aerial photographs dating back to 1963 was undertaken. Historical aerial photographs are presented in Appendix B. A summary of the site features is provided as follows:

- 1965 – Each of the five (5) lots are occupied by individual structures, most likely residential dwellings.
- 1979 – No change in previous fourteen (14) years.
- 1994 – No substantial changes to the site, however a new industrial development is evident adjoining the western side of the site.
- Sometime after 1994 – The aerial imagery depicts that all 5 dwelling structures and inter-lot fencing have been demolished and the site levelled.
- Present – The site remains unoccupied and is unfenced. Path used by pedestrians bisect the site diagonally from north-west to south-east.

2.4 Previous Investigations

2.4.1 Barnson Pty Ltd (2023). Site Contamination Investigation, 88-96 Mitchell Street, Bourke NSW 2840. Ref: 42571-ER01_C

Barnson Pty Ltd was engaged by the Bourke Aboriginal Corporation Health Service to undertake a Site Contamination Investigation of the site located at Lot 6, 7, 8, 9, 10 DP35797 (88-96 Mitchell Street, Bourke, NSW 2840).

The purpose of the site contamination investigation was for investigations to assess whether the site is suitable, or could be made suitable from a contamination perspective, for proposed health care land use.

Residential structures and historical residential land-use represent a potential source of site contamination. Potential sources of contamination associated with the historical land-use of the site include maintenance/demolition of buildings, fill of unknown origin and vehicles and motorised equipment.

Barnson conducted an inspection of the subject site on 28 September 2023. The purpose of the site inspection was to verify the findings of the desktop assessment, as well as to collect confirmatory samples of soil from areas of the subject site where development is proposed, or contamination is suspected.

Based on the findings of the Conceptual Site Model (CSM) the inspection and sampling were focussed on the surface soils (0-150mm). Samples of soil at a depth of 300mm were also collected for classification of excavated material for disposal. The site inspection included all areas of the subject site.

Samples were analysed for Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc and Mercury (heavy metals), Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN), Polycyclic Aromatic Hydrocarbons (PAH),

Polychlorinated Biphenyls (PCB), Organochlorine (OCP), Organophosphorus (OPP) and Asbestos.

The site inspection and confirmatory sampling showed that concentrations of heavy metals, TRH, BTEXN, PAH, PCB, OCP and OPP were below screening criteria in all surface soil samples collected. However, the presence of asbestos containing material (ACM) as fragments in surface and sub-surface soil was confirmed at the site.

The proposed development will require earthworks and excavation of the site which will disturb the surface and buried fragments. Although broken, the bonded ACM fragments appear in reasonable condition and are not easily crumbled i.e. not fibrous asbestos. There is no evidence from the site history or direct observation during the site walkover that other fibrous asbestos materials (such as insulation or woven materials) are present on the site. Soil samples analysed for asbestos confirmed the presence of bonded ACM fragments only.

Visible fragments of cement sheeting containing asbestos in surface soils leads to the classification of any surface material excavated from the site as Special Waste in the Asbestos Waste Category. Visible fragments of asbestos containing material represent a risk to human health and the site is not suitable for the proposed development without remedial action to remove the asbestos contamination.

It is recommended that a suitable contractor, licensed to manage and dispose hazardous materials, be appointed to remove the contaminated surface soil. Validation of the remedial works is to be undertaken under supervision of a licenced asbestos assessor.

3.0 CONCEPTUAL SITE MODEL

3.1 General

A preliminary Conceptual Site Model (CSM) was developed to provide an understanding of the likelihood for contaminants to be present and potential for impacts to occupants or visitors to the site.

The CSM draws together the land-use information for the site, with site specific geological, and contamination information to identify potential contamination sources, migration and exposure pathways and sensitive receptors.

3.2 Sources

Based on the findings of the previous investigation, the following potential contamination sources were identified:

- Maintenance/Demolition of buildings

Former dwelling structures onsite would have required general maintenance and were ultimately demolished.

- Fill of Unknown Origin

Fill of unknown origin and quality was potentially placed over the site during historical construction or subsequent demolition/levelling activities.

3.3 Contaminants of Potential Concern

Considering the potential sources listed in Section 3.2, contaminants of potential concern associated with the demolition of historical buildings and fill of unknown origin include:

- Asbestos Containing Material (ACM)
- Asbestos Contaminated Soil

3.4 Pathways

The various routes by which human receptors could potentially be exposed to the contaminants include:

- Inhalation of fibres following disturbance of contaminated soils and materials
- Transport of ACM and soil containing ACM

3.5 Receptors

Potential human receptors may include:

- Staff
- Visitors to site (adults and children)
- Construction workers
- Intrusive maintenance worker

3.6 Source receptor linkages

Potential source pathway receptor linkages are identified to enable evaluation of any adverse impact on human health.

