Douglas PARTNERS

GROUNDED EXPERTISE

Remediation Action Plan

Proposed Residential Development

72 & 82-86 Menangle Road, Camden NSW

Prepared for Homes NSW

Project 239951.00

25 June 2026

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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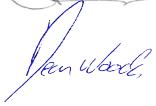
Reviewer		25 June 2026

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Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

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Remediation Action Plan
Proposed Residential Development
72 & 82-86 Menangle Road, Camden NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has prepared this remediation action plan (RAP) for a proposed residential development at 72 & 82-86 Menangle Road, Camden NSW. (the 'site', as shown on Drawing 1 in Appendix A).

This RAP has been prepared by Douglas as part of the Environmental Impact Statement (EIS) for a State Significant Development (SSD) application and concurrent rezoning for a social and affordable housing development at 72 and 82-86 Menangle Road, Camden.

The site is located at 72 and 82-86 Menangle Road, Camden, in the Camden Local Government Area (LGA) and has a combined site area of 7,184sqm.

The SSDA seeks approval for the construction of two residential flat buildings comprising a total of 95 social and affordable housing dwellings.

In June 2026, Douglas completed a detailed site investigation (DSI)[1] for the site which identified asbestos impacted surface soil in the vicinity of the three residential dwellings on 82-86 Menangle Road, and at borehole BH102 in 72 Menangle Road, that will require either remediation and/or management for the site to be considered suitable for the proposed residential land use. The DSI also concluded that further soil investigations, including an asbestos assessment, will also be necessary beneath the buildings on 82-86 Menangle Road following demolition of the structures and at BH102 to assess the lateral and vertical extent of asbestos impact and the % weight / weight in fill. Further investigation should also be completed within the footprint of the former nurses' quarters at 72 Menangle Road following demolition.

The purpose of the RAP is to establish appropriate remediation objectives, strategies, methodologies, and validation processes to enable remediation and management of asbestos impacted surface soil in the in the vicinity of the three residential dwellings on 82-86 Menangle Road, and at borehole BH102 in accordance with EPA requirements. as well as to undertake further testing to confirm the assumptions regarding site suitability. The RAP also contains the further investigation requirements to assess soils beneath the site's structures following demolition.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* [NEPM] (NEPC, 2013);

[1] Douglas (2026b) *Report on Detailed Site Investigation, 72 & 82-86 Menangle Road, Camden NSW*. Ref. 239951.00.R.001.Rev2 dated 24 June 2026.

- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives* (CRC CARE, 2019a).

The remediation objectives, devised in accordance with CRC (2019a), are to:

- Address potentially unacceptable risks to relevant environmental values from contamination; and
- Render the site suitable, from a contamination perspective, for the proposed development.

This RAP provides details of the work that will be required at the site to meet the remediation objectives.

The remediation works outlined in this report constitute Category 1 Remediation under Section 8.1 of Camden Council's *Management of Contaminated Lands Policy* and therefore will therefore require development consent.

This RAP presents the procedures and plans which provide the means by which site remediation can be achieved. The Remediation Contractor must base their detailed work methodologies around the requirements of this RAP.

The site layout is shown on Drawing 1, Appendix A. This report must be read in conjunction with all appendices including the notes provided in Appendix A.

1.1 Secretary's environmental assessment requirements (SEARs)

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-116982991) on (11 May 2026) as detailed in Table 1 below.

Table 1: SEARs compliance table

Issue	SEARs requirement	Section reference
13. Contamination and remediation	In accordance with Chapter 4 of the *State Environmental Planning Policy (Resilience and Hazards) 2021*, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	Remediation Action Plan - This report

1.2 Proposed development

The SSD application seeks consent for the following:

- Site preparation works including excavation.
- Construction of two residential flat buildings containing 95 dwellings for the purpose of social and affordable housing.
- Construction of one level of basement parking for each residential flat building.
- Associated landscaping and communal open space.
- Infrastructure servicing.

2. Scope of work

The scope of work to achieve the objective is as follows:

- Summarise the findings of the previous contamination investigations and identify contamination issues requiring remediation and/or management and the further investigation requirements for the site;
- Present a conceptual site model (CSM) to list potential and likely contamination source, pathway and receptor linkages to address potentially unacceptable risks to human health and relevant environmental values from contamination;
- Define the anticipated extent of remediation;
- Assess potentially suitable remediation options to render the site suitable for its proposed use, and which will minimise potentially unacceptable risk to human health and/or the environment and which includes the consideration of the principles of ecologically sustainable development;
- Assess the remediation approach to management and/or remediation to render the site suitable, from a contamination perspective, for the proposed development;
- Establish the remediation acceptance criteria (RAC) to be adopted for validation of remediation;
- Identify how successful implementation of the RAP will be validated;
- Outline waste classification, handling and tracking requirements;
- Outline environmental safeguards required to complete the remediation works; and
- Include contingency plans and an unexpected finds protocol.

3. Site description

Site address	72 & 82-86 Menangle Road, Camden NSW
Legal description	72 Menangle Road (Lots 73-77 and 86 Deposited plan (DP) 21405); 82 Menangle Road (Lot 1 DP24039); and 84 – 86 Menangle Road (Lots 2 and 3 DP24039).
Area	7,184 m^2
Zoning	Zone SP2 Infrastructure (Hospital)
Local council area	Camden Council

Current use	72 Menangle Road - unoccupied three storey (former nurses' quarters) building 82 Menangle Road – residential dwelling however previously used as an office of administration 84-86 Menangle Road – two unoccupied residential dwellings
Surrounding uses	North – Menangle Road with Camden Hospital beyond to the northwest. Gilbulla Avenue and residential properties are located to the northeast. East – Residential South – Residential West – Menangle Road with Old Hume highway and residential properties beyond

The site boundary is shown on Figure 1.

