Proposed Wee Waa High School, 105-107 Mitchell Street, Wee Waa

Remedial Action Plan

Prepared for Department of Education
November 2022

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Proposed Wee Waa High School, 105-107 Mitchell Street, Wee Waa

Remedial Action Plan

Report Number

E211085 RP1

Client

Department of Education

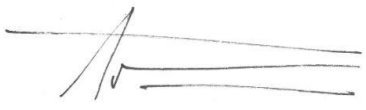
Date

4 November 2022

Version

v3 Final

Prepared by



Andrew Treasure
Senior Environmental scientist
4 November 2022

Approved by

Anthony Davis
Associate Director
4 November 2022

Executive Summary

EMM Consulting Pty Limited (EMM) was engaged by NSW Department of Education (DoE) to prepare this Remedial Action Plan (RAP) for the proposed Wee Waa High School, comprising a 6.03 hectare (ha) parcel of land situated at 105–107 Mitchell Street, Wee Waa NSW, 2388 (the 'site').

The objective of the remediation is to make the site suitable for its proposed land use(s) by reducing the risk of future human and environmental receptors being exposed to soil contaminated with contaminants of potential concern (CoPC) which have been identified in a small area of the site above the remediation acceptance criteria (RAC).

The objective of this RAP is to provide a remediation strategy and document the processes required so that the site can be made suitable for the proposed land use during future development.

The preferred remedial strategy involves the excavation and off-site disposal of hotspot material and other unsuitable materials via targeted excavation and validation and capping of the site with clean material to achieve design levels and finished remediated surface.

The RAP has assumed that the preferred remediation strategy is to be applied to the identified hotspot areas identified in the northern portion of the site within part of Lot 124 DP 757125. Following completion of the remediation works outlined in this RAP, it is anticipated that the site would be suitable for development for the intended land use.

Abbreviations

Acronym	Term
ACM	Asbestos containing materials
ANZG	Australian and New Zealand Governments
AoPC	Areas of potential concern
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
BTEX	Benzene, toluene, ethylbenzene, xylene
CLM Act	NSW Contaminated Land Management Act 1997
COC	Chain of custody
CoPC	Contaminants of Potential Concern
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CSM	Conceptual site model
DBYD	Dial-before-you-dig
DoE	Department of Education
DSI	Detailed site investigation
DP	Deposited Plan
DQO	Data quality objective
DQIs	Data quality indicators
EIL	Ecological investigation level
EIS	Environmental impact statement
ERP	Emergency Response Plan
ESL	Ecological screening level
ENM	Excavated natural material
EMM	EMM Consulting Pty Limited
EMP	Environmental Management Plan
EP&A Act	NSW Environmental Planning and Assessment Act 2000
EPA	Environmental Protection Authority
GSW	General Solid Waste
HEPA	Heads of EPAs Australia and New Zealand
HIL	Health investigation level
HSL	Health screening level
LGA	Local government area
LTEMP	Long-term environmental management plan
m	Metres
m bgl	Metres below ground level
m^2	Square metres

Acronym	Term
mg/kg	Milligram per kilogram
MSDS	Material Safety Data Sheets
NATA	National Association of Testing Authorities
NSW	New South Wales
OCP	Organochlorine pesticides
OPP	Organophosphorus pesticides
OHSP	Occupational Health and Safety Plan
PAH	Polynuclear aromatic hydrocarbons
PID	Photoionisation detector
POEO Act	NSW Protection of the Environment Operations Act 1997
PPE	Personal protective equipment
ppm	Parts per million
QA	Quality assurance
QC	Quality control
RAC	Remediation assessment criteria
RAP	Remedial Action Plan
RSW	Restricted solid waste
SAC	Site assessment criteria
SEPP	State Environmental Planning Policy
S-P-R	Source-pathway-receptor
SSO	Site safety officer
SWMSs	Safe work method statements
TCLP	Toxicity characteristic leaching procedure
TRH	Total recoverable hydrocarbons
VOCs	Volatile organic compounds
VENM	Virgin excavated natural material

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1 Introduction

1.1 Preamble

EMM Consulting Pty Limited (EMM) was engaged by the New South Wales (NSW) Department of Education (DoE) to prepare this Remedial Action Plan (RAP) for the proposed Wee Waa High School, comprising a 6.03 hectare (ha) parcel of land situated located at 105–107 Mitchell Street, Wee Waa NSW, 2388 (the 'site'). The location of the site is shown on Figure 1.1.

The site is legally defined as Lot 125 DP 757125, Lot 124 DP 757125, Lot 2 DP 550633 and Lot 1 DP 577294 and located in the Narrabri Shire Council ('Council') local government area (LGA).

The focus of this RAP is a contamination hotspot identified in the northern portion of the site within Lot 124 DP 757125, herein referred to as the 'remediation area'. The layout of the site and the remediation area is shown on Figure 1.2.

1.2 Background

Students and staff were evacuated from the current Wee Waa High School site due to ongoing health issues in late 2020. Students are currently collocated within the town's primary school in an overcrowded site. A Ministerial announcement made on 3 June 2021 committed to the construction of a new High School at Wee Waa on existing DoE owned land and adjacent Crown land as an urgent priority. The site is located on Mitchell Street/Kamilaroi Highway and is legally described as Lot 1 DP577294, Lot 2 DP550633 and Lots 124-125 DP757125 (the Subject Site).

Barnson Pty Ltd (Barnson) was engaged by the NSW DoE to carry out a preliminary site contamination assessment report (Barnson 2021a) and detailed contaminated site investigation (Barnson 2021b) in support of this development. The reports accompanied a State Significant Development Application (Application SSD-21854025) seeking consent for the construction of a new high school with a capacity of up to approximately 200 students, with future growth potential of up to 300 students (subject to future funding and service need), in a two-storey building, an Indigenous learning centre, sporting fields and associated civil and utilities works.

The preliminary site contamination assessment report identified concentrations of lead and zinc that exceeded the adopted site assessment criteria in samples of soil collected in a specific area of the site. A detailed site investigation (DSI) was subsequently undertaken, which focussed on an area of surficial contamination located in the northern portion of Lot 124 DP 757125. The DSI identified asbestos containing materials as well as elevated concentrations of heavy metals and polycyclic aromatic hydrocarbons (PAHs) in surface soil samples.

Based on the results of the DSI, Barnson (2021b) made several recommendations, including the preparation of an RAP to address an identified area of impact on the site proposed for use as a playing field, including the removal of fibre cement fragments from the surface of the site and application of fill as barrier over the contaminated soil.

1.3 Objectives and scope of work

The objective of the remediation is to make the site suitable for its proposed land use(s) by reducing the risk of future human and environmental receptors being exposed to soil contaminated with contaminants of potential concern (CoPC) above the remediation acceptance criteria (RAC) which was identified in the DSI (Barnson 2021b).

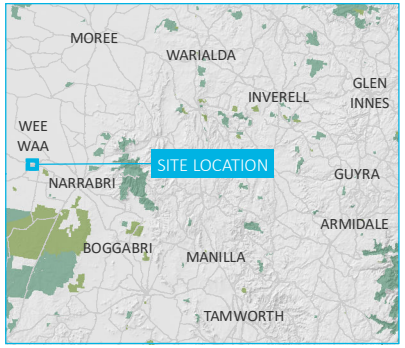
The objective of this RAP is to provide a remediation strategy and document the processes required so that the site can be made suitable for the proposed land use as part of the proposed development.

In accordance with the requirements outlined in NSW EPA Guidelines for Consultants Reporting on Contaminated Land (EPA 2020a), the following scope of work was undertaken in the preparation of this RAP:

- review and summarise the findings of previous investigations and risk assessment (where applicable) previously developed for the site, and present a refined conceptual site model;
- document the identified contamination risks to human health and/or the environment;
- set remediation objectives and remediation acceptance criteria (RAC) for the site that ensure the remediated site will be suitable for its proposed uses with no unacceptable risk to human health or to the environment;
- confirmation of the extent of remediation required across the site, or detail further investigations required during the development phase to determine the extent of remediation required;
- assess options to achieve the remediation objectives and select and justify a preferred approach, with consideration to the principles of ecologically sustainable development;
- document in detail all procedures and plans to reduce risks posed by contamination to acceptable levels for the proposed site use;
- establishment of a validation procedure to ensure the remediation can be assessed as being completed in accordance with the remediation objectives;
- identify the need for and reporting requirements of remedial technology pilot trials (if applicable);
- establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner, including consideration of the potential for off-site impacts (such as air quality, odour and aesthetics); and
- address contingencies and unexpected finds protocols.

This RAP has been prepared with consideration to the following key guidelines:

- NSW Department of Environment and Conservation (DECC) 2007 Guidelines for the Assessment and Management of Groundwater Contamination;
- NSW Environment Protection Authority (EPA) 1995. Sampling Design Guidelines;
- NSW EPA 2014. Waste Classification Guidelines, Part 1: Classifying Waste;
- NSW EPA 2017. Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition);
- NSW EPA 2020. Guidelines for Consultants Reporting on Contaminated Land;
- Standards Australia (2005) Australian Standard AS4482.1 - Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-Volatile Compounds;
- Standards Australia (1999) Australian Standard AS 4482.2 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances; and other relevant guidelines and legislation;
- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM); and
- Department of Urban Affairs and Planning. 1998. Managing Land Contamination, Planning Guidelines, SEPP 55 Remediation of Land.



KEY

- Train station
- Site boundary (Ethos Urban EIS 2021)
- Rail line
- Major road
- Minor road
- Watercourse/drainage line
- Named waterbody

INSET KEY

- Major road
- NPWS reserve
- State forest

Source: EMM (2021); Ethos Urban (2021); DFSI (2017); GA (2011); ASGC (2006)

0 250 500 m

GDA 1994 MGA Zone 55

N

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Site location

Proposed Wee Waa High School
Remediation Action Plan
Figure 1.1

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\\emmsvr1\EMM3\2021\E211085 - DoE Wee Waa High School RAP\GIS\02 Maps\R002 SiteLayout 20211108 03.mxd 8/11/2021

Source: EMM (2021); Ethos Urban (2021); Barnson (2021); DFSI (2017)

Site layout

Proposed Wee Waa High School
Remediation Action Plan
Figure 1.2

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2 Site identification

Site identification data is summarised in Table 2.1.

Table 2.1 Site identification

Item	Description
Site Owner	NSW Department of Education/Crown land
Site Occupier	Vacant land
Site Address	105-107 Mitchell Street, Wee Waa NSW 2388
Legal Description (Lot and DP)	Lot 1 DP577294, Lot 2 DP550633 and Lots 124-125 DP757125
Remediation Area	Contamination hotspot identified in the northern portion of the site within Lot 124 DP 757125
Local Government Authority	Narrabri Shire Council
Zoning and future development use	R1 – General residential. Future development use is a high school
Current Land Use	Vacant land
Geographical Coordinates (AMG)	-30.22283, 149.44059 (approximate to centre of site)
Site Elevation	191-196 metres Australian Height Datum (m AHD) (source: Google Earth)
Site Area (refer to Figure 1.2)	6.03 ha
Site Location and Layout	Figure 1.2

3 Proposed development

The Barnson (2021b) DSI report describes the proposed development including the construction of a new high school with a capacity of up to approximately 200 students, with future growth potential of up to 300 students (subject to future funding and service need), in a two-storey building, an Indigenous learning centre, sporting fields and associated civil and utilities works. The general development layout is illustrated in Figure 3.1. Further details regarding the proposed development are included in the Environmental Impact Statement (EIS) (EthosUrban 2021).

CONSULTANTS

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CONSULTANT AREA
Company Name
T 4927 5566

CONSULTANT AREA
Company Name
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Company Name
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CONSULTANT AREA
Company Name
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Company Name
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AMENDMENTS

No	Drn	Chk	Date	Comment
C	RT	JH	11.06.21	Draft - Work In Progress
D	RT / GM	JH	16.06.21	Issue to Client - Early Contractor Involvement
E	RT / GM	JH	22.06.21	Issue to Client - for Civil input
F	RT / GM	JH	08.07.21	Issue to Client - Early Contractor Involvement - Addendum 01
G	RT	JH	28.07.21	Consultant coordination - Traffic
H	RT	JH	04.08.21	90% (pending client approval)
ZE	RT	JH	15.09.21	Consultant coordination
ZF	RT	JH	23.09.21	Consultant Issue
ZG	RT	JH	28.09.21	Consultant Issue
ZH	RT	JH	07.10.21	EIS Submisison
ZI	RT	JH	08.10.21	Consultant coordination
ZJ	RT	JH	12.10.21	Revised EIS submission

NOTES

1. Dimensions are in millimetres unless otherwise shown.
2. Work to given dimensions. Do not scale from drawing
3. Check all dimensions on site prior to construction and fabrication.
4. Bring any discrepancies to the attention of the proprietor & architect.