The proposed land-use of the site is a healthcare centre and human receptors to the investigation area are likely. Proposed users of the site may have a risk of exposure if contaminants are present and the soil is disturbed.

The contaminant of concern is asbestos fibres. Inhalation of asbestos fibres is considered a pathway for exposure and may occur as a result of asbestos disturbance and dust production. Major soil disturbance before and after the development of the site is considered unlikely. Soil disturbance during construction and development of the site is expected to be accompanied by erosion control measures which will reduce the incidence of dust.

The asbestos contamination is expected to be restricted to shallow depths and relatively immobile. Asbestos fibres are not known to impact on flora or fauna.

Refer to Table 3.1 for a summary of the source receptor linkages present on the site.

Table 3.1: Summary of Source Receptor Linkages

Source/contaminants	Transport	Potential exposure pathways	Receptors
☒ Maintenance/ Demolition of Buildings (asbestos)	☒Wind ☐Sedimentation ☐Groundwater ☐Surface water ☐Volatilisation	☒Direct contact (ingestion and absorption) ☒Inhalation ☐Runoff ☐Leaching	☒Staff ☒Visitors (adults and children) ☒Construction workers ☒Intrusive maintenance workers ☐Vegetation ☐Aquatic receptors
☒ Fill of Unknown Origin (asbestos)	☒Wind ☒Sedimentation ☐Groundwater ☐Surface water ☐Volatilisation	☒Direct contact (ingestion and absorption) ☒Inhalation ☐Runoff ☐Leaching	☒Staff ☒Visitors (adults and children) ☒Construction workers ☒Intrusive maintenance workers ☐Vegetation ☐Aquatic receptors

☒Potential, ☐unknown/unlikely

4.0 REMEDIATION

4.1 Area Requiring Remediation

The contamination located over Lots 6, 7, 8, 9, 10 DP35797, 88-96 Micthell Street, Bourke NSW was confirmed by the previous Barnson Site Contamination Investigation (Barnson Pty Ltd, 2023). Asbestos containing material (ACM) was present over the surface of the subject site in the form of fragments of asbestos fibre reinforced cement sheeting. Asbestos contaminated soil was present in the sub-surface soil of the site. The source is expected to be imported fill which was identified up to a depth of 300mm or residue from buildings previously present on the site. The asbestos identified on the site was confirmed to be non-friable asbestos material. No evidence from the site history or direct observation during the site walkover that other fibrous asbestos materials are present on the site. Greater than 10m^2 of asbestos cement sheeting is estimated to be present on the site. Figures 4.1, 4.2 and 4.3 present photographs of fragments of fibre cement sheeting observed during the site investigation.