Figure 1: Site location

4. Environmental setting

Regional topography	Regional topographic data indicates that surrounding levels are undulating.
Site topography	2 m elevation contour topographical mapping indicates that the site is sloping from the west to the east with an overall difference in level of approximately 7 m from the highest part of the site 88 m relative to Australian Height Datum (AHD) in the north western portion to the lowest (81 m AHD) in the south eastern portion.
Soil landscape	Reference to the Penrith 1:100 000 Soils Landscape Sheet (Bannerman & Hazelton, 2011), indicates that the site is underlain by residual Blacktown soils. The Blacktown soil landscape (mapping unit bt) is characterised by a topography of gently undulating rises on Wianamatta group shales and Hawkesbury formation shales, with local relief to 30 m and slopes usually less than 5%, typically represented by broad rounded crests and ridges with gently inclines slopes. The mapping indicates that the shallow to moderately deep soil horizon (< 100 cm) comprises red and brown podzolic soils on crests, upper slopes and in well-drained areas. The deeper areas of the soil horizon (150 – 300 cm) comprises yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. These soils are typically of low fertility, are moderately reactive, highly plastic, and generally have poor soil drainage.
Geology	The NSW Seamless Geological Series (GSNSW, 2019), indicates that most of the site is underlain by Bringelly Shale of Triassic age of the Wianamatta Group (mapping unit 'Twib'). The Bringelly Shale formation typically comprises claystone, siltstone and laminite with fine to medium-grained lithic sandstone members and rare layers of carbonaceous claystone, siltstone, coal and tuff. Sideritic bands are common. Bringelly Shale typically weathers to form clays of either medium or medium to high plasticity. The alluvial floodplain deposits are described as typically comprising clay, silt, and very fine to medium grained, lithic to quartz-rich sand. The southern portion of the site (84-86 Menangle Road) is underlain by Bringelly Shale (sandstone) of the Triassic age Wianamatta Group (mapping unit 'Twib_s') which typically comprises fine to medium grained quartz-lithic sandstone.
Acid sulfate soils	Reference to the acid sulfate soils information provided by the CSIRO Australian Soil Resource Information System website (CSIRO, 2014) indicates that the site is in an area mapped as having an extremely low probability of occurrence (C4 rating) of acid sulfate soils.
Surface water	The nearest surface water receptor is a small unnamed creek located approximately 250 m to the east of the site. The creek flows

	in a southwest to northeast direction and drains into the Nepean River which flows to the north.
Groundwater	A search of the publicly available registered groundwater bore database indicated that there are no registered groundwater bores within 1 km of the site. Based on the regional topography and the inferred flow direction of nearby water courses, the anticipated flow direction of groundwater beneath the site is to the east, towards the unnamed creek which drains into the Nepean River, the likely receiving surface water body for the groundwater flow path. Given the local geology (i.e. Bringelly Shale), the groundwater in the fractured rock beneath the site is anticipated to be saline and very low yield. Accordingly, there would be no significant potential beneficial uses of the groundwater.

5. Summary of previous investigations

5.1 Previous reports

The following reports provided by Homes NSW or prepared by Douglas are summarised in the sections below:

- ContinuOne Greencap Online Risk Solutions (2021) *Hazardous Material Risk Assessment, NSW Health Camden Hospital – Cottages, 84-86 Menangle Road, Camden NSW 2570*, ContinuOne Greencap ref, C109541 : J168640 dated February 2021 (ContinuOne Greencap, 2021a);
- ContinuOne Greencap Online Risk Solutions (2021) *Hazardous Material Risk Assessment, NSW Health Camden Hospital – The Nurses Quarters, 84-86 Menangle Road, Camden NSW 2570*, ContinuOne Greencap ref, C109541 : J168640 dated February 2021 (ContinuOne Greencap, 2021b); and
- Douglas (2026a) *Report on Preliminary Site Investigation, Proposed Residential Development, 72 & 82-86 Menangle Road, Camden NSW,* Douglas ref.239951.00.R.001.Rev2 dated 23 June 2026.
- Douglas (2026b) *Report on Detailed Site Investigation, 72 & 82-86 Menangle Road, Camden NSW*. Ref. 239951.00.R.002.Rev2 dated 24 June 2026.

5.2 ContinuOne Greencap (2021a)

ContinuOne Greencap (2021a) was a non-destructive hazardous material risk assessment of the cottage structures (Cottages 84 and 86) at 84-86 Menangle Road and included the following as part of the completed scope:

- Inspect representative and accessible areas of the site to identify the following hazardous materials: asbestos, synthetic mineral fibre (SMF), lead paint and lead dust;
- Identify the likelihood of hazardous materials in accessible areas;
- Identify the types of hazardous materials and their condition;

- Assess the risks posed by the materials; and
- Compile a hazardous materials register for the site.

ContinuOne Greencap (2021a) identified non-friable asbestos and lead paint in both cottages (Cottages 84 and 86) and SMF was identified in one of the cottages (Cottage 84). Asbestos was confirmed by laboratory analysis in the fibre cement sheeting used for walls and in a down pipe moulded cement flue. Asbestos was also presumed positive in several other of the building materials used in the cottages.

5.3 ContinuOne Greencap (2021b)

ContinuOne Greencap (2021b) was a non-destructive hazardous material risk assessment of the nurses' quarters at 72 Menangle Road and included the following as part of the completed scope:

- Inspect representative and accessible areas of the site to identify the following hazardous materials: asbestos, synthetic mineral fibre (SMF, lead paint and lead dust;
- Identify the likelihood of hazardous materials in accessible areas;
- Identify the types of hazardous materials and their condition;
- Assess the risks posed by the materials; and
- Compile a hazardous materials register for the site.

ContinuOne Greencap (2021b) identified friable, non-friable asbestos, lead paint, SMF and polychlorinated biphenyls (PCB) in the structure. Asbestos was confirmed by laboratory analysis in vinyl tiles and adhesives in wall coverings, fibre cement sheeting used for infill panels and in the laundry ceiling. Asbestos was also presumed positive in several other of the building materials used in the nurses' quarters. PCB were presumed positive in the capacitors of various fluorescent light fittings observed throughout the structure.

5.4 Douglas (2026a)

Douglas completed a PSI report for the site to assess the potential for contamination based on past and present land uses and to comment on the need for further investigation and/or management with regard to the proposed development.

A desktop review of site history information and a site walkover was undertaken to identify potential areas of environmental concern (PAEC) and related contaminants of potential concern (CoPC) which may arise from previous and current land uses. The desktop investigation comprised a review of published mapping, groundwater bores registered with the NSW Office of Water on or adjacent the site, aerial photographs, the NSW Environment Protection Authority (EPA) public and planning registers, and current and historical title deeds.