CLIENT NAME
School Infrastructure NSW

NSW GOVERNMENT Education School Infrastructure

SCALE
1:500 @A1
0m 5 10 15 20 25

PROJECT NAME AND ADDRESS
Wee Waa High School
105-107 Mitchell St, Wee Waa NSW 2388

DRAWN: RT
APPROVED: JH

STATUS

DRAWING TITLE
Proposed Site Plan - Detailed

PROJECT NO. 4474
DRAWING NO. CD1102
REV. ZJ

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Nominated Architect
Justin Hamilton (6160)
ABN 32 131 584 846

4 Assessment and approval process

4.1 Planning approvals

The planning regime to guide the future redevelopment of the site is established by the:

- *Environmental Planning and Assessment Act 1979*;
- State Environmental Planning Policy (SEPP) No 55 – Remediation of Land (SEPP 55);
- SEPP (Infrastructure) 2007;
- SEPP (State and Regional Development), 2011; and
- Narrabri Local Environment Plan, 2012.

4.2 Legislation relevant to remediation works

The NSW EPA administers a number of Acts and legislative instruments relevant to the remediation works. These include:

- *Contaminated Land Management Act 1997* (CLM Act);
- *Contaminated Land Management Amendment Act 2008*;
- *Protection of the Environment Operations (POEO) Act 1997*, in particular, licensing obligations under that Act; and
- SEPP 55 – Remediation of Land.

4.2.1 Contaminated Land Management Act 1997

The CLM Act is the primary Act under which contaminated land is regulated by the NSW EPA. Relevant legislation relating to the CLM Act includes the Contaminated Land Management Regulation 2013 and the *Contaminated Land Management Amendment Act 2008*. EMM notes that the majority of the provisions in the amending Act commenced on proclamation on 1 July 2009.

This RAP addresses the following aspects of the Act:

- determination and suitability of a contaminated site for a proposed use including the generation of remediation criteria;
- existing orders and regulatory instruments applicable to the site; and
- voluntary remediation proposals and agreements.

The Guidelines for the Contamination Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition) (The Auditor Guidelines) (NSW EPA 2017) were prepared by the NSW EPA under the CLM Act (1997). The Auditor Guidelines (NSW EPA 2017) describe a decision process for assessing urban redevelopment sites that should be followed by contaminated land consultants.

4.2.2 CLM Amendment Act 2008

The majority of the provisions in the amending CLM Act (2008) commenced on 1 July 2009. The purpose of the amendments was to allow contaminated sites to be cleaned up more efficiently while reinforcing the 'polluter pays' principle. The key amendments to the Act included:

- introducing new powers to enable NSW EPA to require certain persons to carry out a preliminary investigation of site contamination;
- amalgamation of the investigation and remediation stages into a single 'management' stage that can cover investigation, remediation or both;
- removing the concept of 'significant risk of harm';
- enabling NSW EPA to declare land to be 'significantly contaminated land' if it has reason to believe that land is contaminated and the contamination is significant enough to warrant regulation;
- enabling management orders to be issued to any one or more persons who are responsible for the contamination of land;
- enabling NSW EPA to issue a management order or to withdraw its approval of a voluntary management proposal that has not delivered a satisfactory outcome in managing contamination;
- provision of a more objective basis for the duty to notify NSW EPA of contaminated land based on criteria to be listed in new guidelines; and
- requiring landowners and persons carrying out certain activities to notify NSW EPA of contamination when it becomes aware of that contamination.

4.2.3 Protection of the Environment Operations Act 1997

Section 48 of the POEO Act requires a person to obtain a licence from the NSW EPA before carrying out any of the premises-based activities described in Schedule 1 of that Act.

Schedule 1 includes the following activity:

> Contaminated soil treatment works for on-site or off-site treatment (including, in either case, incineration or storage of contaminated soil but excluding excavation for treatment at another site) that:
>
> (1) handle more than 1,000 cubic metres per year of contaminated soil not originating from the site on which the works are located; or
>
> (2) handle contaminated soil originating exclusively from the site on which the works are located; and
>
> (a) incinerate more than 1,000 cubic metres per year of contaminated soil, or
>
> (b) treat otherwise than by incineration and store more than 30,000 cubic metres of contaminated soil, or
>
> (c) disturb more than an aggregate area of 3 hectares of contaminated soil.

The remediation works for the site involving the management of contaminated soil originating from the site only, is not likely to involve the treatment of more than 30,000 m^3 of contaminated soil and is not likely to involve disturbance of an aggregate area of 3 hectares (ha) of contaminated soil. If soil treatment works are required, an Environment Protection License (EPL) licence would be required under the POEO Act.

4.2.4 State Environmental Planning Policy (Resilience and Hazards)

Clause 4.8 of SEPP (Resilience and Hazards) defines Category 1 remediation works as:

a) Designated development; or

b) Being carried out or to be carried out on land declared to be critical habitat; or

c) Likely to have significant effect on a critical habitat or a threatened species, population or ecological community; or

d) Development for which another State environmental policy or regional environmental plan requires development consent; or

e) Carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument -

   i) coastal protection;

   ii) conservation or heritage conservation;

   iii) habitat area, habitat protection area, habitat or wildlife corridor;

   iv) environment protection;

   v) escarpment, escarpment protection or escarpment preservation;

   vi) floodway;

   vii) littoral rainforest;

   viii) nature reserve;

   ix) scenic area or scenic protection; and

   x) wetland.

f) "carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Minister".

Based on the information reviewed in Barnson (2021), the remediation works do not trigger the requirement for Category 1 remediation works and therefore do not require Development Consent (ie Category 2 remediation work). As such, remediation work may be carried out without development consent. Notwithstanding, the remediation works at the site will need to comply with the provisions of SEPP 55 where appropriate.

5 Site history

5.1 Previous investigations

EMM is aware of two reports relating to the site that has informed the understanding of site conditions and the development of the remedial strategy:

- Barnson (29 April 2021a) "Preliminary Site Contamination Assessment Wee Waa High School, 105-107 Mitchell Street, Wee Waa, NSW". Document No: 35754 ER01 prepared for NSW DoE.
- Barnson (28 September 2021b) "Detailed Site Contamination Assessment Wee Waa High School, 105-107 Mitchell Street, Wee Waa, NSW". Document No: 35754 ER02 prepared for NSW DoE.

5.1.1 Preliminary site contamination assessment

The preliminary site contamination assessment (PSCA) (Barnson 2021a) identified historical building structures and unregulated waste as potential sources of contamination at the site within the remediation area and adjacent to an observed vehicle access path. A limited sampling program was completed as a part of the PSCA which included the collection of:

- 10 soil samples from across the site which were composited based on the spatial locations and submitted to the laboratory as six composite samples (WW01–WW06);
- one painted wood sample; and
- one fibre cement sample.

Samples were variably analysed for the following:

- metal/metalloids – arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead, (Pb), mercury (Hg), nickel (Ni) and zinc (Zn);
- total recoverable hydrocarbons (TRH);
- benzene, toluene, ethylbenzene and xylenes (BTEX);
- polycyclic aromatic hydrocarbons (PAH);
- organochlorine pesticides (OCPs) and organophosphorus pesticides (OPP); and
- asbestos (presence/absence).

The following summarises the analytical results:

- elevated concentrations of lead, zinc, TRH and PAH were reported for two samples obtained from the remediation area;
- both locations reported a of lead concentration exceeding the adopted ASC NEPM health investigation level (HIL) for recreational areas (HIL-C) and the adopted ecological criteria;
- both locations reported a zinc concentration exceeding the adopted ecological criteria;

- TRH and PAH concentrations did not exceed the adopted criteria;
- the painted wood sample was confirmed to contain lead in the paint; and
- the fibre cement sample was confirmed to contain chrysotile and amosite asbestos.

Elevated concentrations of contaminants of potential concern (CoPC) were not detected in other samples analysed.

Based on the preliminary findings an additional fifteen samples were collected from across the remediation area and composited based on spatial location into five soil samples which were submitted for laboratory analysis. Construction rubble and potential asbestos containing material (ACM) was observed within the remediation area but no samples were collected. Samples were variably analysed for the following:

- metal/metalloids - As, Cd, Cr, Cu, Pb, Hg, Ni and Zn;
- TRH;
- total petroleum hydrocarbons (TPH);
- BTEX; and
- PAH.

The following summarises the analytical results:

- two samples (449 and 1,690 mg/kg) exceeded the adopted HIL-C for lead (600 mg/kg);
- three samples (1,110–1,390 mg/kg) exceeded the adopted ecological criteria for zinc (460 mg/kg); and
- TRH was detected in two samples but below the adopted criteria.

5.1.2 Detailed site investigation

As part of the DSI the remediation area was cleared of the majority of vegetation and demolition waste. The remediation area was segregated into five zones, herein referred to areas of potential concern (AoPC) which are illustrated in Figure 5.1. The following observations were made:

- painted wood fragments were observed in one area. Samples previously collected during the PSI confirmed paint to contain lead;
- masonry footing were observed at the location of a former structure;
- fibre cement sheet fragments were identified observed which were estimated to cover an area of less than 10 square metres (m^2); and
- uncontrolled waste was located along the northern fence line.

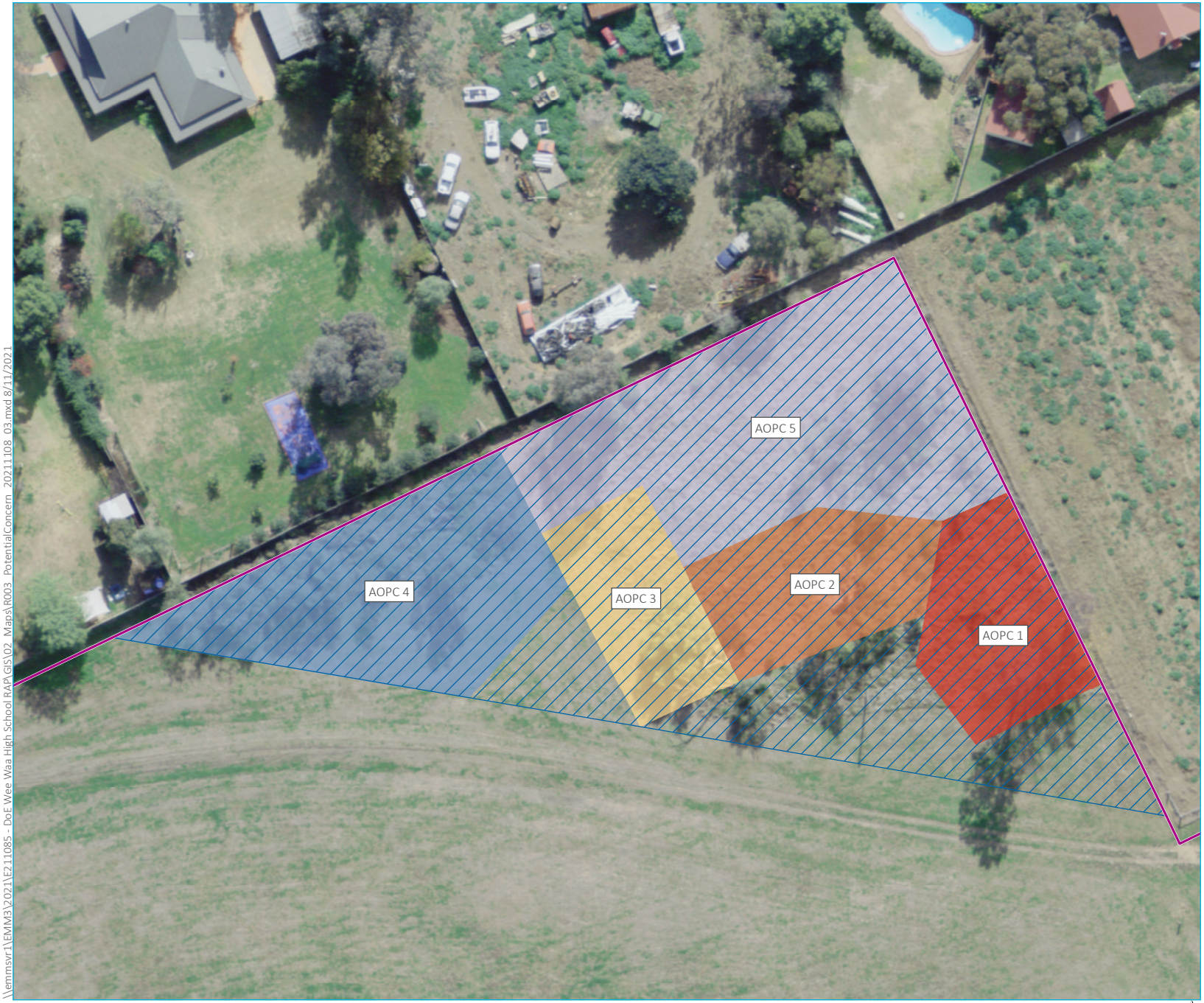
Following ground clearance, 25 surface soil samples were collected from the remediation area and analysed for:

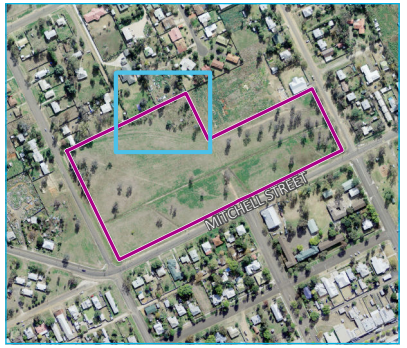
- metal/metalloids - As, Cd, Cr, Cu, Pb, Hg, Ni and Zn;
- TRH;
- BTEX; and

- PAH.