Figure 4.1: Photograph of Cement Sheet Fragments Observed on the Site Surface

Figure 4.2: Photograph of Cement Sheet Fragments Observed on the Site Surface

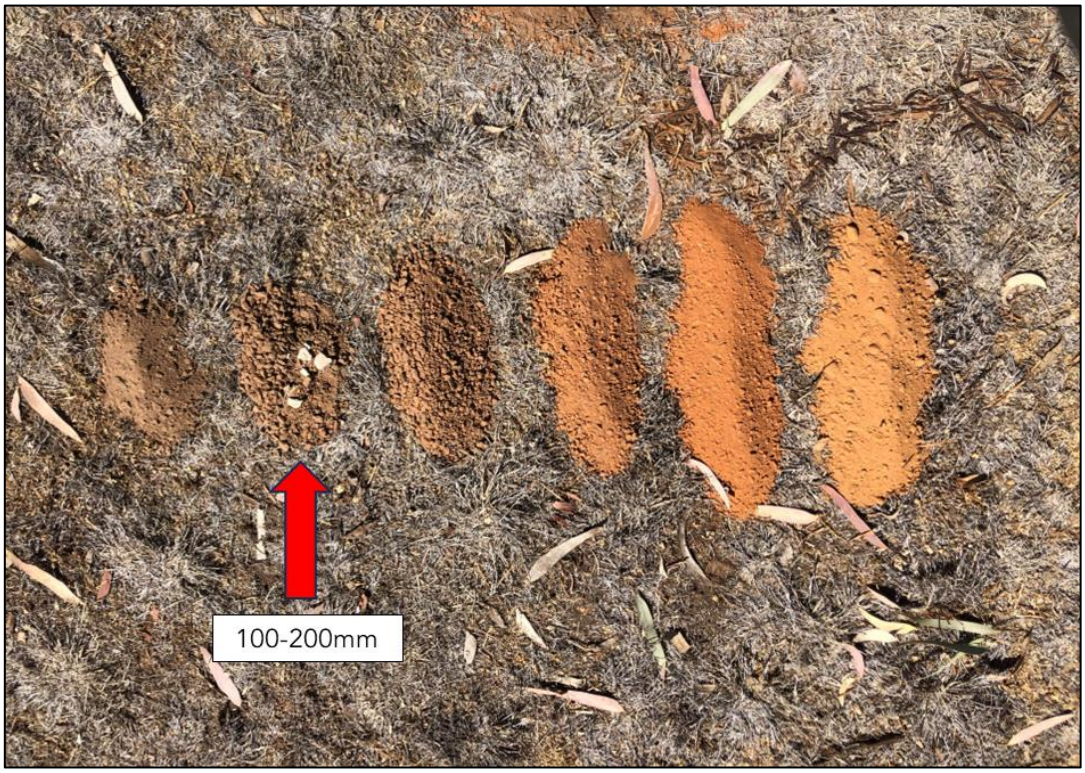


Figure 4.3: Photograph of Cement Sheet Fragments in Excavated Soil

5.0 ASSESSMENT

5.1 Remedial Objectives

Table 5.1: Remediation Objectives

Concern	Remediation Objective	Remediation End Point
Asbestos in and on the soil	Reduce the exposure of asbestos to people utilising or working on the site	Removal or no complete pathways to expose human receptors

5.2 Remediation Hierarchy

The CRC National Remediation Framework hierarchal order for remediation and management is:

- On-site treatment of the soil so the contaminant is either destroyed or the associated hazard is reduced to an acceptable risk.
- Off-site treatment of excavated soil so the contaminant is either destroyed or the associated hazard is reduced to an acceptable risk, after which the soil is returned to the site.
- Removal of the contaminant to an approved site or facility followed where necessary with replacement with clean fill.
- Consolidation and isolation of the soil on-site by containment with a barrier.
- Adoption of a less sensitive land-use or control of activities on-site that will reduce the need for remediation.

5.3 Review of Remediation Options

The appropriateness of the remediation option depends on technical feasibility, local factors, environmental factors and cost. Remediation methods are aimed at removing the contamination and disposing off site (Table 5.2).

Table 5.2: Summary of Remediation Technology Evaluation

Technology	Advantages	Disadvantages	Comments	Suitability
On-site treatment	Impacted material remains on-site reducing the need for transport and landfill space	Not technically feasible	Not an option	No
Excavation Off-site treatment and return to site.	Reduces risk of migration	Not technically feasible Transport costs	Not an option	No
Excavation Off-site disposal	Simple option No ongoing management Suitable for landfill material	Transport costs Use of landfill space Risks during transport High carbon footprint	May be cost prohibitive due to waste classification of material and long distances for transportation to suitable landfill	Yes
Physical containment	Cost effective depending on size	Does not provide clean-up Intergenerational equity due to ongoing liability Cost prohibitive for an engineered cell	Will restrict potential future land-use All ground disturbance works will be required to be undertaken in accordance with an environmental management plan	Yes
Less sensitive land-use	Nil	Does not provide clean-up Intergenerational equity due to ongoing liability	Will restrict potential future land-use No land-use is suitable when ACM is located on the surface	No

5.4 Preferred Remediation Option

Asbestos containing materials will be excavated under supervision of a class A or B licensed asbestos removalist or an environmental scientist. The contaminated material will be disposed to a landfill licensed to receive asbestos waste. The asbestos remediation works will be validated through visual inspections and issuance of a clearance certificate. The source of the contamination will be removed and no on-going management will be required for the material. Table 5.3 presents a summary of the preferred remediation option for the asbestos contaminated material identified at the subject site.

Table 5.3: Remediation Method

Remedial Option	Extent	Details
Excavation and removal off-site for disposal	Impacted area is estimated to be 4,601m^2 and approximately 0.3m depth.	Excavate asbestos containing material and stockpile for waste classification. Load to truck and transport off-site to licenced facility for disposal. Backfill the excavated area with ENM or VENM material, to the level required for landscaping or construction.

5.5 Rationale for Selection of Option

The proposed works are suitable for the characteristics of the identified contaminants and do not result in ongoing liability and management. A low future risk remediation option is the preferred option to ensure minimal ongoing liability and risk to people utilizing the site.

The preferred management option of removal offsite for disposal is considered sustainable considering the client objectives. Initial costs in remedial works will be incurred in excavation, transport and disposal and are expected to be similar to the costs associated with capping. Transport off-site will minimize risk from future exposure and movement.

The proposed remediation will be a low-risk option for human health. Options for the management of the excavated waste will be assessed following classification of the waste in accordance with the NSW EPA Waste Classification Guidelines (NSW EPA, 2014).

5.6 Environmental and Social Considerations

5.6.1 Reasons for Strategy Selection

The proposed works are suitable for the characteristics of the identified contaminants and require minor controls to ensure ongoing suitability for occupation. A low future risk remediation option is the preferred option to ensure minimal ongoing liability and risk to people utilising the site.