A Site Search for Schedule 11 Hazardous Chemicals on Premises application was lodged with SafeWork NSW on 3 February 2026, and a request was made on 3 February 2026 to Camden Council for the release of any Council information of relevance to the site under the Government Information (Public Access) Act 2009 (GIPA). Council has advised that they do not have any information regarding contamination or contaminating activities for the site.

The results of the PSI site history investigation identified that the site was historically used for rural land-use purposes, likely for grazing since at least 1947. A large residential unit block was constructed on the property at 72 Menangle Road and residential dwellings were constructed on the properties at 82-86 Menangle Road sometime between 1956 and 1969. The site has remained relatively unchanged since at least 1969 and appears to have been used for residential purposes and / or health services associated with the nearby Camden Hospital located to the northwest of the site.

The following PAEC and potential sources of contamination were identified from the PSI desktop investigation and site walkover:

- **PAEC1** - Potential for contamination of soils across the site, as the result of potential importation of fill material associated with levelling, bulk earthworks and construction of buildings, garden beds, and general ground disturbances observed in aerial photographs;
- **PAEC2** - Former structures, residential unit block and dwellings / associated current structures; and
- **PAEC3** - Potential for contamination of surface soils, as a result of fly-tipped refuse material.

Several fragments of potential asbestos-containing material (PACM) were observed on the ground surface during the site walkover beneath and in the immediate vicinity of the three residential dwellings on 82- 86 Menangle Road. Given the findings of the hazardous building materials reports provided for these dwellings, it was considered likely that several of these fragments contain asbestos.

The PSI concluded that following demolition, further intrusive soil investigations, including asbestos assessment, will be necessary beneath the buildings. The PSI also concluded that a DSI is required to determine the extent of contamination from identified potential sources and to investigate whether other contamination sources are present.

5.5 **Douglas (2026b)**

Douglas completed a detailed site investigation (DSI) for the site. As a part of the DSI, soil sampling was completed at 10 boreholes and eight test pits at broadly spaced locations in accessible areas of the site, targeting potential sources of contamination and background areas. Soil samples were sent for analysis of CoPC commonly associated with the identified potential sources of contamination comprising:

- Metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc
- Per and polyfluoroalkyl substances (PFAS)
- Total recoverable hydrocarbons (TRH);
- Benzene, toluene, ethylbenzene and xylene (BTEX);
- Polycyclic aromatic hydrocarbons (PAH);
- Polychlorinated biphenyls (PCB);
- Organochlorine pesticides (OCP);
- Phenols; and
- Asbestos.

The Douglas (2026b) borehole and test pit locations are shown on Drawing 2, Appendix A.

The results of the fieldwork and laboratory analysis identified asbestos impacted surface soil in the vicinity of the three residential dwellings on 82-86 Menangle Road, and at borehole BH102 on 72 Menangle Road. Remaining CoPC were not detected in the collected soil samples at concentrations exceeding the adopted site assessment criteria.

The DSI noted that boreholes have a low confidence of detecting asbestos and further soil investigation, including an asbestos assessment, will be necessary beneath the buildings on 82-86 Menangle Road following demolition of the structures and at BH102 to assess the lateral and vertical extent of asbestos impact. Further investigations should also be completed within the footprint of the former nurses' quarters at 72 Menangle Road following demolition.

The DSI concluded that preparation of a remediation action plan (RAP) will be required to detail the remediation, validation and further investigation requirements for the asbestos impacted surface soil in the footprints of the dwellings and at borehole BH102 to render the site suitable for the proposed land use. The RAP should also include an unexpected finds protocol to provide a formal contingency to be followed in the event of an unexpected find with respect to potential site contamination issues encountered during future bulk earthworks.

6. Contamination summary

The previous investigations, including Douglas (2026b), identified the following AEC in Table 2 as requiring remediation / management for the site to be suitable for the proposed land use.

Table 2: Summary of AEC, COPC and assessment criteria

AEC	AEC requiring remediation/management and/or further investigation	COPC	Assessment criteria which exceeded
1	Surface soils in the in the vicinity of the three residential dwellings on 82-86 Menangle Road, and at borehole BH102 on 72 Menangle Road impacted with fragments of bonded ACM – Remediation/management of asbestos impacted surface soil is required.	Asbestos (bonded form)	No visible asbestos on the ground surface.

The DSI also concluded that further investigation, including an asbestos assessment, will be necessary beneath the buildings on 82- 86 Menangle Road following demolition of the structures and at BH102 to assess the lateral and vertical extent of asbestos impact. Further intrusive investigations of soil should also be completed within the footprint of the former nurses' quarters at 72 Menangle Road following demolition. The further testing requirements are further documented in Section 8.

7. Pre-remediation conceptual site model

A conceptual site model (CSM) is a representation of the site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors (linkages).

The CSM provides a framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source-pathway-receptor linkages.

A CSM was documented and updated in the DSI (Douglas, 2026b). The data collected for the DSI confirmed that certain potential contaminant sources pose a potentially complete pathway to the identified receptor(s) whilst others do not. No other sources of contamination have been identified as a result of the testing.

The CSM has therefore been updated from the findings of the DSI, refer to Table 3 below.

Table 3: Summary of potential sources

Potential sources and associated CoPC
S1: Fill: Associated with levelling and potential burying of waste CoPC: • Metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc • PFAS • TRH; • BTEX; • PAH; • PCB; • OCP; • Phenols; and • Asbestos
S2: Former structures, residential unit block and dwellings / associated current structures - residential dwellings are located within the site and historical aerial photographs identified several shed structures on the properties which have now been demolished. Demolition and alterations to these buildings, including degradation of paints and renovations, may lead to hazardous materials being present within the near surface soils surrounding the building footprints. The PSI site inspection and DSI laboratory analysis identified fragments of bonded ACM on the ground surface beneath and in the immediate vicinity of the three residential dwellings located at 82 to 86 Menangle Road and at BH102 on the property at 72 Menangle Road. CoPC: Metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB
S3: Potential fly tipping/illegal dumping. Given the site's relatively open accessibility, there is potential for fly tipping/illegal dumping to have occurred CoPC: Metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos

The following potential human and environmental receptors, along with relevant potential pathways, have been identified and summarised in Table 4.