The following summarises the analytical results:

- three samples (623-1,480 mg/kg) exceeded the HIL-C for lead (600 mg/kg) obtained from AoPC 2 (two samples) and AoPC 5 (one sample); and
- TRH was detected in five samples slightly above the LOR but below the adopted criteria obtained from AoPC 1, 3 and 4.





KEY

Site boundary

Remediation area (Barnson 2021b)

Area of potential concern (Barnson 2021b)

AoPC 1 AoPC 2 AoPC 3 AoPC 4 AoPC 5

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Source: EMM (2021); Ethos Urban (2021); Barnson (2021); DFSI (2017)

0 10 20 m

GDA 1994 MGA Zone 55

N

Area of potential concern

Proposed Wee Waa High School
Remediation Action Plan
Figure 4.1

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6 Site condition and surrounding environment

This section describes the present condition of the site and surrounding areas based on data provided in the PSI and DSI.

6.1 Current land use

The site and remediation area are currently vacant lands with limited sparse vegetation and stormwater drainage channels. There are small areas of uncontrolled waste along the northern fenced boundary and there is a vehicle access track running east-west through the site along the remediation area boundary.

6.2 Surrounding land use

Notable land uses in the surrounding area are summarised in Table 6.1.

Table 6.1 Surrounding land uses

Direction	Surrounding land uses
North	The area to the north of the site contains residential area.
East	The site is bordered to the west by George Steet, residential area and Dangar Park recreation area.
South	The site is bordered to the south by the Kamilaroi Highway followed by the Wee Waa Public School and residential areas.
West	The site is bordered to the west by Charles Street followed by a strip of residential area and light industrial area.

6.3 Topography and surface drainage

The site is unsealed and contains grass lined surface stormwater drains flowing through the site generally from the south towards the north where the Namoi River is located approximately 1,150 m north west of the site. The remediation area does not incorporate any reported drainage features (Barnson 2021b).

6.4 Soils

The site is mapped within the Namoi soil landscape containing deep to very deep grey and black vertosols which are generally poorly drained. Previous geotechnical investigations have reported sandy silty clay soils at the site. The Atlas of Australian Acid Sulfate Soil maps the site in an area of 'extremely low' probability of occurrence (a 1-5% chance of occurrence). Surface soils of the Namoi landscape are not saline.

6.5 Geology and hydrogeology

Geologically, the site is underlain by alluvial units consisting of sand, silt and clay. A review of the Narrabri 1:250,000 Geology map shows the majority of the basin sequences are covered with Quaternary age alluvial sandy material of the Marra Creek Formation.

A search of the NSW Government registered bore database was undertaken during the PSI and reported 14 registered bores within a 500 m radius of the site. Standing water is reported to be between 14-18 metres below ground level (m bgl)

7 Site characterisation and conceptual site model

7.1 Conceptual site model

A conceptual site model (CSM) is a qualitative description of the mechanisms by which potential and/or complete exposure pathways exist between known or potential sources of site contamination and human or environmental receptors.

In order for a receptor to be exposed to a chemical contaminant derived from the site, a complete exposure pathway must exist. An exposure pathway describes the course a chemical or physical agent takes from the source to the exposed individual and generally includes the following elements:

- a source and mechanism of chemical release;
- a retention or transport medium (or media where chemicals are transferred between media);
- a point of potential human contact with the contaminated media; and
- an exposure route (eg ingestion, inhalation) at the point of exposure.

Where one or more of the above elements is missing, the exposure pathway is considered incomplete and there is therefore no direct risk to the receptors. Where this is identified, the exposure pathway does not warrant further assessment.

Based on the information reviewed in the PSI and DSI, a CSM has been developed to identify complete or potentially complete linkages between contaminant sources of sensitive receptors. The CSM is summarised below.

7.1.1 Sources

The identified sources of potential contamination at the site have been evaluated in Table 7.1.

Table 7.1 Contamination sources

Source and CoPC	Evaluation
Historical uncontrolled waste	Likely
Lead, ACM	Concentrations of lead in soil were detected above the adopted criteria at three locations. ACM was confirmed at the remediation area and observed in areas containing uncontrolled waste.
Historical uncontrolled waste	Potential
TRH	Low level detections of hydrocarbons were detected in five samples from three AoPCs. Notwithstanding the low concentrations, there is the potential that TRH impacts are present elsewhere at the remediation area or impacts have impacted sub-soils.

7.1.2 Pathways

The following transport mechanisms may apply at the site:

- atmospheric dispersion (aeolian transport) of dust or fibres, derived from contaminated soil;
- excavation and re-location of soil/fill during future construction activities; and
- seepage of leachate from on-site waste into underlying natural soils.

Identified potential exposure pathways for the nominated CoPC include:

i) dermal contact and incidental ingestion of soil; and

ii) inhalation of dust (including soil derived) or fibres.

7.1.3 Potential receptors

Potential sensitive receptors at the site, in the context of school sporting areas and open space land uses, comprise:

- future site users of the school and associated field;
- construction and maintenance workers involved in the development of the site;
- users of adjacent properties (ie sensitive residential receptors to the north); and
- terrestrial ecosystems.

7.2 Potential for off-site contamination

Based on the available information summarised in this report, contamination at the site is generally considered to present a low contamination risk to off-site receptors. Given the highly localised impacts indicated by the reported results, there is a no current data to indicate contamination is impacting adjacent off-site receptors.

7.3 Extent of contamination

The historical information summarised in Barnson (2021a), observed site condition and available sample data support the conclusion that the extent of contamination within the remediation area should comprise:

- localised ACM fragments scattered in surficial soils in areas of uncontrolled waste;
- localised hot-spots of other types of contamination, most likely lead and possibly TRH; and
- uncontrolled waste in localised areas.

8 Remediation acceptance criteria

8.1 Remediation assessment screening criteria

The following guidelines are applicable to the soil investigation:

- National Environment Protection Council (NEPC) (1999). National Environment Protection (Assessment of Alignment Contamination) as amended, 2013 – Soil Health Investigation Levels (HILs) (for metals, PAHs, VOCs, SVOCs, OCPs, asbestos) and Health Screening Levels (HSLs) (for asbestos) (ASC NEPM 2013).
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report No.10 - Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater. September 2011. (Friebel and Nadebaum 2011) – Soil HSLs (for TPH and naphthalene).
- NSW EPA (2014). Waste Classification Guidelines – Part 1 Classifying Waste.

Based on the understanding of the land use of the remediation area being a sports field, the most applicable land use scenarios in the ASC NEPM 2013 for the remediation area is recreational/open space.

The human health based screening criteria are listed below in Table 8.1.

Table 8.1 Adopted remediation assessment criteria (RAC)

Guideline	Screening criteria adopted	CoPC
ASC NEPM (NEPC, 2013)	Table 1A(1) Health investigation levels (HILs) for soil contaminants: • HIL_C (open space)	Metals/metalloids, PAHs
ASC NEPM (NEPC, 2013)	Table 1A(3) Health screening levels (HSLs) for vapour intrusion: • HSL_C (recreational/open space)	TRH, BTEXN
Friebel, E. and Nadebaum, P. (2011)	Table B4 HSLs for direct contact: • HSL_C (recreational/open space)	
ASC NEPM (NEPC, 2013)	Table 1B (7) Management Limits: • Residential/parkland/open space for TPH fractions F1-F4 in fine soils	TPH fractions

It is noted that asbestos will be analysed for absence and presence only, as such the asbestos results will not be compared to the quantification levels in the ASC NEPM 2013.

9 Remediation objectives

The goals of the remediation work are to render the site suitable for the proposed high school and playing field development. In doing so, the potentially complete exposure pathways between identified site contamination sources (ie localised soil contamination and uncontrolled waste) and receptors will need to be rendered incomplete.

Additional remediation goals include:

- demonstrating that the proposed remediation strategy for the site is environmentally justifiable;
- adopting remediation criteria appropriate for the future use(s) of the site to mitigate possible impacts to human health and the environment;
- mitigating possible off-site migration of contaminants; and
- demonstrating that the plans for site management or remediation work consider issues related to worker health and safety, environmental management and site contingencies such as unexpected finds.

10 Remediation options

10.1 Soil

Where appropriate, the project would aim to retain suitable materials on site to ensure compliance with NSW EPA's waste hierarchy as follows:

- Waste avoidance - including action to reduce the amount of waste generated by households, industry and all levels of government;
- Resource recovery - including re-use, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources; and
- Waste disposal - including management of all disposal options in the most environmentally responsible manner.

Offsite disposal is the least preferred option whereas waste avoidance is the preferred option.

The RAP has evaluated remediation options for the three main types of contamination that need to be remediated, these being:

- ACM;
- lead in soil; and
- uncontrolled waste.

Based on the current detailed design, development of the site will require bulk earthworks to facilitate the construction of the athletics track and sports field, which is located partially within and directly adjacent to the remediation area, illustrated in Figure 10.1. The construction activities will likely require the excavation of surficial soils within the remediation area and the importation of suitable subsoils for the proposed development. The use of clean and validated soils to achieve design levels at the site will effectively form a cap which can be utilised to address some of the issues posed by contamination at the site and has been considered when evaluating remediation options.

The proposed development design will achieve the remediation objectives by completing targeted excavations of contaminated soil for off-site disposal. This approach will minimise soil removed from the remediation area.