5.6.2 Social

The proposed remediation is a low risk and low impact option for the surrounding residences. Retaining the levee will maintain the flood protection for the surrounding residences. The disposal of soil would require significant truck movements and disruption to local roads and require significant space at a landfill.

5.6.3 Sustainability

The preferred management option is considered sustainable. Some initial costs will be incurred in excavation and transport however over the longer term it will minimize risk from offsite movement and impacts on the environment. The initial costs in excavation works are considered low and similar to the emissions required to install a capping layer and long term maintenance of the cap.

The proposed remediation will be a low risk option from the environment.

6.0 REMEDIATION PLAN

6.1 Remediation Goal

To establish site conditions that will be an acceptable risk to human health from contamination at the site. The proposed land-use is healthcare.

The remediation goals are:

- To make the site acceptable and safe for long-term healthcare land-use. The site is considered acceptable and safe when contaminants of concern are present below the adopted thresholds or do not form linkages with sensitive receptors.

6.2 Remediation Criteria

6.2.1 Asbestos

The proposed land-use is healthcare. Healthcare is a sensitive land-use and residential assessment criteria is considered suitable for the site according to the Schedule B7 of the NEPC (1999) Derivation of Health-Based Investigation Levels. The appropriate initial criteria are described in Guideline on Investigation Levels for Soil and Groundwater (NEPC 1999).

The health-based screening levels of asbestos in soil for residential land-use is listed in Table 6.1, as recommended in the NEPM (NEPC 1999 rev 2013).

Table 6.1: Health Screening Levels for Asbestos Contamination in Soil

Form of Asbestos	Health Screening Levels (w/w) Residential A
Bonded ACM	0.01%
FA and AF (friable asbestos)	0.001%
All Forms of Asbestos	No visible asbestos for surface soil

ACM – Asbestos Containing Material, FA- Fibrous Asbestos, AF – Asbestos Fines

Monitoring of airborne fibres will be undertaken at selected locations during soil disturbance work where asbestos may be present and compared with acceptable limits. The criteria for air monitoring action levels are listed in Table 6.2, as recommended in the SafeWork NSW Code of Practice *How to Safely Remove Asbestos* (NSW Government, 2022).

Table 6.2: SafeWork NSW Criteria for Asbestos Fibres Action Levels

Action level (airborne asbestos fibres/mL)	Control	Action
Less than 0.01	No new control measures are necessary	Continue with control measures
Between 0.01 and 0.02	1. Review	Review control measures
	2. Investigate	Investigate the cause
	3. Implement	Implement controls to eliminate or minimise exposure and prevent further release
More than 0.02	1. Stop removal work	Stop removal work
	2. Notify regulator	Notify the relevant regulator by phone followed by fax or written statement that work has ceased and the results of the air monitoring
	3. Investigate the cause	Conduct a thorough visual inspection of the enclosure (if used) and associated equipment in consultation with all workers involved with the removal work.
	4. implement controls to eliminate or minimise exposure and prevent further release	Extend the isolated/barricaded area around the removal area/enclosure as far as reasonable practicable (until fibre levels are at or below 0.01 fibres/ml), wet wipe and vacuum the surrounding area, seal any identified leaks (e.g. with expandable foam or tape) and smoke test the enclosure until it is satisfactorily sealed.
	5. Do not recommence removal work until further air monitoring is conducted	Do not recommence until fibre levels are at or below 0.01 fibres/ml.

6.2.2 Waste Classification

Excavated surface soil impacted by asbestos must be classified in accordance with the Waste Classification Guidelines (NSW EPA 2014), prior to selection and evaluation of a suitable management option for the material (Table 6.3).

Table 6.3: Waste Classification Guidelines

		General Solid Waste			Restricted Solid Waste		
Analyte	Units	CT1	SCC1	TCLP1	CT2	SCC2	TCLP2
Arsenic	mg/kg	100	500	5.0	400	2,000	20
Cadmium	mg/kg	20	100	1.0	80	400	4
Chromium (VI)	mg/kg	100	1,900	5	400	7,600	20
Copper	mg/kg	-	-	-	-	-	-
Lead	mg/kg	100	1,500	5	400	6,000	20
Nickel	mg/kg	40	1,050	2	160	6,000	8
Zinc	mg/kg	-	-	-	-	-	-
Mercury	mg/kg	4	50	0.2	16	200	0.8
TPH (C6-C9)	mg/kg	650	650	NA	2,600	2,600	NA
TPH (C10-C36)	mg/kg	10,000	10,000	NA	40,000	40,000	NA
Benzene	mg/kg	10	18	0.5	40	72	2
Toluene	mg/kg	288	518	14.4	1,152	2,073	57.6
Ethylbenzene	mg/kg	600	1,080	30	2,400	4,320	120
Xylenes	mg/kg	1,000	1,800	50	4,000	7,200	200
PAH	mg/kg	200	200	NA	800	800	NA
Benzo(a)pyrene	mg/kg	0.8	10	0.04	3.2	23	0.16

NA – Not Applicable

The excavated material is expected to be classified as Special Waste, Asbestos with a sub classification to be determined.