Table 4: Summary of potential receptors and pathways

Potential human receptors
HR1: Current users [Property on 82 Menangle Road previously used as an office of administration. All properties are currently unoccupied] **HR2:** Construction and maintenance workers **HR3:** End users [residential land use] **HR4:** Adjacent site users [residential land use use]
Potential environmental receptors
ER1: Surface water [Unnamed creek located approximately 250 m east of the site which drains to the Nepean River; likely to be freshwater] **ER2:** Groundwater **ER3:** Terrestrial ecosystems
Potential pathways to human receptors
HP1: Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours
Potential pathways to environmental receptors
EP1: Surface water run-off **EP2:** Leaching of contaminants and vertical migration into groundwater **EP3:** Lateral migration of groundwater providing base flow to water bodies **EP4:** Inhalation, ingestion and absorption

A summary of the potentially complete exposure pathways for the proposed land use is shown in Table 5 below.

Table 5: Summary of potentially complete exposure pathways (proposed land use)

Source and CoPC	Exposure pathway	Receptor	Risk management action
S1: Fill: CoPC: metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos **S2:** Former structures, residential unit block and dwellings / associated current structures: CoPC: Metals, TRH, BTEX, PAH, OCP, OPP,	**HP1:** Ingestion and dermal contact **HP2:** Inhalation	**HR1:** Current users [All properties are currently unoccupied] **HR2:** Construction and maintenance workers **HR3:** End users [residential land use] **HR4:** Adjacent site users [residential land use]	Given the identified impact to surface soil from asbestos (in bonded form) in the vicinity of the residential dwellings at 82-86 Menangle Road and at BH102 at 72 Menangle Road, surface soil in these areas will, at a minimum require remediation/management for the site to be
	EP1: Surface water run-off	**ER1:** Surface water	

Source and CoPC	Exposure pathway	Receptor	Risk management action
PCB and asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB **S3**: Potential fly tipping/illegal dumping CoPC: Metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos	**EP3:** Lateral migration of groundwater		considered suitable for the proposed land use. Further intrusive soil investigations, including an asbestos assessment, will be also necessary beneath the buildings and the car park on 72 Menangle Road following demolition of the structures to assess the lateral and vertical extent of asbestos impact and potentially other fill related CoPC. (A further assessment of deeper soils, soil vapour and/or groundwater may be deemed necessary should significant contamination be identified in surface soils or data gaps be identified).
	EP2: Leaching of contaminants and vertical migration into groundwater	**ER2:** Groundwater	
	EP4: Inhalation, ingestion and absorption	**ER3:** Terrestrial ecosystems	

8. Further investigation requirements

Given that testing has been limited in the immediate vicinity of the site's structures and no testing has been completed within the building footprints and the car park on 72 Menangle Road, further intrusive soil investigations, including an asbestos assessment, is required within building footprints and the carpark (at 72 Menangle Road) following demolition of the structures.

To further assess the potential for contamination at the site and to minimise the potential for unexpected finds, the following is required following demolition of the building structures onsite:

- Excavation of 16 test pits on an approximate 6 m grid across the building footprints at 82 – 86 Menangle Road. For the estimated site area (combined building footprint area at 82-86 Menangle Road of approximately 560 m^2), the grid size selected satisfies the 2 × *Contaminated Sites Management Series Guideline – Development of Sampling and Analysis Programs* (CSMS) sample grid recommended by WA DoH 2021 in an area of likelihood of ACM;
- Excavation of 16 test pits on an approximate 12 m grid across the building footprint and car park at 72 Menangle Road. For the estimated site area (combined building footprint and car park area at 72 Menangle Road of approximately 2271 m^2), the grid size selected satisfies the 2 × CSMS sample grid recommended by WA DoH 2021 in an area of likelihood of ACM.

- Excavation of an additional five test pits in the immediate vicinity (within 5 m) of BH102 to further assess the extent of asbestos impact to site soils nearby to borehole BH102;
- Test pits will be completed using an excavator until natural soils are observed;
- At each test pit location, one 10 L bulk and one 500 mL soil sample will be collected from the surface soils (0.0 – 0.1) and then from each metre of fill encountered. The 10 L bulk samples will be inspected in accordance with WA DoH 2021 gravimetric method. The 500 mL samples will be sent to the laboratory for asbestos identification and quantification in the soil sample; and
- Collection of soil samples for other COPC from each metre of fill encountered at 16 test pits (every other test pit – eight test pits at 82-86 Menangle Road and eight test pits at 72 Menangle Road) or at depths where signs of contamination (i.e. odours, staining or ACM identified) are observed. The number of sample points satisfies the minimum sampling points recommended by NSW EPA (2022) *Sampling Design Guidelines* for the building footprint and car park portions of the site of 0.283 ha. Soil samples from fill encountered at each of the test pits will be screened with a pre-calibrated photoionisation device (PID). Based on PID screening and site observations selected soil samples are to be sent for laboratory analysis of COPC associated with fill including metals, PFAS, TRH, BTEX, PAH, PCB, OCP, OPP, phenols and asbestos..

9. Remediation extent

The approximate extent of AEC1 identified by the previous investigations are shown on Drawing 2, Appendix A. The actual extent (the final remediation extent) will be established at the completion of the further investigation (Section 8) and excavation / remediation of the AEC. The identified AEC1 areas are as follows:

- AEC1 (A) - ACM impacted surface soil within and in the vicinity of borehole BH102 on the property at 72 Menangle Road. Given that further investigation is required within the building footprint and car park at 72 Menangle Road these areas have been included within AEC1 (A);
- AEC1 (B) - ACM impacted surface soil within and in the vicinity of the building footprint of the building at 82 Menangle Road;
- AEC1 (C) - ACM impacted surface soil within and in the vicinity of the building footprint of the building at 84 Menangle Road;
- AEC1 (D) - ACM impacted surface soil within and in the vicinity of the building footprint of the building at 86 Menangle Road; and

10. Remediation options assessment

The objective of the remediation options assessment and evaluation is to establish a preferred remediation strategy. The process involves canvassing various remediation options which may be viable and then ranking each option based on a number of evaluation criteria. The remediation options assessment was undertaken with reference to CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019b).

The remediation options assessment is included in Appendix B.

11. Preferred remediation strategy

11.1 Rationale

The rationale for the selection of the preferred remediation strategy is outlined in Appendix B. Based on the outcome of the options assessment, the recommended preferred remediation strategies are hand picking of ACM fragments from the surface of the site and / or excavation/offsite disposal of ACM impacted surface soil. A remediation strategy has also been provided for onsite management/cap and contain, if preferred and / or if required in the event that further investigations and /or unexpected finds identify additional contamination that is suitable for such a remediation / management strategy.