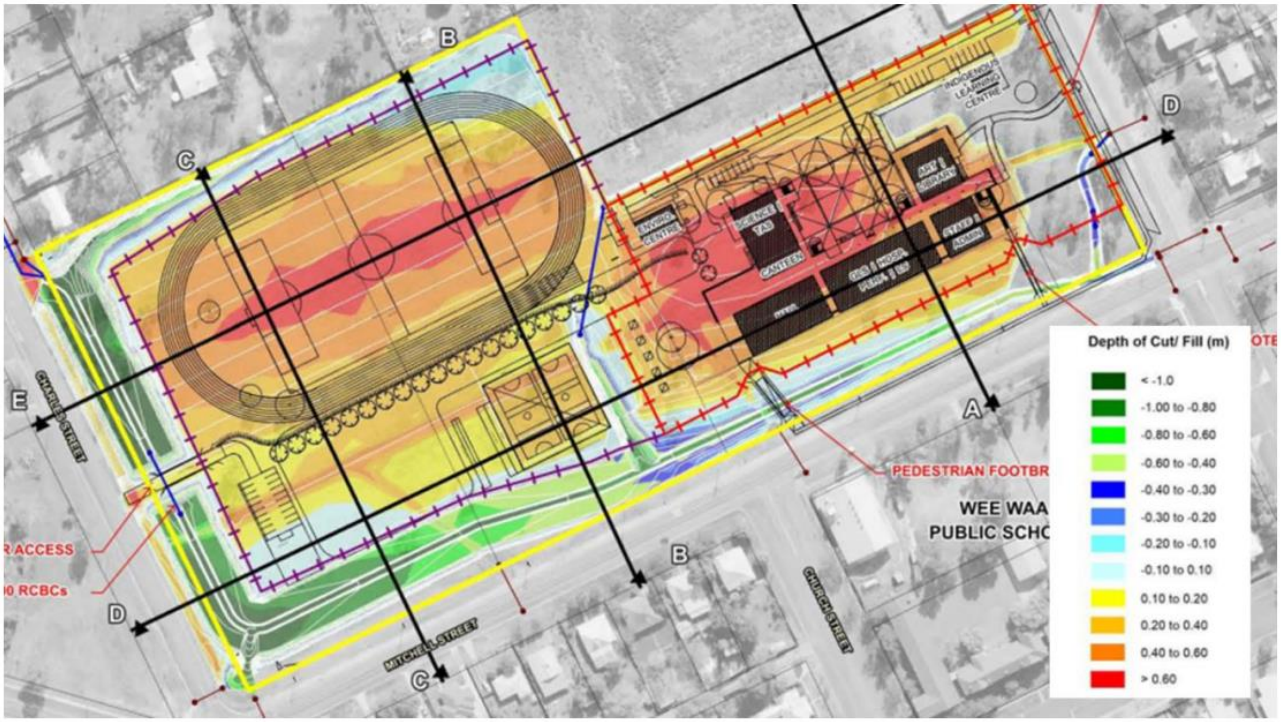

Figure 10.1 Cut and fill concept designs

10.2 Remediation options for residual soil contamination

The proposed development will likely involve the regrading of surface levels to accommodate the design and may involve the reuse of suitable materials won from the site during bulk earthworks and land forming and/or the importation of virgin excavated natural material (VENM). Options for soil and sediment remediation include:

- Option 1: Do nothing;
- Option 2: Off-site treatment prior to off-site disposal or onsite reuse;
- Option 3: Off-site disposal to landfill;
- Option 4: Containment of the impacted soil on site beneath an engineered barrier or cap; and
- Option 5: Reuse/burial of suitable materials to the extent practical; off-site disposal of hotspot material and other unsuitable materials via targeted excavation and validation, capping of site with clean material to achieve design levels and finished remediated surface.

Table 10.1 Contaminated soil remediation options

Option	Evaluation	Option ranking
Option 1: Do nothing	In the context of the proposed development, bulk earthworks and land forming works will be required, therefore this option is not considered appropriate.	Not applicable

Table 10.1 Contaminated soil remediation options

Option	Evaluation	Option ranking
Option 2: Off-site treatment prior to off-site disposal or onsite reuse/burial	There is anthropogenic fill on the site including soil and fill contaminated with ACM and contaminated soil hot-spots that needs to be managed. Offsite treatment prior to disposal or onsite reuse is considered unnecessary and not cost effective given the nature and quantum of CoPC identified in the remediation area.	Not applicable
Option 3: Off-site disposal to landfill	This option is achievable and practical due to the limited lateral and vertical extents of contamination and minimal anticipated volume of material requiring disposal. Excavation could be adopted to facilitate the removal and off-site disposal of hotspots identified in the DSI investigation works and for unexpected finds. Additional sampling and analysis of excavated and stockpiled contaminated soils would be undertaken to improve the understanding of the off-site disposal options for lead impacted soils. Additional characterisation works should include toxicity characteristic leaching procedure (TCLP) and be undertaken in accordance with the NSW EPA (2014) *Waste classification guidelines*.	Preferred approach
Option 4: Containment of the impacted soil on site beneath an engineered barrier or cap	In the context of the proposed high school development, bulk earthworks and land forming will be required to achieve design levels which will require the reuse of clean and validated onsite materials and/or importation of VENM for use as engineered fill, which can be used as a cap overlying any residual soil contamination that may be present. This option would minimise the requirement for additional investigations and possibly minimise the requirement to remove soil contamination 'hotspots', however the practicalities of this approach would need to be confirmed following completion of the detailed design for the site.	Applicable, contingency
Option 5: Reuse/burial of suitable materials to the extent practical; off-site disposal of hotspot material and other unsuitable materials via targeted excavation and validation, capping of site with clean material to achieve design levels and finished remediated surface	There is anthropogenic fill on the site including soil and fill possibly contaminated with ACM and contaminated soil hot-spots that needs to be managed. Hen-picking of asbestos fragments for off-site disposal of ACM and unsuitable fill material to a licensed facility followed by validation sampling. Targeted removal of uncontrolled waste followed by validation of the excavation to confirm the hotspot areas are remediated. Waste material would be disposed off-site. In AoPC 2 complete targeted soil scrapes to 0.3 m bgl to remove elevated lead hotspots, followed by validation of the underlying material. This material may be considered for on-site burial beneath the centre of the sporting fields where fill depth will be up to 0.6m. Additional sampling and analysis of excavated soils may improve the understanding of the off-site disposal options for lead impacted soils. Capping of impacted soils using either site-won materials validated as suitable for use on-site, or imported VENM can be achieved as part of the earthworks required to reach final site design levels. Additionally, sporting fields and athletic track can be used as capping methods.	Applicable, contingency

10.3 Summary of preferred remediation options

Preferred remediation options are summarised below:

- Soil –off-site disposal of hotspot material and other unsuitable materials via targeted excavation and validation; and
- General:
  - remove other vegetation/biodegradable waste;
  - removal of surficial ACM, waste material and unacceptable anthropogenic fill (based on exceedances of the RAC); and
  - remove rubbish/oversize material that is geotechnically unsuitable for use as controlled fill.

11 Staged remediation works overview

11.1 Project schedule

The remediation works have been organised into tasks that will allow the work to be undertaken in a practical and efficient manner that will be protective of human health and the environment. The preliminary task breakdown structure involves:

1. EIS approvals process, including concept, project and development approval;
2. site establishment, installation of environmental protection measures and environmental monitoring;
3. removal of residual surficial waste (if any) across the remediation area incorporating appropriate environmental management measures;
4. removal of any observed surficial ACM;
5. excavation and stockpiling of all contamination hotspots within the remediation area identified in the DSI (Barnson 2021b);
6. waste classification sampling of stockpile to confirm offsite disposal requirements;
7. excavation of all unsuitable fill material including ACM and uncontrolled waste for offsite disposal;
8. hen-picking of scraped areas for any residual ACM;
9. tracking of all excavated materials in accordance with the materials tracking procedure (refer to section 13.3);
10. validation sampling to demonstrate compliance with the requirements of this RAP;
11. excavation of any additional hotspot material exceeding the RAC (if encountered during validation) and then validation of additional excavations;
12. backfilling of site to design levels (as required) with suitable site-won materials and/or imported and validated VENM (refer to section 14.2.4);
13. decommissioning and demobilisation;
14. reporting – preparation of a validation and remediation report; and
15. implementation of an ongoing long-term environmental management plan (if required).

Further refinement of the task breakdown structure will occur as part of detailed design and during the appointment and coordination of the work with the remediation/bulk earthworks contractor.

11.2 Remediation works overview

A summary of the proposed remediation works to be completed is provided in Table 11.1. Based on the Barnson (2021a) report, the location of each AoPC is shown on Figure 5.1.

Table 11.1 Remediation works overview

Remediation area	Remediation process summary
AoPC 1	1) Initial screening of unsuitable fill materials for offsite disposal 2) Hand picking of surficial ACM 3) Validation sampling and analysis 4) Chasing out residual RAC exceedances and re-validation 5) Backfilling and compaction of the to design levels with certified and validated VENM 6) Post-remediation surface to be capped with athletics track surface or topsoiled, seeded and area fenced off and not utilised until development
AoPC 2	1) Initial screening of unsuitable fill materials for offsite disposal 2) Excavation and off-site disposal of all identified hotspots exceeding 250% of the adopted RAC 3) Hand picking of surficial ACM 4) Validation sampling and analysis 5) Chasing out residual RAC exceedances and re-validation 6) Backfilling and compaction of the excavations to design levels with certified and validated VENM 7) Post-remediation surface to be capped with clean, validated soil and turf/seed or final sports field surface and area fenced off and not utilised until development
AoPC 3	1) Initial screening of unsuitable fill materials for offsite disposal 2) Hand picking of surficial ACM 3) Validation sampling and analysis 4) Chasing out residual RAC exceedances and re-validation
AoPC 4	1) Initial screening of unsuitable fill materials for offsite disposal 2) Hand picking of surficial ACM 3) Validation sampling and analysis 4) Chasing out residual RAC exceedances and re-validation
AoPC 5	1) Initial screening of unsuitable fill materials for offsite disposal 2) Excavation and off-site disposal of all identified hotspots exceeding 250% of the adopted RAC 3) Hand picking of surficial ACM 4) Validation sampling and analysis 5) Chasing out residual RAC exceedances and re-validation 6) Backfilling and compaction of the excavations to design levels with certified and validated VENM 7) Post-remediation surface to be capped with final sports field surface or topsoil, turfed/seeded and area fenced off and not utilised until development

Further refinement of the task breakdown structure will occur following the appointment and coordination of the work with the remediation/bulk earthworks contractor and will be presented in the work plans prepared for the site.

12 Site establishment

12.1 Work to be completed prior to establishment

Prior to site establishment, all plans, programs, licences, certificates and other documents necessary for the commencement of work will be completed. These documents will include, but not be limited to the following:

- community consultation activities prior to the commencement of remediation work;
- management plans and work procedures for the remedial program addressing:
  - occupational health and safety (OH&S);
  - environmental management;
  - project management;
  - quality management; and
  - emergency response and contingency;
- all necessary licences and approvals from regulatory authorities, including:
  - State Environmental Planning Policy (SEPP) No. 55 – Remediation of Land, relates to the decision-making process for conducting remediation activities and making planning decisions regarding contaminated land. Category 1 remediation works require development consent while Category 2 remediation works do not. The proposed works at the Site are considered to be Category 2 works under SEPP 55, which require:
    - notification to Council at least 30 days prior to works commencing; and
    - at least 14 days prior to works commencing, provide copies of investigations reports and a remediation action plan, including contact details, to Council;
  - submission of all SafeWork NSW notifications;
- commissioning and mobilisation of plant; and
- underground utility clearance surveys.

12.2 Site preparation and installation of environment protection measures

The risks to the environment posed by the construction, remediation and bulk earthworks program have been assessed as part of the EIS being prepared for the development of the site. Environmental protection measures required by the plan will be installed and commissioned at the beginning of the project during the site establishment stage and then operated and maintained throughout the period of the remediation and the wider site development.

12.3 Site facilities and procedures

It is note anticipated that specific site facilities will be required for the remediation works program given the relatively small duration of work required. Notwithstanding, site facilities will be required as part of the wider site construction activities and will be established in compliance with the relevant regulations. These facilities will be connected to appropriate utilities as required. All connections and reticulations will be carried out by licensed and qualified personnel in accordance with statutory requirements and standards.

12.4 Site access and security

12.4.1 General

Only authorised personnel and equipment will be allowed onto the site and the remediation area. Access will be strictly controlled throughout the course of the remediation and site works using the following procedures.

12.4.2 Working hours

It is anticipated that remediation works hours would be between the hours of 7 am and 6 pm Monday to Friday, and 7 am to 1 pm Saturdays. No remediation works would occur on Sundays and public holidays without prior approval from relevant authorities.

12.4.3 Site access

The primary access route to the site will be via George Street or Charles Street. The entry point will control access to and around the site during the remediation works.

12.4.4 Signage

Signage will be installed at the site entrance detailing the location of:

- the site offices;
- remediation works area;
- first aid facilities; and
- parking.

Traffic restrictions will be installed to limit access into the site and to ensure the safety of site visitors. Signage at the main gate will include after hours contact details.

12.4.5 Fencing

Security fencing may be required around the remediation works area in the event that the site is accessible. Additional fencing will be erected where necessary to secure portions of the site.

12.4.6 Control of site entry and exit

Entry to any designated remediation works areas will be controlled through the use of a sign-on/sign-off log system at the main gate. As remediation work may be completed as a part of the wider site earthworks, personnel will gain access to the remediation works area only after they have:

- attended and completed a site safety induction briefing (applicable to all site workers and visitors);
- are wearing all applicable PPE as detailed in the OH&S Plan; and
- been inducted into the OH&S Plan.

All construction vehicles and delivery vehicles will enter the site through the nominated main gate.

In the event of an emergency on-site and the need for emergency services personnel to access the site works, the site access process may be expedited. In these situations, which require the need to minimise delays in accessing injured site personnel, prior arrangement will be made for special site access procedures.

An Emergency Response Plan will be developed prior to site establishment detailing the specific procedures relating to site emergencies.