6.2.3 Imported Fill

All fill imported to the site shall be documented by the Contractor, including landscaping materials. All soils and landscaping materials shall be validated by the contaminated land consultant PRIOR to being received at the site to confirm these are Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM).

VENM must meet the definition of VENM and ENM must meet the requirements of the Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The Excavated Natural Material Order 2014 (Table 6.4).

Fill will be compacted on placement to a specification of 95% standard of compaction.

Table 6.4: ENM Assessment Criteria

Analyte	Units	ENM thresholds	
		Maximum Average Concentration	Absolute Maximum Concentration
Arsenic	mg/kg	20	40
Cadmium	mg/kg	0.5	1
Chromium (VI)	mg/kg	75	150
Copper	mg/kg	100	200
Lead	mg/kg	50	100
Nickel	mg/kg	30	60
Zinc	mg/kg	150	300
Mercury	mg/kg	0.5	1
Electrical Conductivity	dS/m	1.5	3
pH	pH units	5 to 9	4.5 to 10
TPH (C6-C9)	mg/kg	-	-
TPH (C10-C36)	mg/kg	250	500
Benzene	mg/kg	NA	0.5
Toluene	mg/kg	NA	65
Ethylbenzene	mg/kg	NA	25
Xylenes	mg/kg	NA	15
PAH	mg/kg	20	40
Benzo(a)pyrene	mg/kg	0.5	1
Foreign Materials	%	0.05	0.10

NA – Not Applicable

6.3 Remediation method

All contaminated material will be excavated and transported off site to a licensed landfill.

Table 6.5: Recommended Remediation Method

Contaminant	Location	Works	Waste Classification
Asbestos	Fill covering the subject site	Excavate, stockpile and dispose to landfill	Asbestos waste

6.3.1 Excavation of Soil and Transport to Landfill

The soil disturbance works will be supervised by a Class A or B licensed asbestos removalist.

Excavation, stockpiling and transportation of contaminated soil will include:

- Excavation and stockpiling of the contaminated soil for waste classification prior to disposal to landfill.
- Temporary stockpiles need to be secure, cover material with adequate bunding
- Any drains in the area need to be covered
- Dust mitigation measures comprising water misting will be implemented to reduce airborne dust.
- The soil will be securely packed and transported in a covered, leak proof vehicle.
- The asbestos impacted soil should be tracked from the site to the landfill using the NSW Integrated Waste Tracking System.
- The waste should be disposed to a landfill licensed to receive the waste
- The works will be undertaken by a contractor with a Class A or B asbestos removal licence and in accordance with an Asbestos Removal Control Plan prepared by the contractor in accordance with SafeWork NSW guidelines.
- Personal protection equipment (PPE) required includes P2 rated disposable masks, disposable gloves and disposal coveralls (rated type 5, category 3 (ISO 13982-1)) made of fabric capable of preventing tearing and providing protection against fibre penetration. The PPE are single use and will be disposed as asbestos waste at completion of collection.
- An environmental scientist or asbestos assessor is required to supervise remediation works, undertake air monitoring (if required) and provide clearance inspection.
- Validation sampling of the site will be required post removal of contaminated material.

6.4 Services, Excavation and Earth Moving

Excavation, transport and disposal methods must ensure that potentially affected soil is not spread onto non-excavation areas. Care will be taken to separate differently classified

materials from each other and from the surrounding soil. The impacted soil will be removed with an excavator. Excavated material will be stockpiled to enable waste classification. Once waste classification is completed, the material will be loaded onto trucks for transportation to landfill. The following will be implemented concerning stockpiles:

- Any stockpiles shall be placed in a secure bund
- All stockpiles of soil or other material shall be placed within an erosion containment boundary away from drainage lines, and
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered.

6.5 Validation of Excavation Areas

Requirements for validation of remediated area and backfill are discussed in Section 9.0

6.6 Supervision

Remediation works will be supervised by an environmental scientist and comply with EPA guidelines including Chapter 4 of State Environmental Planning Policy (Resilience and Hazards) 2021.

6.7 Contingency Plans

6.7.1 Method

A review of the remediation works will be undertaken to identify potential risks to meeting the specified remedial criteria. The initial methods may be varied to ensure objectives will be achieved.

6.7.2 Water Volumes

The excavations are shallow and no water ingress is expected. The excavations will be timed to avoid periods of rainfall.