11.2 Sequence of remediation

The remediation works outlined in this report constitute Category 1 Remediation under Section 8.1 of Camden Council's *Management of Contaminated Lands Policy* and therefore, will require development consent.

The general sequence of remediation shall be determined by the Remediation Contractor with the aim of minimising the potential for cross contamination of 'clean' areas / soils with contaminated soils. This should include avoiding, wherever possible transporting or placing contaminated soil over 'clean' areas separating stockpiles of different origin / contamination profile and validating the complete removal of any contaminated material placed / potentially impacting 'clean' areas.

It is the Remediation Contractor's responsibility to devise a safe work method statement and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP does not relieve the Remediation Contractor of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the immediate workspace. This RAP sets out the minimum standards and guidelines for remediation that will need to be used in preparing a method statement.

All asbestos excavation works must be undertaken by an appropriately licensed Asbestos Contractor. Works must comply with all NSW legislative requirements including (but not limited to) all SafeWork requirements, notification of works to SafeWork five days prior to work commencing, implementation of this RAP and the Asbestos Contractor's Work Method Statement, wearing appropriate personal protective equipment (PPE) and air monitoring for asbestos fibres (where appropriate). The Environmental Consultant will provide information/reporting to the Asbestos Contractor as required enabling the Asbestos Contractor to undertake the work safely and in accordance with relevant NSW legislation.

The Asbestos Contractor must be licensed for Class B asbestos removal. A Class B licence is suitable for the remediation related to surface soil given that asbestos identified at the site to date has been identified in the bonded (non-friable) form (i.e. ACM in good condition). It is recommended that air quality monitoring is undertaken during bonded ACM removal work.

In the event that quantities of AF or FA are observed or detected during the further investigations or remediation, works shall cease until a Class A asbestos removal license is obtained by the Remediation Contractor. A licenced asbestos assessor must undertake air quality monitoring for all removal work requiring a Class A asbestos removal licence.

11.2.1 On-site treatment of asbestos (ACM) of surface soils across the site within (Suitable for AEC1)

Where ACM has been identified within surface soils (to maximum depth of 0.1 m), treatment of the surface soils/fill may be adopted, and remediation should be conducted as follows:

1. The Environmental Consultant is to undertake the recommended air monitoring during the works.
2. Given that ACM is considered likely localised to the ground surface, the Asbestos Contractor should hand-pick ACM from surface soils across the site. A thorough 1 m grid-based inspection should be undertaken to collect ACM.
3. The Asbestos Contractor should mechanically rake/turn the surface at the AEC location, excavate the surface soil (topsoil), any fill and aggregate. Clods of clay must be broken down/crushed as part of the spreading process.
4. The raked surface should be re-inspected on a 1 m-grid based transect with any visible ACM hand-picked.
5. Steps 2 to 4 are to be repeated until no ACM is observed during three consecutive inspections by the Environmental Consultant.
6. Each raking event should be recorded, which will specify the date, time, location, volume of material being treated, description of the soil, number of passes, number of asbestos finds per pass, and photographed.
7. Double bag bonded ACM fragments for temporary storage whilst on site in a secure designated area awaiting off-site disposal.
8. Following removal of the ACM fragments, the site surface will be validated by the Environmental Consultant as per Section 13.4.

11.2.2 Excavation and off-site removal (Suitable for AEC1 and other COPC in the event additional areas at the site are identified by further investigations or unexpected finds as requiring remediation).

Excavation and off-site disposal is also considered suitable for AEC1 and where COPC have been identified by further investigations or unexpected finds at concentrations exceeding the RAC / SAC and found not suitable to remain onsite.

The remediation of impacted fill/soil should be conducted as follows:

- Preparation of a waste classification report by the Environmental Consultant to facilitate appropriate off-site disposal of impacted soil to a licensed facility;
- Undertake air monitoring during the works (Environmental Consultant), when asbestos related remediation is being undertaken, refer to Section 11.2;
- Excavation of impacted surface soil / fill under the supervision of the Environmental Consultant. Excavation should progress to 0.1 m into the underlying natural soils;
- Disposal to a waste facility licensed to receive the waste;
- Validation inspection and sampling of the resultant remediation footprint as per Section 13.4 (for ACM in surface soils), Section 13.5 (for asbestos in deeper fill) or Section 13.6 (for other COPC);

- If a validation sample exceeds the RAC provided in Section 12, chase out the impacted soil. Re-sample the resulting excavation and re-excavate as required until the RAC are met;
- Once the remediation areas/excavations have been successfully validated, survey the full extent of the remediation area or excavation and produce survey drawings showing the depth and extent of the remediation; and
- Disposal dockets for all material removed from the site are to be provided to the Environmental Consultant for inclusion in the validation report.

11.2.3 Capping/containment of soil (if preferred)

If the capping/containment contingency is adopted, any material which exceeds the RAC for asbestos can either be left in-situ or can be placed within a designated fill location and capped with an engineered barrier.

If excavation of the fill is to be completed in portions of the site for placement within a specific area of the site, then a designated stockpiling area should be established at the site so that all excavated material requiring containment can be consolidated in one area prior to placement within the containment cell.

The capping/containment area requires the following:

- If excavating and placement within a designated area of the site, the area should have a suitable size to house all impacted material and taking into account soil bulking factor, depth to groundwater and elevation of final surface level to ensure sufficient cover;
- Survey of excavated area selected as a containment area;
- The Remediation Contractor shall place any excavated impacted material into the area;
- The surface of the containment area, and after placement of any excavated impacted material, shall be covered using a coloured geotextile cover layer to act as a physical marker for any future excavation works. Geo-textile fabric requirements are provided in Section 11.2.4;
- Suitable soil cover shall be placed above the geotextile cover which meets the minimum requirements as set out in Section 11.6 (materials for use in backfilling and importing); and
- If areas of the site are proposed to be unsealed in the proposed development, the top of the capping area (i.e. the geotextile cover) shall be a minimum of 0.5 m below the final site level; or
- If areas of the site are proposed to be covered with either asphalt, concrete, “astroturf” or “soft-fall” safety surface material in the proposed development, the top of the capping area (i.e. the geotextile cover) shall be a minimum 0.2 m below the final site level.