13 General remediation excavation and materials management

13.1 Excavation operations

Excavations will be regularly inspected by a suitably experienced environmental engineer or scientist to confirm that the visual and olfactory characteristics of the excavated materials are consistent with expectations. These regular inspections will also serve to identify additional hotspots that may not otherwise have been identified by the previous site investigations.

13.2 Water management

13.2.1 Surface water management

Surface water from remediated and undisturbed areas of the site will be considered clean. Undisturbed surface water runoff will continue to follow existing drainage patterns, unless diversion from work areas is warranted.

13.3 Materials handling

13.3.1 Materials tracking

All materials handled during the remediation works will be tracked in order to allow verification of the correct movement and handling. The system will track materials from cradle-to-grave, and will provide detailed information on the location and quantity of all material movements both on and off-site, so that the material being handled can be identified and accounted for. The tracking system shall include accurate tracking of stockpiles throughout the entire material handling stage. This is to reduce the risk of cross-contamination between stockpiles.

Plans will be made with respect to the extent of each excavation. A register of all analytical results for stockpiles and excavations will be maintained throughout the validation works.

Standard forms shall be prepared as part of the Materials Tracking Procedure. The forms and their function shall include, but not be limited to:

- **Off-site Transport/Disposal Form** - Providing a record of materials removed from the site and including the material type, quantity, origin, shipping destination and an approval by the environmental consultant that the material meets the disposal requirements.
- **Imported Fill Form** - Providing a record of materials imported to the site including the date, material type, quantity, point of origin, intended use and the suitability of the material for use as backfill at the site.
- **Material Excavation Form** - Providing a record of excavated materials for each excavation on the site including the date, material type, excavated quantity, origin and intended destination.
- **Material Stockpiling Form** - Provides a record of all materials placed in stockpiles. The form will include the date, material type, stockpiled quantity, origin and intended end use.

Each form shall be completed on a weekly basis and collated into a cumulative log for each process on a weekly basis.

13.3.2 On-site transportation of material

Materials at the site will be excavated, handled, moved and stockpiled in a manner designed to minimise exposure to the environment and human health.

The validated excavations will be effectively isolated from contaminated areas of the site by the use of physical means such as the placement of clean material bunds, temporary fences and by use of signage.

13.3.3 Off-site transportation of materials

The following materials handling requirements will be developed for trucks transporting materials away from the site:

- trucks carrying contaminated materials will be covered prior to exiting the site and will remain covered until authorised to unload at the destination; and
- trucks will exit the site through predetermined exit points and will follow a predetermined transport route to the destination (licensed landfill or other).

13.3.4 Stockpiling of materials

Stockpile Locations

Soils that are contaminated or not suitable for reuse at the site should be classified in-situ, or in the event of hotspots requiring characterisation temporarily stockpiled in bunded elevated areas for characterisation, then loaded directly onto trucks for expedited disposal. Soils that are contaminated but can reused at the site (based on the results of analytical results or validation sampling) should be classified/validated in-situ wherever possible, then excavated and placed in the final location. Material movements will be tracked via registered survey as part of the Materials Tracking System.

For clean material, stockpiling will be minimised to the extent practical with material temporarily stockpiled in designated stockpile areas located on elevated ground and not flood prone areas. All stockpiling works of clean material should be temporary in nature with placement subject to consideration of up to date Bureau of Meteorology forecasts.

Stockpile Area Preparation

During site establishment, stockpile areas will be prepared using the following methods:

- works will be undertaken initially to clear the area of rubbish, rubble and vegetation;
- where possible, all material will be managed to limit stockpiling to minimise environmental hazards (such as flooding and erosion hazards) and reduce the requirement for validation sampling after the stockpile is removed;
- diversion drains and bunds will be constructed around the perimeter of the stockpile areas to minimise the potential for erosion. Additional sediment and erosion control measures including silt fencing and hay bales will be installed where necessary;
- signs will be erected at the entrance to the stockpile area and at locations around the stockpile specifying individual stockpile numbers and the type of materials stored; and
- buffer zones will be established around each stockpile area to enable access to the stockpiles and minimise impacts of the stockpile area on the surrounding facilities.

Stockpile Construction and Maintenance

The drainage, sediment and erosion control measures installed within stockpiling areas at the commencement of the project will be maintained, repaired and replaced where necessary for the duration of the stockpiling activities. All stockpiles will be maintained in a tidy and safe condition with stable batter slopes.

13.4 Material fate

Where possible, materials won from the screening of excavated materials will be assessed for their recycling suitability as follows:

- steel materials will be transported to appropriate off-site steel recyclers;
- concrete, brick and rock may be crushed to create fill for use in other areas of the development (as required) and for construction of haul roads or recycled off-site; and
- timber will be recycled off-site, where possible.

13.4.1 Waste classification

i General solid waste

Where off-site disposal is required, materials classified as General Solid Waste in accordance with the NSW EPA (2014) Waste Classification Guidelines will be transported off-site and disposed of at a landfill licensed to accept General Solid Waste (GSW).

ii Restricted solid waste

Where off-site disposal is required, materials classified as Restricted Solid Waste in accordance with the NSW EPA (2014) Waste Classification Guidelines will be transported off-site and disposed of at a landfill licensed to accept Restricted Solid Waste (RSW).

iii Documentation

Waste disposal dockets and other relevant other waste documentation must be recorded and provided as required for any disposed waste.

13.5 Imported soil

Soils to be imported to the site to be used for the reinstatement of excavations or for fill to the design levels are to be VENM or excavated natural material (ENM) that has been obtained from reputable, tested and certified in accordance with NSW EPA requirements.

14 Validation strategy

14.1 Validation principles

The validation principles that apply to the site are listed below.

- soils remaining on site must comply with the soil RAC as detailed in Section 8;
- soils to be imported to the site to be used for the reinstatement of excavations are to be VENM or ENM that has been obtained from reputable sources, tested and certified in accordance with NSW EPA requirements;
- soils to be imported to the site to be used for reinstatement of excavations must be validated VENM/ENM; and
- topsoil to be imported to the site must comply with the human health-based soil RAC detailed in Section 8.

14.2 Soil validation

14.2.1 Hotspot excavations (RAC exceedances)

Hotspot excavations will be required where soils exceed the RAC. It is anticipated that excavations will be of surficial material only. Validation samples will be collected from the base of these hotspot excavations at a minimum rate two samples per base. Where the area of the base of the excavation exceeds 25 m^2, then samples will be collected at a rate of one sample per 25 m^2 of base, with a minimum of three samples collected for the initial 25 m^2.

Samples will be analysed for heavy metals/metalloids (As, Cd, Cr, Cu, Hg, Pb, Ni and Zn), TRH/BTEX, asbestos (presence/absence) and PAHs.

Excavated hotspot material will be temporarily stockpiled (whilst laboratory analytical results are pending) and tracked using a Materials Tracking Register. Samples will be collected at the rate of one sample per 25 m^3 for stockpiles less than 100 m^3, following minimum rates for characterisation.

Samples will be analysed for heavy metals (As, Cd, Cr, Cu, Hg, Pb, Ni and Zn), TPH/BTEX, asbestos (presence/absence), OCPs and PCBs and PAHs (Total and TCLP) for characterisation prior to off-site disposal.

14.2.2 Visible asbestos across natural and excavated surfaces

The validation strategy for visible asbestos will comprise the following:

- no visible asbestos is permitted to remain on natural or excavated surfaces;
- prior to any excavations commencing the remediation area should be inspected by an appropriately trained environmental consultant or occupational hygienist for visible ACM fragments. Should visible bonded ACM be encountered during the inspection, the visible fragments should be removed (via hand picking) and appropriately disposed to a suitably licensed facility. All disposal records will be maintained for inclusion in the final validation report prepared for the site;

- following completion of excavations an appropriately trained environmental consultant or occupational hygienist will undertake a grid based inspection of the excavated surface and provide a written and photographic record confirming that no visible asbestos was present on the inspected excavated grounds surface;

- should visible bonded ACM be encountered during the excavation inspection, the visible fragments should be removed (via hand picking) by an appropriately trained environmental consultant or occupational hygienist and appropriately disposed to a suitably licensed facility. All disposal records will be maintained for inclusion in the final validation report prepared for the site; and

- inspected and cleared excavation locations and the date of clearance will be recorded and marked on a plan for inclusion in the final validation report prepared for the site. A cleaned certificate will be issued for each cleared area by a suitably qualified occupational hygienist.

14.2.3 Imported VENM/ENM and landscaping materials

The following validation process for VENM will be required prior to delivery of the VENM/ENM and landscaping materials to the site:

- a desktop review of readily available information of the VENM source site history such as current aerial photographs, NSW EPA register of contaminated sites, published geological and soil maps by a suitably qualified environmental consultant;

- a site inspection and collection of representative samples of VENM from the VENM source site by a suitably qualified environmental consultant;

- preparation of a letter by a suitably qualified environmental consultant that certifies the material as VENM; or

- acquisition of VENM from a certified source or quarry.

Following delivery to the Site, the VENM will be validated by the following process:

- visual inspection of the VENM for observations of potential contamination and screening of subsamples with a photo-ionisation detector (PID);

- collection of one sample per 1,000 m^3 of VENM; and

- analysis of each sample for heavy (As, Cd, Cr, Cu, Hg, Pb, Ni and Zn), TRH, BTEX and PAHs.

Each VENM sample collected will be described in accordance with Section 14.3.3 and VENM delivery dockets will be kept for inclusion in the validation report.

14.2.4 Imported topsoil

Imported topsoil will be stockpiled before use and validation samples collected prior to spreading on the site. Validation samples will be collected at the following minimum rates:

- one sample per 25 m^3 for stockpiles less than 100 m^3; and

- four samples plus one sample per 100 m^3 for stockpiles greater than 100 m^3.

Sub-samples will be collected for VOC screening with a photoionisation detector (PID) and each topsoil sample collected will be described in accordance with 14.3.3.

Samples will be analysed for heavy metals, TRH, BTEX and PAHs. Copies of topsoil delivery dockets will be kept for inclusion in the validation report prepared for the site.

14.3 Soil sampling methodology

14.3.1 Sample collection

The sampling methodology to be used during soil validation is detailed below.

Table 14.1 Methodology for validation soil sampling

Activity	Details
Soil Sampling Excavations	a) Soil samples will be collected from the base of all excavations by hand. If excavations exceed 0.5m samples will be collected from the excavator bucket. b) Samples collected by hand will use a new pair of nitrile gloves and place soil directly into laboratory supplied containers c) If sampling from an excavator bucket is required, a sample will be collected from the centre of excavator bucket that has not made contact with the sides of the excavator bucket d) A new pair of nitrile gloves will be used for the collection of each sample
Soil Sampling Stockpiles	a) Soil samples will be collected in grid pattern across stockpiles and also target any areas of concern b) Soil samples will be collected from a minimum of 0.2 m below the stockpile surface c) Soil samples will be collected by hand d) A new pair of nitrile gloves will be used for the collection of each sample
Asbestos inspections	a) Natural surface soils and excavated surfaces should be inspected by the environmental consultant or occupation hygienist for visible asbestos b) If no visual asbestos is identified the location will be cleared (via issue of a clearance certificate prepared by an occupational hygienist) and recorded as having no visually identifiable asbestos present c) If asbestos is visually identified, it should be appropriately packaged by suitably trained personnel for disposal to a facility licensed to receive that type of waste
Sample Containers	a) Sampled materials will be placed in new laboratory supplied glass jars with Teflon lined lids b) Sample jars will be filled with no headspace c) Samples collected for volatile analysis will not be homogenised
Soil logging	a) Soil logging will be undertaken in accordance with the Unified Soil Classification System. Samples information will be recorded in the field (eg soil/rock type, colour, grain size, inclusions, moisture conditions, staining and odour, etc)
Sample Nomenclature	a) Each sample will be labelled with a unique field sample identification number, the sample date, sampler and job reference number
Field Screening	a) Duplicate soil sub-samples are to be collected in snap-lock plastic bags and the vapour headspace screened in the field for volatile organic compounds (VOCs) using a calibrated PID equipped with a 10.6 eV lamp

Table 14.1 Methodology for validation soil sampling

Activity	Details
Decontamination	1. Equipment decontamination will be undertaken as described below. The following equipment will be needed for the detergent wash and water rinse decontamination process: a) laboratory (phosphate-free) detergent, Decon 90 or Liquinox b) tap water and deionised water c) buckets or tubs (sufficient for size of equipment to be cleaned) d) stiff brushes for cleaning. 2. The equipment is to be scrubbed with the detergent solution until gross contamination is removed and then rinsed in potable water and then deionised water before sampling use. 3. Equipment that cannot be thoroughly decontaminated using the detergent wash and water rinse should be steam cleaned, or if a steam cleaner is not available, not used for further sampling (and marked clearly "not decontaminated") or discarded. Equipment decontaminated using the high pressure steam cleaner will be further decontaminated as described above

14.3.2 Field quality control samples

The quality control (QC) samples to be collected as part of the field quality control procedures are listed below.