6.7.3 Excessive Odours

No odours are expected form the excavation works.

6.7.4 Other

Other circumstances in which a contingency plan is required (Table 6.6).

Table 6.6: Contingency plan

Issue	Contingency Response
Levels of potential contaminants in validation samples exceed adopted criterion	Additional excavations required.
Excessive dust	Increase dust suppression management. Cease works if dust cannot be controlled.
Excessive noise	Operation of the remediation will be between 8am and 5pm.
Excessive vibrations	The machinery will not cause excessive vibrations.
Spillage/leakage of oil, hydraulic fluid or fuels, treatment system, excavator/backhoe and trucks	Major spill: Stop spill and contain. Place sandbags downslope, cover area in sand, excavate impacted soil and dispose in appropriate approved facility Minor spill: Stop spill and contain. Cover area in sand, excavate impacted sand and soils and dispose in EPA approved facility
Additional asbestos or other contaminants identified	Contact an environmental scientist for advice

7.0 REMEDIATION MANAGEMENT

7.1 Approvals

The site is a Category 2 remediation under State Environmental Planning Policy (Resilience and Hazards) 2021. Notification to Bourke Shire Council is required 30 days prior to commencement of the remediation works.

Applications for approval to dispose of waste will follow the guidelines set out in NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste. Approval from the landfill will be required before transportation.*

7.2 Access

Barricading may be established to prevent unauthorised access during soil disturbance works and excavation. Vehicle access to the site shall be stabilised to prevent the tracking of soils onto non-excavation areas, the roads, and footpaths. Care will be taken to ensure soil, earth or similar materials are retained within the site. Soil, earth, mud, or similar materials must be removed from non-excavation surfaces by shovelling or a means other than washing, at the end of the day or as required to prevent movement off the work area.

7.3 Dust Control

Dust emission shall be confined within the site boundary. The following dust control procedures may be employed to comply with those requirements:

- Securely covering all loads entering or exiting the site
- Use of water sprays across the site to suppress dust, as appropriate
- Covering of stockpiles may be considered
- Excavation surfaces will be kept moist
- Work to stop during high winds to minimize problems with dust generation

7.4 Sediment and Water Management

The NSW Department of Housing Blue Book Managing Urban Stormwater – Soil and Conservation August 2004 outlines the general requirement for the preparation of an Erosion and Sediment Control Plan. All remediation works shall be conducted in accordance with a soil and water management plan prepared by the contractor using this Remediation Action Plan. A copy of the plan shall be kept on-site and made available to Council officers on request. All erosion and sediment measure must be maintained in a functional condition throughout the remediation works.

7.5 Stockpile Management

Temporary stockpiling will be required for excavated material. The following will be implemented for stockpiles if required:

- Care will be taken to separate differently classified materials from each other and from the surrounding soils.
- Contaminated material stockpiles shall be placed on PVC plastic or concrete, in a secure bund consisting of hay bales/sandbags and covered if required.
- All stockpiles of soil or other material shall be placed within an erosion containment boundary away from drainage lines, gutters or stormwater pits or inlets.
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered.
- Inspections will be undertaken to ensure liner not breached. If the liner has been breached, samples will be taken from the soil beneath the liner and analysed for contaminants of concern.

7.6 Excavation Pump-out

Based on available knowledge of the current site conditions, a pump-out shall not be required. In the unlikely event that it shall be required the following will be carried out:

- Any excavation pump-out water must be analysed for suspended solid concentrations, pH, and any contaminants of concern identified during the site investigation prior to discharge to the stormwater system or other disposal method as appropriate. The analytical results must comply with relevant Council/EPA and ANZG standards for water quality, and
- Other options for the disposal of excavation pump-out water include disposal to sewer,
- Contaminated groundwater will need to be collected by a liquid waste contractor.

7.7 Landscaping/Rehabilitation

Backfilling of the excavated areas may be required to re-establish the original soil surface level. Landscaping and rehabilitation may be required. Seeding, rehabilitation or stabilisation of the disturbed areas will be undertaken to prevent erosion. Grass seed will be spread over remediated areas not expected to be developed immediately in accordance with the sediment and erosion control plan.

7.8 Bunding

All stockpiles shall be covered and bunded as required

7.9 Timing

The remediation is expected to be completed over a period of 4 weeks. Delays may occur due to timing for approvals and weather conditions.

7.10 Noise Control

During the construction works on the site there is likely to be a slight increase in noise due to the higher incidence of workers and equipment onsite. It is considered that any additional noise generated is unlikely to be offensive to any neighbouring properties in the locality.

All remediation works shall comply with the Environment Protection Authority's Environmental Noise Manual and the Protection of the Environment Operations Act (1997).