Excavation of impacted materials should be conducted as follows.

- Excavation of the impacted fill to the underlying natural soils in the presence of the Environmental Consultant;
- Either (i) stockpiling in a designated location for future burial, or (ii) placement in the prepared containment/capping area;
- Collect validation soil samples from the base of excavations as per Section 13.5 (for asbestos) and/or 13.6 (other COPC);

- If a validation sample result exceeds the RAC, chase out the impacted soil;
- Re-sample the resulting excavation and re-excavate as required until the RAC are met; and
- Once the excavation has been validated, backfill the excavation with validated virgin excavated natural material (VENM) or excavated natural material (ENM); or a suitable validated material from natural soil within the site. Refer to Section 11.6 for details on validation of backfill material.

The Remediation Contractor shall survey the base and top of the containment/capping area and confirm the construction with drawings/surveys. It will be necessary to include the survey as part of the Validation Report and the Environmental Management Plan (EMP). If capping is required, and after the containment area has been determined, a work method statement must be prepared by environmental consultant to provide clear instruction to the Remediation Contractor on the requirements for any subsequent soil disturbance, including any construction works.

This option will require an EMP to be prepared and a notification on planning certificate will be required (Section 10.7 Certificate (formerly Section 149 Certificate)). The EMP will provide ongoing control measures to aid the management of the risks associated with impacted fill at the site to protect human health and the environment.

Consultation must be completed with the consent authority and owner to determine the most suitable enforcement mechanism for the implementation of the EMP, however, suitable enforcement mechanisms may include either:

- Making the completion and implementation of an EMP a condition of consent on the development application for the site; or
- Notating the EMP and the extent of remedial works on the land title for the property.

11.2.4 **Geo-textile fabric requirements**

A geo-textile barrier is to be incorporated into the capping layer to provide a warning of the underlying soil contamination. In accordance with Western Australian Department of Health *Guidelines for the Assessment, Remediation, and Management of Asbestos Contaminated Sites in Western Australia*, (DoH 2021) the geotextile fabric should meet the following conditions:

- Water permeable;
- Highly visible (orange);
- Rot-proof and chemically inert;
- High tensile strength;
- Coverage of the contaminated areas and 0.5 m beyond boundary if practical; and
- Parallel sheets to be fixed together or overlaid by 0.2 m.

11.3 **Waste disposal**

Disposal of waste must be to an appropriately licensed waste facility, as per the *Protection of the Environment Operations Act 1997* NSW (POEO Act) and the *Protection of the Environment (Waste) Regulation 2014* NSW.

Any waste disposed off-site must be initially classified by the Environmental Consultant in accordance with:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a);
- NSW EPA *Waste Classification Guidelines, Part 2: Immobilisation of Waste* (NSW EPA, 2014b);
- NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014c); and
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016) [addendum for per- and poly-fluoroalkyl substances (PFAS)].

Samples will be collected from stockpiles/in situ fill at various depths to characterise the full depth of the material. The frequency is to be determined by the Environmental Consultant based on the risk of contamination and heterogeneity of the material.

For stockpiles comprising similar materials and a:

- Volume up to 200 m^3: a recommended minimum frequency of one sample per 25 m^3, with a minimum of three per stockpile (NSW EPA, 2022); or
- Volume greater than 200 m^3: a recommended minimum frequency of one sample per 25 m^3, with a minimum of 12 samples OR a minimum of 10 samples and calculation of the 95% upper confidence limit of the arithmetic mean for all applicable analytes (NSW EPA, 2022). Note that this does not apply to stockpiles impacted, or potentially impacted, by asbestos. For stockpiles greater than 200 m^3 which are impacted, or potentially impacted, by asbestos, the Environmental Consultant shall provide guidance in accordance with NSW EPA (2022).

Sample results obtained in the previous investigations, including the DSI, must be used for waste classification purposes.

It may be possible to classify excavated soil/fill for reuse on another site under a relevant NSW EPA resource recovery order (RRO) so that it can be used on other sites under the requirements of the corresponding NSW EPA resource recovery exemption (RRE). For this option, the frequency of sampling should be in accordance with the relevant RRO and the contaminants to be analysed will be determined by the Environmental Consultant. The Environmental Consultant will provide a report confirming the suitability of the spoil for reuse under a RRO, or otherwise.

All waste must be tracked by the Remediation Contractor from 'cradle to grave'. Copies of all consignment notes/disposal dockets (or similar) and environment protection licences for receipt and disposal of the materials must be maintained by the Remediation Contractor as part of the site log and must be provided to the Environmental Consultant for inclusion in the validation report.

The tipping dockets will require to be provided to the Environmental Consultant for waste reconciliation purposes. In addition, any waste disposal must be tracked and reported to the EPA using Integrated Waste Tracking Solution online waste tracking system[2].

11.4 Materials for use in backfilling and imported fill

Any soil, aggregate etc imported for the remediation works must have contaminant concentrations that meet the relevant criteria outlined in Section 12. Imported materials will only be accepted for use at the site if:

- It can legally be accepted onto the site (e.g. classified as virgin excavated natural material (VENM), accompanied by a report / certificate prepared by a qualified environmental consultant);
- Visual inspection of the imported soil confirms that the soil has no signs of concern and is consistent with those described in the supporting classification documentation; and
- It has no aesthetic issues of concern, and
- The materials are validated (by inspection / sampling) by the Environmental Consultant as being suitable for use at the site.

The classification report / certificate for all material proposed for import must be reviewed and approved in writing by the Environmental Consultant prior to import. Materials to be imported may need to meet geotechnical requirements which are to be assessed by others, as required.

If permitted by the development consent and approved by the site owner, Remediation Contractor and Environmental Consultant, material classified under a NSW EPA RRO may also be accepted, provided the material can be used on site in accordance with the corresponding RRE. This could include excavated natural material (ENM), classified under NSW EPA *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, The excavated natural material order 2014* (NSW EPA, 2014d).

The need for check-sampling of VENM and/or RRO material is to be determined by the Environmental Consultant depending on the source of the material, adequacy of the supporting documentation provided and inspection(s) of material. Quarried material / VENM may need little or no check sampling.