Table 14.2 Field quality control samples

QC Sample Type	Description	QC Sample Collection Rate
Intra-Laboratory Duplicates	Are identical to field samples, but both samples are sent anonymously to the primary laboratory. Blind duplicates provide an indication of the analytical precision of the main testing laboratory, but may also be affected by sampling techniques and inherent heterogeneity in the sample medium	Collected at a rate of approximately 1 in 20 soil samples and analysed for the full analyte suite. At least one blind duplicate sample will be included in each batch of samples.
Inter-Laboratory Duplicates	Are identical to blind duplicates, but the duplicate sample is sent to the second (check) laboratory. Split duplicates provide an indication of the accuracy of the main testing laboratory	Samples will be collected at a rate of approximately 1 in 20 soil samples and analysed for the full analyte suite. At least one split duplicate sample will be included in each batch of samples.
Equipment Blanks	Are prepared in the field (at the sampling site) using empty bottles and the distilled water used during the final rinse of sampling equipment. After completion of the decontamination process fresh distilled water is poured over the sampling equipment and collected. The distilled water is exposed to the air for approximately the same time the sample would be exposed. The collected water is then transferred to an appropriate sample bottle and the proper preservative added, if required. Equipment blanks are a check on equipment decontamination procedures.	One equipment blank of soil sampling equipment will be collected for every day of sampling and analysed for full analyte suite.
Trip Blanks/Spikes	Are samples of soil or water prepared by the laboratory with either zero or known anolyte concentration. Trip blanks/spikes are a check on the sample contamination originating or lost from sample transport and handling, and shipping. One Trip Blank/Spike will be analysed per sample batch	One Trip Blank/Spike will be analysed per sample batch

Procedures for duplicate sampling will be identical to those used for routine sampling and duplicate samples will be despatched for analysis for the same parameters using the same methods as the routine sample. Duplicate soil samples will be collected from directly adjacent to original samples. No homogenisation of samples will occur to reduce the loss of volatile compounds.

14.3.3 Laboratory quality control and quality assurance

The laboratories will undertake the analyses utilising their internal procedures and their test methods (for which they are NATA, or equivalent, registered) and in accordance with their quality assurance (QA) system which forms part of their registration.

Table 14.3 Laboratory quality control and quality assurance

QC Sample Type	Description
Laboratory Duplicate Samples	These are sub-samples taken from one sample submitted for analytical testing in a batch. A laboratory duplicate provides data on analytical precision. The rate of duplicate analysis will be according to the requirements of the laboratory's accreditation but will be at least one per batch. Results of the QC analyses for both laboratories will be reported with each batch.
Matrix Spiked Samples	The purpose of the matrix spike is to monitor the performance of the analytical methods used, and to determine whether matrix interferences exist. A sample is spiked by adding an aliquot of known concentration of the target analyte (s) to the sample matrix prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. These will be analysed at a rate of approximately 5% of all analyses. At least one per batch will be reported.
Laboratory Blank	This is usually an organic or aqueous solution that is as free of analyte as possible and contains all the reagents in the same volume as used in the processing of the samples. The reagent blank must be carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample. Blanks will be analysed at a rate of once per process batch, and typically at a rate of 5% of all analyses.
Laboratory Control Samples	These comprise either a standard reference material or a control matrix fortified with analytes representative of the analyte class. Recovery check portions should be fortified at concentrations that are easily quantified but within the range of concentrations expected for real samples. These will be analysed at a rate of one per process batch, and typically at a rate of 5% of analyses.
Surrogates	Surrogate spikes are known additions to each sample, blank and matrix spike or reference sample analysis, of compounds which are similar to the analytes of interest in terms of: • extraction; • recovery through clean-up procedures; and • response to chromatography or other determination; but which: • are not expected to be found in real samples; • will not interfere with quantification of any analyte of interest; and • may be separately and independently quantified by virtue of, for example, chromatographic separation or production of ions of different mass in a GC/MS analyser.
Surrogate spikes	Surrogate spikes are added to the analysis before extraction. The purpose of surrogates is to provide a means of checking, for every analysis that no gross errors have occurred at any stage of the procedure leading to significant analyte losses. Other internal laboratory quality control procedures, as required for NATA, or equivalent, registration, will also be performed.

15 Remediation environmental management plan

This section assesses the risks to the environment posed by the remediation programme and outlines how these risks will be mitigated.

15.1 Potential remediation/construction impacts

15.1.1 Potential impacts on existing sources from project construction activities

The construction phase has the potential to disturb existing contamination (where present) through the exposure pathways and receptors enabled by various activities, particularly the excavation and management of construction spoil.

Excavated material would be transported to disposal/reuse sites following classification and confirmation of suitability for the proposed land use.

Construction activities which require consideration of potential contamination are primarily related to excavation works (surface and trenching works), and may include the following:

- temporary stockpiling of spoil on land;
- cut and fill; and
- excavating, filling and rehabilitation of disturbed areas to the final approved landform.

15.1.2 Potential introduced sources from project activities during construction

Additionally, new sources of contamination may be introduced through construction. These include and are not limited to spills/leaks of chemicals or waste generation associated with:

- ancillary utility works;
- storage of petroleum, diesel, chemicals and other hydrocarbons (including dangerous goods), etc;
- establishment of site offices, amenities and temporary infrastructure; and
- construction of permanent project infrastructure.

There is the potential for exposure of human and ecological receptors to contamination as a result of the inappropriate management of waste, including potential leaks and spills from equipment and plant (generated by construction activities). Typical examples would include spills of hydrocarbons while refuelling or lubricants used by machinery, and generation of construction waste. If managed appropriately, potential impacts to human and environmental health can be minimised.

15.2 Environmental management plan principles

This section of the RAP describes the minimum standards to be adopted to protect the environment during the Remediation Works. The Remediation Contractor will develop and implement a suitable Environmental Management Plan (EMP) in compliance with legislative and regulatory requirements. The EMP will detail the appropriate information and mitigation measures necessary to conduct the remediation works in a manner that will minimise the risk to the environment, as outlined below.

All site workers and visitors will be inducted to be made aware of potential environmental risks and management procedures at the site. As part of the site induction, all employees, sub-contractors and visitors will be made aware of the specific protocols for management of asbestos and acid sulfate soils.

15.3 Water management

Water management is critical to successful remediation and reduction of cross contamination issues. The EMP for the works will include general procedures for the management of surface during the works including those outlined below.

15.3.1 Surface water

Impacted surface water that may accumulate in a remediation area will be contained prior to being tested and where required, disposed of at a licensed waste facility. Surface water from remediated and undisturbed areas of the site will be considered clean. Undisturbed surface water runoff will continue to follow existing drainage patterns, unless diversion from work areas is warranted. Surface water drainage will also be arranged so that surface water run-off from disturbed or contaminated areas does not enter remediated or undisturbed areas or the Georges River.

15.3.2 Flooding

The flooding risk of the site is considered low due to the presence of surface stormwater drains around the permitter of the site which are being expanded as a part of the winder site construction. Notwithstanding this the placement of stockpiles at the site and within the remediation area should be limited to minimise the chance of being impacted by flooding.

Specific measures that will be adopted to protect water quality within the Namoi River include the preparation of a erosion and sediment control plan (ESCP) within the EMP.

15.3.3 Spills and leaks

A spill response plan will be developed and implemented as part of the EMP detailing the procedures for responding to spills and leaks. The procedures outlined in the plan will be aimed at minimising the impact of any contaminant releases that may occur during the works.

The following actions will be taken in preparation for spills or leaks:

- training of site personnel in appropriate spill response techniques;
- allocation of spill response materials and equipment on-site (such as oil absorbent pads and booms). Specifically, spills are to be mitigated by the provision of oil absorbent booms to address any accidental spillage (eg from heavy machinery);

- containment of all storage tanks and drums inside bunded areas with a capacity of 110% of the largest container, or 25% of the total volume of all containers, whichever is greater;
- initial assessment of the spill;
- Notification of the appropriate authorities if necessary;
- following a spill or leak, an investigation to determine the root cause of the incident will be undertaken; and
- corrective and preventative actions implemented to prevent future incidents.

15.4 Air quality management

15.4.1 Dust

Care should be taken to manage wind-blown (aeolian) dust at the site during excavation and earthworks activities. Dust can be generated through a range of means and activities:

- wind action - exposed soil surfaces will generate dust during winds;
- agitation and movement - excavation, mixing and placement of soil will generate dust; and
- vehicle Movements - vehicles' wheels on exposed soil surfaces (such as unsealed roadways) will generate dust and transfer of soil in uncovered trucks may also result in dust generation.

Appropriate management of dust is required to ensure that it is minimised and/or prevented. Dust management will include the following:

- covering surfaces;
- minimising exposed/excavation areas;
- wetting down; and
- dust monitoring.

Should unacceptable levels of dust be detected during the remediation works, an investigation will be conducted to determine the source of the dust, and evaluate the appropriate measures to be implemented.

These measures may include the following:

- increased use of a water cart or water sprays to suppress dust in open areas;
- installation of temporary sheeting to cover localised exposed areas and stockpiles;
- installation of dust screens around the remediation area;
- covering stockpiles of contaminated soil which will remain on the site for more than 24 hours (where practical);
- alteration of the works program to minimise the extent of disturbed open areas;
- consolidation of material stockpiles;

- use of chemical dust-suppressants provided the chemicals do not pose a contamination or health and safety hazard;
- use of alternative coverings such as hydromulch to stabilise the surface of open disturbed areas;
- use of additional dust suppression features on items of dust generating plant and equipment;
- securely covering all loads entering or exiting the site; and
- use of alternate work practices such as modified equipment to minimise dust generation.

Due to the identified presence of asbestos at the site, an asbestos dust management plan is outlined below.

Table 15.1 Asbestos management - dust

Objective(s)	**To ensure the impacts of dust on contractors and surrounding areas are minimised.**		
Management Strategy	Dust issues managed principally by emission controls at source, and administrative controls during works.		
		Responsibility	**Timing**
Control(s)	Area to be disturbed minimised. Clearance lots to be approved by Project Manager. Where dust is identified as an issue, dust control measures will be implemented. These will primarily involve the use of water carts, but may include surface treatments. Vehicle movements controlled and kept to established tracks and haul roads. Dust awareness issues in environmental induction process.	Site Manager	Immediate
Performance Indicator(s)	No complaints from adjacent commercial premises and/or community.	Site Manager	Immediate
Monitoring	Daily inspection of works sites to occur, including: • visual check for dust crossing the site boundaries; and • visual check of high potential dust areas, such as haul roads, stockpiles and operational areas.	Site Manager	Immediate
Reporting	Any complaints or incidents to be reported to Site Manager.	Site Manager	Immediate
Corrective Action(s)	• Investigate cause of excessive dust. • Implement controls immediately (eg water carts). • Implement corrective measures prior to the recommencement of site works. • Implement administrative controls if required, such as rescheduling of dust generating activities to more favourable weather conditions.	Site Manager	Immediate

15.5 Noise and vibration management

The potential for noise and vibration impacts from the remediation works will result from:

- works associated with preparation of the remediation area;
- movement of construction vehicles around the remediation area; and

- operation of plant and activities on the remediation area.

Should unacceptable noise and/or vibration levels be detected during the remediation works the following measures may be implemented:

- modify the works program to minimise the impact of noisy or vibratory operations, including:
  - modify the timing of the works to appropriate times of the day; and
  - accelerate the works program to complete the works quickly and minimise the period of disturbance;
- install additional noise suppression features on plant and equipment;
- construct additional noise attenuation measures such as stockpile barriers, works area enclosures; and
- use of different items of plant and equipment that generate less noise or vibration.

15.6 Erosion and sediment control

15.6.1 General controls

Erosion and sediment control measures will be in place during the remediation works in accordance with Managing Urban Stormwater, Soils and Construction, 4th edition (Landcom 2004). A detailed erosion and sediment control plan (ESCP) will be developed based on the requirements outlined in The Blue Book - Managing Urban Stormwater: Soils and Construction (Volumes 1 and Volume 2).