7.11 Odour Control

Based on the current knowledge of the site it is our expectation that odour control measures will not be required.

7.12 Vibration

Remediation works include shallows excavation of soil. It is not expected that any in situ rock will be excavated for the remediation proposed.

7.13 Site, Signage and Contact Numbers

The following are contact numbers that will be needed for the various parties involved:

- Barnson Pty Ltd- 1300 227 676
- Contractor- To be determined

Signage displaying the contact details of the remediation contractor shall be displayed on the site adjacent to the site access. These signs shall be displayed throughout the duration of the remediation works.

7.14 Roads, Traffic and Transport Networks

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site shall be selected to meet the following objectives:

- Comply with all road traffic rules
- Minimize noise, vibrations and odour to adjacent premises
- Securely cover all loads to prevent any dust or odour during transportation
- Exit the site in a forward direction and

- Will not track soil, mud or sediment onto the road.

7.15 Decontamination

Footwear of workers should be rinsed prior to leaving the site. Plant and equipment removed from the site must be inspected and brushed down before leaving the site.

Personnel undertaking asbestos removal works will undergo decontamination procedures as specified in the asbestos removal control plan.

7.16 Hazardous Materials

In the event that hazardous and/or intractable wastes are encountered during the remediation work, they shall be treated and disposed of in accordance with the requirements of the NSW EPA and SafeWork NSW, together with the relevant regulations.

A suitable management plan for their proper disposal to a licensed landfill would be developed by and approved by the principal. The plan would include additional testing to quantify the material and classify it to ensure proper off-site disposal to a licensed landfill. Material will not be removed from the site until this approval is given.

7.17 Imported Fill

If fill is required, the fill material will be validated prior to importing in accordance with NSW EPA requirements to ensure it is compatible with the proposed site use. Requirements for imported fill are discussed in detail in Section 6.

7.18 Site Security

The contractor will be responsible to ensure any temporary barricading/ fencing erected is secure and prevents unauthorised access to the site. All SafeWork NSW requirements will be followed regarding signs and safety measures when working near excavations and with asbestos containing materials.

8.0 PUBLIC AND WORK, HEALTH AND SAFETY (P&WH&S)

8.1 Prior Remediation

Fencing will be erected around the site to prevent unnecessary access. It may be required based on site conditions at the time of soil disturbance works.

Warning signs will be erected.

Erosion controls measures will be implemented.

8.2 During Remediation

Standard P&WH&S procedures for earthworks projects should be implemented on the site together with emergency and evacuation procedures.

A site-specific P&WH&S plan is to be developed by the contractor prior to starting the works this plan may include but not be limited to the following:

- Briefing of all Staff on P&WH&S concerns, contractors and individuals' responsibilities and personal protective procedures.
- Site access exclusively for briefed and authorized staff. A logbook shall be kept.
- Soil and Water, Dust and Waste management plans.
- Dust suppression particularly during the excavation and handling of materials.
- Staff personal protection handling affected soils.
- Crib and washing facilities.
- Provision of site security at all times.
- Emergency and evacuation procedures. The nearest hospital is Bourke District Hospital, 26 Tarcoon Street, Bourke NSW. Relevant telephone numbers are:
    - Bourke District Hospital (02) 6870 2600
    - Fire Brigade, Police, Ambulance 000
    - Poisons Information Centre 131 126
    - SafeWork NSW 131 050

The following WH&S plan outlines requirements to be implemented during the site remediation to ensure works are conducted in a safe and health conscious manner. The following protective equipment should be used:

- Highly visible safety vests
- Safety boots with steel toe and shank

- Safety glasses with side shields
- Long sleeved shirts and long pants
- Hardhat
- Gloves when handling soil or equipment

Coveralls, boot covers or washable laceless boots and P2 mask are required when handling non-friable asbestos impacted material.

Smoking, eating and/or drinking on the site is prohibited whilst remediation works are active. Exposed areas including hands and face are to be washed thoroughly upon completion of work and prior to eating and drinking.

Heat stress is an important consideration that must be taken into account in hot weather.

9.0 REMEDIATION WORK VALIDATION

9.1 Validation

A validation report will be prepared describing the removal of the asbestos containing material during remediation works. Visual inspection of the asbestos removal areas will be undertaken to confirm removal and ensure no asbestos containing materials remain on the surface.

9.2 Waste Classification

Excavated material will be characterised for waste classification. The material will be stockpiled on-site and sampled at a density in accordance with NEPM (1999) guidelines. Samples will be analysed for heavy metals, polycyclic aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene and xylenes (BTEX) and total petroleum hydrocarbons (TPH). Results will be compared against NSW EPA Waste classification guidelines (2014).