Any recycled materials proposed for importation must be sampled at a frequency of one sample per 25 m^3, with a minimum of three samples per load. The recycled material will not be permitted to be used on site until the results of the inspection and laboratory analysis have been approved in writing by the Environmental Consultant.

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[2] https://www.epa.nsw.gov.au/your-environment/waste/integrated-waste-tracking-solution-replaces-wastelocate

12. Assessment criteria

12.1 Remediation acceptance criteria

The overarching remediation acceptance criterion (RAC) to be adopted for the project is for 'no unacceptable risks posed by the relevant media (i.e., soils, groundwater or soil vapour) to human health or the environment'.

The remediation works are to be validated as meeting the RAC by the Environmental Consultant by means of visual inspection, field screening, recovery and analysis of samples and review of any available plans as set out in this report.

In the absence of derivation of Tier 2 site specific target levels (SSTL), the (RAC) for contaminants in soil are the same as the Tier 1 site assessment criteria (SAC) adopted for Douglas (2026b), protective of human health and ecology. The following Table 6 provides a summary of the RAC for asbestos.

Table 6: Remediation acceptance criteria for soil (RAC) - Asbestos

Contaminant	RAC	Rationale
Asbestos	<u>500 mL Sample:</u> • 0.001% w/w FA and AF. <u>10L bulk sample:</u> • 0.01% w/w of asbestos in soil with bonded ACM generally comprising 15% asbestos; and • No visible asbestos on the ground surface.	NEPC (2013) defines the various terminology for asbestos: Bonded ACM: Asbestos containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7 mm x 7 mm sieve. FA: Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically un-bonded or was previously bonded and is now significantly degraded and crumbling. AF: Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. Given that the proposed land use is residential, the 'residential A' asbestos health screening levels (in accordance with Table 7, Schedule B1 of NEPC 2013) have been adopted.

12.2 Site assessment criteria

Additional area(s) of contamination encountered beyond those outlined in Section 9 during the further investigation, remediation and site redevelopment will be subject to the contingency plan or unexpected find protocol (Appendix F) and assessed using the SAC in Appendix C. The SAC are the same as the Tier 1 SAC adopted for Douglas (2026b). This is on the provision that other considerations such as risks to groundwater are also taken into account. The broader list of contaminants and their SAC are included in Appendix C.

The SAC should also be used as part of the assessment framework for imported soils (i.e. contaminant concentrations in imported soils must comply with the SAC).

The adopted investigation and screening levels comprise levels for a generic residential with accessible soils land use scenario. The derivation of the SAC is included in Appendix C.

The SAC are not RAC, and an exceedance of the SAC does not automatically trigger the need for remediation. Exceedances of the SAC will trigger the need for further assessment of risk by the Environmental Consultant to determine the need for remediation in accordance with NEPC (2013).

13. Validation plan

13.1 Data quality objectives

The data quality objectives (DQO) for the validation plan are included in Appendix D1 (for excavation /offsite disposal and hand picking) and / or D2 (for capping and containment, if required).

13.2 Validation assessment requirements

The following site validation work will be required:

- Field assessment by the Environmental Consultant comprising:
  - Visual inspection, including taking photographs for record purposes;
  - Collecting validation samples from excavations resulting from the removal of contaminated soils, including contaminated soil stockpile footprints (if relevant)
  - Collecting validation / characterisation samples for materials to be re-used on site.
- Surveying by the Surveyor comprising:
  - Survey of the extent and levels of the base of the excavations;
  - Survey of the extent and levels of the top of the marker layer (for capping and containment, if required); and
  - Survey of the extent and levels of the top of the capping layer (for capping and containment, if required).
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
  - The CoPC relevant to the remediation area; and
  - Quality control (QC) samples in accordance with Section 14;
- Comparison by the Environmental Consultant of the laboratory results with the SAC and/or RAC as appropriate (refer to Section 12); and
- Preparation by the Environmental Consultant of a validation report detailing the methods and results of the remediation works and validation assessment.

13.3 Visual inspections

All areas to be assessed and validated will first be subject to a visual inspection by the Environmental Consultant. Any areas of fill / ACM / staining must be removed prior to validation sampling.

Development works within the site (other than remediation works detailed in this RAP) should only progress following written confirmation by the Environmental Consultant.

13.4 Validation of areas of treatment of ACM in surface soil

For ACM impacted surface soils subject to hand-picking within the building footprints and at BH102, or any other additional ACM impact to surface soil the Environmental Consultant will be required to validate the remediated area as follows:

- A visual inspection for signs of fill and anthropogenic material (including ACM) within the area on a 2 m grid;
- Validation sampling for asbestos (500 mL samples) at a rate of one sample per 10 m by 10 m grid over the footprint excavation (minimum of one sample);
- 10 L bulk samples will also be required in areas where fill is present;
- All 500 mL samples will be analysed at a NATA accredited analytical laboratory for determination of ACM, AF and FA concentrations; and
- Where analytical results indicated the presence of asbestos, or visual results indicate the presence of fillI impacted with ACM, chase out excavation of the contaminated materials will be required, followed by further validation sampling as detailed above.

For remediation areas where significant walls are formed by excavations or additional ACM encountered at depth (>0.1 m bgl) or significant demolition waste encountered, validation sampling should be completed from the resultant excavation as described in Section 13.5.

13.5 Validation of other excavations associated with ACM impacted soil with concentrations exceeding SAC (if identified)

Following the remediation and/or excavation of ACM impacted soils from portions of the site where concentrations of ACM has been identified in fill exceeding land use criteria, the Environmental Consultant will validate remediation the surface soils and/or remedial excavations as follows:

1. Visual inspection for signs of anthropogenic material including ACM and construction and demolition waste. The visual inspection will be conducted from across the surface of the remediated area or the base of the remediation excavations on a 2 m grid.
2. The results of the visual inspection will be confirmed through soil sampling at the densities equivalent to that required by Western Australia Department of Health (2021) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DoH, 2021);
3. At each sample location, a 500 ml sample of soil will be collected from exposed natural surface soils (0.0 – 0.1 mbgl) for asbestos identification and quantification in the soil sample;

4. Where 'walls' are formed by a remedial excavation, strip trenches will also be excavated, at a rate of one strip trench per 10 m horizontal length or a minimum of one per sidewall, to confirm the fill impacted with asbestos has been excavated;
5. Sampling and analysis of any remaining fill soil in trenches completed in walls by the Environmental Consultant with reference to NEPC (2013) and WA DoH (2021) guidelines as follows:
6. Collection of ~10 L bulk samples by the Environmental Consultant;
7. Collection of a 500 mL sample for each ~10 L bulk sample for laboratory analysis of AF and FA to calculate the asbestos %w/w and compare against the RAC;
8. Where impacted fill (ACM and/or construction and demolition waste) is observed, or analytical results identify asbestos above the RAC, further chase out of that location will be required and steps 1 to 3 will be repeated; and
9. A survey of the final remediation excavation areas is to be undertaken and provided to the Environmental Consultant prior to final validation.