General erosion and sediment control measures may include:

- installation of silt fencing and bunding as appropriate for the site;
- silt fences must be installed upright and securely fixed. Accumulated sediments behind silt fences must be periodically removed to maintain the retention capacity of the fencing;
- inspections of the control measures in place must be completed daily during the remediation works or immediately following heavy rainfall events to confirm the measures are in good condition; and
- the surface area of exposed soils at a given time should be minimised by adopting a controlled sequence of works and progressive approach to excavations.

15.7 Stockpile management

Given the proximity of the site to stormwater drainage systems which discharge to the Namoi River, and to minimise contaminated soil loss in the event of heavy rainfall or flooding, the use of stockpiles should be minimised and where possible should be temporary in nature. Soils that are contaminated or not suitable for reuse at the site should be classified in-situ, then excavated and loaded directly onto trucks for disposal. Soils that are contaminated but can reused at the site (based on the results of additional investigations and validation sampling) should be classified/validated in-situ, then excavated and placed in the final location. Material movements will be tracked via the Materials Tracking System.

For non-contaminated ('clean') material, stockpiling will be minimised to the extent practical with material temporarily stockpiled in designated stockpile areas located on elevated ground and not flood prone areas. All stockpiling works of clean material should be temporary in nature (<24 hours) where possible with placement subject to consideration of up to date Bureau of Meteorology forecasts.

Any temporary stockpiles are to be appropriately located and tracked to avoid mixing of difference classes of material (eg soil types, evidence of contamination). Bunding and sediment controls will be installed as appropriate to minimise runoff from stockpiles to surrounding areas. All stockpiles should be formed in a manner that reduces the potential for erosion.

15.8 Soil haulage

Soil tracked off the remediation area due to vehicles and plant should be avoided. The following measures are to be adopted to minimise the risk of tracking soils off the remediation area:

- the number of vehicles and plant at the remediation area should be minimised where practicable;
- the frequency of vehicles and plant entering and exiting the site should be minimised where practicable; and
- covers should be used on vehicles transporting soils for off-site disposal.

15.9 Asbestos management

During the remediation works, ACM may be encountered and will require management and disposal to an off-site landfill licenced to receive 'Special Waste – Asbestos' under the Waste Classification Guidelines (NSW EPA, 2014). Additional health and safety measures will be provided in the health and safety plan developed for the remediation works.

Asbestos dust management is outlined in Section 17.1.2.

15.10 Long term environmental management plan

Following finalisation of the detail design and earthworks staging for the site, a long-term environmental management plan (LTEMP) would be prepared if required. The LTEMP will document in specific detail the staging and procedures for the long-term (post construction) management of contamination that will remain at the site with consideration to any residual contamination risk.

The LTEMP will document:

- contamination that remains at the site;
- long term ownership of the contamination;
- any restrictions that the contamination may place on the future use of the land;
- tasks that will need to be undertaken as part of the long term management of residual contamination at the site;
- how the LTEMP will be made legally enforceable;
- reporting protocols and requirements;
- a mechanism for progressive improvement and monitoring of compliance with the LTEMP;
- compliance auditing of LTEMP implementation;
- end points that would need to be achieved before the LTEMP could be terminated;

- contingency measures; and
- triggers for defining when contingency measures would need to be implemented.

A draft version of the LTEMP would be prepared by the environmental consultant and approved in writing by Council prior to the commencement of development works. This will allow issues of concern to stakeholders to be flagged and addressed prior to the commencement of site work. The LTEMP would be prepared in accordance with NSW EPA endorsed guidelines.

16 Remediation occupational health and safety

16.1 General

This section of the RAP describes the minimum standards to be adopted to protect the health and safety of all persons involved in the remediation works. The remediation/earth works contractor will develop and implement a suitable Health and Safety Management System in compliance with legislative and regulatory requirements. A site-specific Occupational Health and Safety Plan (OHSP) will be developed prior to commencement of the works. The OHSP will detail the appropriate health and safety information necessary to conduct the remediation works in a safe manner.

16.2 Occupational Health and Safety

The purpose of the site-specific OHSP is to present all relevant health and safety information for the works. The information presented in the OHSP will include:

- assignment of responsibilities for management personnel and workers;
- an outline of the existing site conditions;
- details of all work to be conducted;
- an evaluation of hazards and risks;
- details of the proposed measures to be implemented to manage the identified hazards and risks;
- establishment of personnel protection standards and mandatory safe work procedures;
- establishment of OHS monitoring protocols;
- training requirements for emergency team members;
- communication protocols and training procedures;
- evacuation procedures, emergency contacts and emergency drills to be implemented; and
- provision for contingencies and changes in work practices.

16.3 Responsibilities

The responsibilities and duties of the remediation/earthworks contractor in relation to OHS will include:

- ensuring all work undertaken is performed in accordance with relevant legislation and regulations, and directions issued by regulatory authorities;
- developing and documenting safe working practices for all employees and subcontractors;
- ensuring workers are adequately trained to undertake their work tasks using the adopted work practices;

- ensuring that work is performed in strict adherence to the adopted work practices;
- appointing a suitably qualified and experienced site safety officer (SSO) to supervise and control safety matters;
- supplying and maintaining first aid kits, first aid facilities and ensuring first aid attendants are present in accordance with statutory requirements;
- ensuring that all workers are inducted prior to their commencement of work. This will include site-specific training in regard to the site conditions, works procedures, emergency and evacuation procedures, first aid procedures, decontamination procedures and other relevant matters detailed in the OHSP;
- ensuring that copies of the OHSP are readily available;
- establishment and maintenance of a record of all hazardous substances on the site including provision of Material Safety Data Sheets (MSDS);
- ensuring that all personnel who work with contaminated materials undergo a medical examination prior to and at the completion of their work on-Site;
- reporting all site incidents and accidents to SafeWork NSW;
- ensuring that the SSO is on-site during all site works to monitor compliance with the OHSP;
- ensuring that regular documented OHS inspections are conducted, including the use of a documented follow-up system to monitor improvements and measures introduced to rectify any observations made;
- supplying and maintaining the required personal protective equipment (PPE);
- ensuring all workers are trained in the use of the PPE and correctly use PPE; and
- ensuring that all electrical equipment, plant and tools comply with appropriate statutory requirements and are maintained in a good, serviceable and safe condition.

16.4 OH&S Legislation, regulations and standards

The remediation works will be conducted in compliance with applicable OH&S legislation, regulations and standards. In addition, the remediation works will comply with relevant industry codes of practice, guidelines and other publications that have been developed by the WorkCover Authority. These may include:

- the Work Health and Safety Act 2011 and Regulation 2011;
- the Dangerous Good Act 1975 and General Regulation 1999;
- Guide for Riggers (November 1995);
- Electrical Practices for Construction Work (February 1992); and
- Exposure Standards for Atmospheric Contaminants in the Occupational Environment (May 1995).

A number of Australian Standards have been identified relating to OH&S issues for the works proposed at the Site. These standards include:

- AS 1319 -1994 Safety Signs for the Occupational Environment;
- AS 1336 -1997 Recommended Practices for Occupational Eye Protection;
- AS 1470 -1986 Health and Safety at Work - Principles and Practices;
- AS 1715 -1994 Selection, Use and Maintenance of Respiratory Protective Devices;
- AS 1716 -2003 Respiratory Protective Devices;
- AS 1801 -1997 Occupational Protective Helmets;
- AS 1885.1 -1990 Measurements of Occupational Health and Safety Performance - Describing and Reporting Occupational Injuries and Disease (known as the National Standard for Workplace Injury and Disease Recording);
- AS 2161 - 2000 Occupational Protective Gloves;
- AS 2210 - 2000 Occupational Protective Footwear;
- AS 2436 -1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites; and
- AS/NZS 3012 -1995 Electrical Installations – Construction and Demolition Sites.

16.5 Risk assessment

A hazard analysis should be conducted prior to site establishment to identify the OHS hazards expected during the course of the remediation works. A Safe Work Method Statement (SWMS) will be developed to identify hazards associated with each work activity required by the proposed remediation works, evaluate the associated risks and determine the necessary measures to reduce or mitigate those risks. This section of the RAP outlines some of the hazards expected over the course of the remediation works. Hazard identification and risk assessment will be conducted and documented on an ongoing basis as the remediation works proceed.

16.5.1 Chemical hazards

Based on the information provided in previous investigations at the site, the presence of asbestos, heavy metals, TRH and PAHs has been confirmed within soils on the site. The hazard posed by these materials will be evaluated and the associated risks assessed in the SWMS.

16.5.2 Atmospheric Exposure Limits and Recognition Qualities

The exposure limits and recognition qualities of the chemicals likely to be encountered in the remediation works will be taken from the following guidelines (listed in order of precedence) and detailed in the OHSP:

- NOHSC, Exposure Standards for Atmospheric Contaminants in the Occupational Environment, 1995. The most up-to-date Australian exposure standards are located on the Safe Work Australia Hazardous Substances Information System (http://hsis.ascc.gov.au/SearchHS.aspx); and

- National Institute for Occupational Safety and Health (NIOSH) 2007, Pocket Guide to Chemical Hazards. Also refer to http://www.cdc.gov/niosh/npg/.

16.5.3 Additional hazards and risks

The OHSP will identify and describe a range of other hazards anticipated during the remediation works. These hazards will include:

- heat stress;
- explosive atmospheres in areas dealing with contaminated materials;
- oxygen deficient atmospheres and confined spaces (as defined under AS/NZS 2865 - 2001 Safe Working in a Confined Space);
- underground utilities;
- underground pipelines, pits, and other obstructions;
- above ground electrical and utility hazards;
- traffic hazards;
- instability of excavation batters and stockpiled material; and
- physical hazards such as trip hazards and mobile plant.

Specific minimum standards for these hazards will be outlined within the SWMS.

16.6 Work zones

The remediation area will be divided into the AoPC areas based on the understanding of contaminants presented in the DSI (Barnson, 2021b) and the respective management requirements for each AoPC (refer to Section 11.2).

17 Contingency planning

17.1 Approach

The purpose of this contingency plan is to outline procedures for the identification and management of unexpected issues or events that may occur during the remediation works.

A number of unexpected issues or events that may occur during the remediation works, which may include, but not be limited to:

- increased volumes of contaminated material – to be mitigated by additional off-site disposal and/or use on an on-site containment and/or capping strategy;
- unknown chemical contamination – to be mitigated by stop work, additional investigation, options assessment then remediation in accordance with NSW EPA requirements;
- flooding; and
- emergencies – to be mitigated by preparing an emergency response plan as described in Section 19.1.6.

17.1.1 Chemical contamination

The range of contaminants analysed in previous site investigations is considered appropriate. However, there is the potential for occurrence of as-yet unidentified contaminants and for variation to the concentration or distribution of known contaminants. Should any significant changes to the nature or types of contaminants be identified during the works, a variation to the RAP may be required.

17.1.2 Asbestos contamination

ACM has been identified in surficial soils but not been identified within the soil profile in fill in previous investigations within the site, noting that excavations have not been advanced at the site. Notwithstanding this, due to the presence of fill there is a potential for ACM to be encountered during excavation works. Should asbestos be uncovered the following process should be undertaken:

- the material is not to be further disturbed and an exclusion zone created around the affected area to prevent access by site workers or visitors;
- the material and the soil immediately surrounding the suspected ACM should be wetted down;
- a suitably qualified environmental consultant or occupational hygienist should inspect and test the suspected ACM for asbestos;
- an Occupational Hygienist should be engaged to implement necessary controls and/or monitoring of the asbestos removal works;
- soils containing bonded ACM may be excavated and disposed off-site to an appropriately licensed landfill by a contractor with a minimum “Class B” asbestos removal license in accordance with the NSW DECC (2009) Waste Classification Guidelines as Special Waste (Asbestos) or as per the advice of the occupational hygienist; and

- soils containing friable asbestos should be excavated and disposed off-site to an appropriately licensed landfill by a contractor with a minimum "Class A" asbestos removal license in accordance with the NSW EPA (2014) Waste Classification Guidelines as Special Waste (Asbestos).

17.2 Increased volumes of contaminated material

The remediation works strategy is to undertake excavation and off-site disposal of all impacted fill material such that the site is suitable for recreational land uses. In addition to those completed (Barson 2021a, 2021b), additional environmental site investigations will be conducted to further characterise material within the site as part of the remediation programme which will help to minimise the risk of increased volumes of contaminated material requiring management during the remediation works.

Excavated materials will be disposed to landfill and tracked using the Materials Tracking System described in Section 13.3.1.