9.3 Validation Imported Fill

Where fill is required to backfill the excavated remediation area the following will be required:

- An ENM certificate issued by a suitable qualified professional including a description of the source of the material, typical analysis results and a statement that the material is suitable for the proposed land use.
- Systematic and documented inspection of loads of fill entering the site will be undertaken. Loads of material suspected to not be ENM or that are not consistent with the material at the source site will be rejected.
- Validation will be achieved by sampling and analysis for heavy metals, electrical conductivity, pH, PAH, BTEX and TPH. Additional laboratory analysis of samples will be undertaken if any additional potential contaminants of concern are identified at the source site. Results will be compared against the ENM order (2014) assessment criteria.
- The frequency of samples will be in accordance with the ENM Exemption and include a minimum of three samples for volumes of soil of less than 500 tonnes. Sampling frequency and analysis will be increased if site condition or analytical results suggest a potential risk of contamination. The results of analysis will reflect the adopted thresholds. The sample density and results will be adequate to characterize the imported fill as ENM suitable for the proposed land-use.
- All fill to a depth greater than 0.6m will be compacted with a vibratory roller and density testing undertaken.

9.4 Validation Reporting

Following the completion of the remediation works, a validation report will be prepared in accordance with NSW EPA *Consultants Reporting on Contaminated Land* (NSW EPA, 2020). The validation report will:

- Provide a summary of previous assessment work carried out
- Outline the remediation works undertaken on-site
- Summarise field observations
- Describe validation sampling and analysis
- Discuss analytical results
- Confirm waste has been disposed of appropriately through the presentation of waste disposal dockets
- Confirm that any imported fill has been validated as required and are accompanied with ENM certificates
- Confirm the Remedial Action Plan's objectives have been achieved, and
- Detail any on-going management requirements.

10.0 OTHER ISSUES

10.1 Community Consultation

Nearby residents shall be consulted and notified in accordance with Council policies.

10.2 Progress Reporting

No progress report will be prepared.

10.3 Regulatory Compliance

All works are to comply with the relevant regulations ensuring that the remediation works do not adversely impact on the environment and public amenity.

11.0 REFERENCES

Barnson Pty Ltd. (2023). *Site Contamination Investigation, 88-96 Mitchell Street, Bourke, NSW 2840. Ref: 42571-ER01_A*. Orange: Barnson Pty Ltd.

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

NSW EPA. (2014). *Waste Classification Guidelines - Part 1: Classifying Waste, EPA2014/0796*. Sydney: NSW Environmental Protection Authority.

NSW EPA. (2014). *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014*. Sydney: NSW Environment Protection Authoroty.

NSW EPA. (2015). *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. Sydney, NSW: State of NSW, Environment Protection Authority.

NSW EPA. (2017). *Contaminated Land Management -Guidelines for the NSW Site Auditor Scheme (3rd edition)*. Sydney, NSW: NSW Environmental Protection Authority.

NSW EPA. (2020). *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines*. Sydney: NSW Environmental Protection Authority.

NSW Government (n.d.) *eSpadev2* (https://www.environment.nsw.gov.au/eSpade2WebApp)

NSW Government (2015) *Naturally occurring asbestos* (datasets.seed.nsw.gov.au/dataset/naturally-occurring-asbestos)

NSW Government (2021). *State Environmental Planning Policy (Relisence and Hazards)*. NSW Legislation (https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0730#)

NSW Government (2022). *How to safely remove asbestos, Code of practice*. SafeWork NSW (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0015/50082/How-to-safely-remove-asbestos-COP.pdf)

barnson.

APPENDIX A

Data Quality Indicators

Quality control and assurance is undertaken to ensure the representativeness and integrity of field and laboratory procedures to ensure accuracy and reliability results.

1. Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 90%)

1.1 Field

Consideration	Requirement
Locations to be sampled	Described in the sampling plan
Depth to be sampled	Described in the sampling plan, each layer or explained
SOP appropriate and compiled	Described in the sampling plan
Experiences sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP, PAH, TPH, PCB 14 days

2. Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size and preparation

2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

3. Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality
All media identified	Sampling media identified in the sampling and quality plan

3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks

4. Precision

A quantitative measure of the variability (or reproduced of the data)

4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within +/-40% or discussion required indicate the appropriateness of SOP

4.2 Laboratory

Consideration	Requirement
Laboratory and inter lab duplicates	Frequency of 5%, results to be within +/-40% or discussion required
Field duplicates	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within +/-40% or discussion required

5. Accuracy

A quantitative measure of the closeness of the reported data to the true value

5.1 Field

Consideration	Requirement
SOP	Complied

5.2 Laboratory

Consideration	Requirement
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Frequency of 5%, results to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

barnson.

APPENDIX B

Historical Aerial Photographs

1963 – Houses onsite

1979 – No Change

1994 – No Change

Sometime after 1994 – Demolished