In addition to unanticipated increased volumes of contaminated material, increased volumes of foreign materials in the form of uncontrolled waste may have the potential to adversely impact on the remediation works. Depending on the magnitude of the changes of anticipated volumes of excavated materials, and the extent of contamination, changes to the depth of excavation and to the final reinstatement levels may be made during the remediation works.

17.3 Unexpected contamination

The following unexpected events have been identified as having the potential to occur during remediation works and will be assessed by the nominated environmental consultant overseeing the remediation programme:

- Variation of contaminant characteristics or identification of unanticipated contaminants and materials. This may include the following materials:
    - soil that appears to be different to the expected finds material described in Sections 5 and 7;
    - soil that appears to be contaminated based on visual and olfactory (odour) indications;
    - the presence of potential bonded ACM fragments or other contaminants in areas which have not been previously identified; and
    - the presence of friable asbestos.

Contingency mitigation measures for managing unexpected contamination are described in the following sections.

17.3.1 Variation of contaminant characteristics

The range of contaminants analysed as part of the previous site investigations (Barnson, 2021a,b) is considered appropriate for assessing the site's suitability for the proposed redevelopment. However, given the potential for heterogeneous fill material to be encountered across the site resulting from historical land uses and emplacement of imported fill, there is the potential for occurrence of as yet unidentified contaminants, and for variation in the concentrations or distribution of known contaminants. Should any significant changes to the nature or types of contaminants be identified during the construction works, the material will be sampled and analysed to determine whether the material can be reused on site. The analytical suite for such materials would be confirmed by an environment consultant prior to conducting the sampling.

Table 2 details the recommended actions and responsible site personnel for unexpected finds during earthworks.

Table 2 Unexpected find responses

Unexpected find/event	Action	Responsibility
Excavation of discoloured, odorous or otherwise contaminated soils	• Stop work and segregate the work area • If potentially contaminated soil has been excavated, place on high density polyethylene (HDPE) plastic sheeting • Cover stockpiled material with HDPE sheeting • Engage a suitably qualified environmental consultant to complete soil sampling and analytical characterisation • Complete waste characterisation to inform off-site disposal (if required)	Site Supervisor Equipment operator
Encounter previously unidentified potential ACM fragments	• Stop work and segregate the work area • Engage a suitably qualified and experienced occupational hygienist to validate and document the appropriate removal, disposal, and absence of bonded ACM at the site	Site Supervisor Equipment operator
Encounter fibrous/friable materials (potentially fibrous ACM)	• Stop work and segregate the work area • Wet the area down to supress the generation of any dust • Cover with plastic and secure with soil • Engage a suitably qualified, experienced and licensed asbestos removalist to sample, remove, validate and document the appropriate removal, disposal, and absence of fibrous ACM at the site	Site Supervisor Equipment operator

17.3.2 Notifications to regulators

If gross contamination is encountered or occurs during earth works at the site, notification to NSW regulators may be required and should be conducted in consultation with DoE and an environment consultant. Where any unexpected contaminated material is identified which requires off-site disposal, the disposal location and results of testing should be submitted to the Planning Secretary prior to removal from the site.

17.4 Operational contingencies

17.4.1 Emergency response plan

An Emergency Response Plan (ERP) will be prepared prior to the commencement of the site remediation works. The plan will outline the process for identifying possible emergency situations and detailing the procedures necessary to ensure the safety of both on-site and off-site personnel in the event of an emergency.

The ERP should include the following general information:

- assignment of responsibilities to nominated key personnel;
- assessment of the potential on and off-site impacts of hazards;
- emergency reporting procedures including on-site reporting and reporting to the appropriate authorities;
- emergency response procedures including, but not limited to, the following:
  - on-site fires or explosions;
  - chemical spills;

- rupture of buried services;
- hazardous gas releases and emissions;
- traffic accidents both involving the transportation of "Dangerous Goods";
- first aid for injured personnel;
- evacuation of on-site personnel; and
- managing unknown/uncertain situations;

- incident investigation procedures to determine the root cause of the incident, and to identify the appropriate corrective and preventative actions to prevent future incidents.

18 Community engagement

Community engagement prior to and during remediation is an integral component of successfully delivering the remediation works. The strategy includes processes for communicating with the local community on the remediation works, discussing potential short-term impacts and mitigation measures relating to the remediation.

Table 18.1 Summary of community consultation strategy

Communication channel	Purpose
Site Concept Plan Website	This is the central portal for information about the proposed development. It contains information for the community and stakeholders regarding the remediation works including electronic copies of notifications, press releases and links.
Notifications	To ensure all residents and businesses potentially impacted by Site works are informed in advance of key work commencing. Notifications will be used to inform the community of key issues such as the timing of noisy work, out of hours construction and traffic impacts.
Signage	To inform the community about who is responsible for the Site activities and the contact details for further information about the work.

19 Key personnel

19.1 Contractual framework

The contractual framework of delivery of the remediation works has not yet been determined by DoE. Potential contractual structures may include:

- turn-key delivery of the remediation works by a remediation contractor;
- supervision of the remediation works by a superintendent and validation team engaged separately for the remediation contractor; and
- a variation on the above.

Notwithstanding the contractual framework initially adopted, the key roles and responsibilities associated with the remediation works are as discussed following. Depending on the contract structure the various roles and responsibilities may be discharged by one or more entities.

19.1.1 Project Director

The Project Director is responsible for ensuring that the remediation works undertaken on-site are in accordance with this RAP, the EMP, the OHSP and other relevant documentation, and that the objectives stated within the RAP are ultimately met. The Project Director will generally also be responsible for ensuring that the remediation works occur within the timeframe nominated, within the financial budget allocated, and is completed safely. The Project Director assumes ultimate responsibility for the project.

19.1.2 Project Manager

The Project Manager is responsible for daily operations and directs the site operations to ensure effective planning, verification, documentation and management of operational and environmental and safety issues in accordance with this RAP. This includes maintaining a liaison with regulatory authorities to ensure that all necessary work is undertaken to satisfy the NSW EPA that the remediation achieves the objectives of this RAP.

The Project Manager is responsible for the implementation of all Project Plans including the RAP, EMP, OHSP Plan, Quality Plan and other relevant contractual documents associated with the remediation works. This includes responsibility for:

- any design that may be required during the remediation work;
- implementation and scheduling of the remediation works in accordance with the abovementioned documents; and
- ensuring compliance with relevant legislation and regulations.

The Project Manager is also responsible for ensuring that human health and the environment are protected at all times, including the provision of training and site inductions to all appropriate subcontractors and workers.

The Project Manager will be a primary community contact and the first point of contact for subcontractor issues.

19.1.3 Remediation and validation works team

A suitably qualified environmental consultant will undertake the supervision and validation of the remediation works under the direction of the environmental consultant Project Manager. The environmental consultant's PM is responsible for ensuring that all required validation systems are fully functional, and that personnel are trained in the requirements of the validation requirements as detailed Section 14.1 of this RAP.

A site-based administrative system will be established to ensure that the remediation works are fully documented. A daily fieldwork summary will be prepared and filed. All project-related incoming and outgoing communications will be logged in a register.

Decisions related to validation will be made in accordance with relevant guidelines endorsed by the NSW EPA. Copies of relevant guidelines will be made available and accessible on-site as required (electronic versions are acceptable).

All remediation site work will be directed by qualified environmental engineer(s)/scientist(s) with experience working on contaminated sites. A member of the environmental consultant's field team will be the validation site supervisor responsible for making all validation decisions and directing all routine site fieldwork. Prior to commencement of the project, the environmental consultant's Site Supervisor will prepare a project manual containing all required procedures and forms. The manual will be updated on an as needed basis. It is the responsibility of the environmental consultant's Site Supervisor to ensure that the validation requirements detailed in Section 14.1 are followed.

Site meetings will be convened, as required, to discuss fieldwork procedures. At least one meeting per week will be held with the environmental consultant's Site Supervisor and the Remediation Contractor's Project Manager to plan work for the following week and to resolve outstanding issues.

Where, because of an unforeseen circumstance, the environmental consultant's Site Supervisor considers that a departure from the validation requirements is required, this must be discussed with the environmental consultant's Project Manager before any other related action is taken. If the departure is approved, it will be documented in site files. If urgent action is required, the environmental consultant's Project Manager will be responsible for deciding the particular issue. The client representative will be sent written confirmation as soon as practicable, but in any case within 5 working days of the reasons for making the changes to the validation procedures detailed in Section 14.1, feedback and endorsement of the changes will be requested in writing from the client representative.

19.1.4 Site Foreman

The Site Foreman implements day-to-day operations as directed by the Project Manager.

19.1.5 Safety and Quality Officer

The Safety and Quality Officer is responsible for implementation of the quality and safety management systems. This person assists the Project Manager with day-to-day tasks that arise, reports activities undertaken, directs the subcontractors, maintains accurate records of works such as safety checklists, and maintains a photographic record of works undertaken. This will include review and update of the OH&S Plan and EMP plus health and safety manuals, rules and procedures.

The Safety and Quality Officer ensures personnel and visitors to the site are inducted and has responsibility for emergency response and training in accordance with the Emergency Plan. The Safety and Quality Officer has the authority and independence to require reasonable steps to be taken to avoid or minimise unintended or adverse work safety impacts, and can direct relevant actions to be ceased should any adverse impact on worker safety be likely to occur.

The Safety and Quality Officer ensures all health and safety monitoring devices are operating in accordance with the RAP, EMP and OHSP and also keeps the incident and accident register up to date with notification given to Work Cover NSW as necessary.

The Safety and Quality Officer will provide advice and recommendations, when appropriate, with regards to:

- legal requirements;
- changes in legislation;
- dealings with Work Cover New South Wales;
- prevention of injury or damage;
- accident and injury investigations and reports;
- work methods, equipment, or materials which could reduce risk; and
- selection, suitability and application of safety equipment.

The Safety and Quality Officer will be responsible for holding regular 'toolbox' safety meetings with all site personnel and will ensure meeting minutes are appropriately documented.

19.1.6 Subcontractors

All work will be undertaken, as specified by the Project Manager, and per the requirements stated within this RAP and the EMP, the OHSP and relevant management plans.

Subcontractors will be advised of required work procedures through induction, training, and meetings provided by the Contractor. Maintenance of subcontractor equipment will be the responsibility of the subcontractors.

The Subcontractor is responsible for ensuring that all works executed by the subcontractor complies with relevant SafeWork NSW as necessary.

References

Australia and New Zealand Heads of EPA (HEPA), *2020 PFAS National Environmental Management Plan*

Australian Bureau of Agriculture and Resource Economics and Sciences, *Atlas of Australian Soils*

Barnson, 2021a. *Preliminary Site Contamination Assessment Wee Waa High School, 105-107 Mitchell Street, Wee Waa, NSW*. Document No: 35754 ER01 prepared for NSW DoE

Barnson, 2021b. *Detailed Site Contamination Assessment Wee Waa High School, 105-107 Mitchell Street, Wee Waa, NSW* Document No: 35754 ER02 prepared for NSW DoE

Department of Urban Affairs and Planning. 1998. *Managing Land Contamination, Planning Guidelines, SEPP 55 Remediation of Land*

Friebel, E. & Nadebaum, P., 2011. *Health Screening Levels for petroleum hydrocarbons in soil and groundwater. Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE). Technical report series No. 10*

Landcom, 2004. *Managing Urban Stormwater: Soils and Construction*, 4th Edition. Printed March 2004

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

National Health and Medical Research Council (NHMRC) 2011. *National Water Quality Management Strategy. Australian Drinking Water Guidelines* 6. National Health and Medical Research Council and Natural Resource Management Ministerial Council (NHMRC/NRMMC). January 2011

NSW Environment Protection Authority (EPA) 1995. *Sampling Design Guidelines*

NSW EPA 2014. *Waste Classification Guidelines, Part 1: Classifying Waste*

NSW EPA 2017. *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition)*

NSW EPA 2020b. *Assessment and management of hazardous ground gases Contaminated Land Guidelines*

NSW EPA 2020a. *Guidelines for Consultants Reporting on Contaminated Land*

SafeWork Australia 2018. *How to safely remove asbestos Code of Practice*, October

Standards Australia (2005) Australian Standard AS4482.1 - *Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil. Part 1: Non-volatile and Semi-Volatile Compounds*

Standards Australia (1999) Australian Standard AS 4482.2 - *Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances*

Western Australia (WA) Department of Health (DOH) 2009. *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Study Areas in Western Australia*. Dept. Of Health, Perth. May 2009