13.6 **Validation of excavations associated with other COPC with concentrations exceeding SAC (if identified)**

The sampling frequency will depend on the volume or area to be assessed and the previous results. The following approximate sampling frequencies will be adopted but may be modified by the Environmental Consultant to take into account previous results, where applicable, and findings from the visual inspections.

- Small to medium excavations (base <500 m^2):
- Base of excavation: one sample per 25 m^2 or part thereof, with a minimum of three samples where the base of the excavation is fill rather than natural soils; and
- Sides of excavation: one sample per 10 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Large excavations (base ≥500 m^2):

- Base of excavation: sampling on a grid at a density in accordance with Table 2 in NSW EPA (2022) or a minimum of 10 samples. In sub-areas with any specific signs of concern, a higher sampling density may be required; and
- Sides of excavation: one sample per 20 m length or part thereof with a minimum of one sample per wall. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of one sample per 1.5 m depth in fill.

Where contaminated soils are stored or treated on bare soils, the footprint of the stockpile will require validation following removal of the contaminated soils.

Validation samples will be analysed by a NATA accredited laboratory for the relevant CoPC relevant to the remediation area.

Validation sample test results will be compared to the RAC, as per the DQO (Appendix D). Where the RAC are considered to have not been met, the remediation excavation(s) will be expanded to 'chase-out' impacted material, as advised by the Environmental Consultant, with the validation sampling then continuing into the extended excavation. This process will continue until all results are below the RAC.

In the event that contamination extends beyond site boundaries or in areas that can't be practically chased out (e.g. under buildings), validation samples will be taken at the limit of excavation. Notwithstanding that there may be residual contamination present.

Advice may need to be obtained from a qualified geotechnical or structural engineer regarding excavation and/or structure stability if excavations approach site boundaries and/or existing structures.

13.7 Validation of the burial areas where suitable – Containment cell/capping layer

Regular inspections and photographs are to be completed during all remedial excavation and capping/containment works.

Final validation of the site will be provided on the understanding that the soils impacted by contaminants are placed below final design levels as constructed surface levels as specified in Sections 11.2.3 and 11.2.4.

A survey of the final fill area, including the base of containment area, the depth of the marker layer and the finished surface level (depth of cover) is to be undertaken and provided to the environmental consultant prior to final validation.

14. Quality assurance and quality control

Field quality assurance and quality control (QA/QC) testing will include the following:

- 10% sample intra-laboratory analysis of CoPC (other than asbestos), analysed for the same suite as the primary sample;
- Rinsate samples (where re-useable sampling equipment is used), analysed for the suite of analytes analysed by the majority of the primary samples; and
- Trip spike and trip blank samples (analysed for BTEX) (approximately one per batch of samples where volatile contaminants are CoPC).

The laboratory will undertake analysis in accordance with its NATA accreditation, including in-house QA/QC procedures.

- The QC analytical results will be assessed using the following criteria:
- Sampling location rationale met the sampling objective;
- Standard operating procedures (SOP) are followed;
- Appropriate QA/QC samples are collected/prepared and analysed;
- Samples are stored under secure, temperature-controlled conditions;

- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory;
- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
- Field and laboratory duplicate, and replicate samples will have a precision average of +/- 30% relative percentage difference (RPD); and
- Rinsate samples will show that the sampling equipment (if used) is free of introduced contaminants, i.e. the analytes show that the rinsate sample is within the normal range for deionised water.

15. Management and responsibilities

15.1 Site management plan

A general site management plan for the operational phase of site remediation is included in Appendix E. The management plan includes soil, noise, dust, work health safety (WHS), remediation schedule, hours of operation and incident response. The Remediation Contractor is to implement the general site management plan for the duration of remediation works by incorporating the plan into their over-arching construction environmental management plan (CEMP).

15.2 Site responsibilities

The site management plan (Appendix E) provides a summary of the general program management and associated responsibilities. Contact details for key utilities are also included in the event of needing to respond to any incidents.

15.3 Contingency plan and unexpected finds protocol

Plans for contingency situations (e.g. encountering asbestos in fill), along with an unexpected finds protocol for dealing with unexpected finds during remediation work / earthworks, are included in Appendix F.

16. Validation reporting

16.1 Documentation

The following documents will need to be collated and reviewed by the Environmental Consultant as part of the validation assessment (including those items that are prepared by the Environmental Consultant):

- Any licences and approvals required for the remediation works (Remediation Contractor);
- Waste classification report(s) (Environmental Consultant);
- Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g. registration number), date, time, source site, load characteristics (e.g. type of material, i.e. quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.) (Remediation Contractor);

- Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility / site (Remediation Contractor). Note: a record of the building materials disposed off-site is also to be kept and provided to the Principal, on request;
- Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records (Remediation Contractor);
- Records relating to any unexpected finds and contingency plans implemented (Remediation Contractor);
- Laboratory certificates and chain-of-custody documentation;
- Inspections records from the Environmental Consultant;
- Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities (Remediation Contractor);
- Surveys pre- and post-installation of geotextile marker layer and clean fill cap (Remediation Contractor);
- Airborne asbestos monitoring records (in the event that asbestos works are undertaken) (Remediation Contractor); and
- Interim / final visual and sampling clearances for any asbestos related works (in the event that asbestos works are undertaken) (Remediation Contractor).

16.2 **Reporting**

A validation assessment report will be prepared by the Environmental Consultant in accordance with NSW EPA (2020).

The validation report shall describe the remediation approach adopted, methodology, results and conclusion of the assessment and make a statement regarding the suitability of the site for the proposed development (residential).

17. **Conclusions**

It is considered that the site can be made suitable for the proposed residential development subject to implementation of this RAP and completion of remediation and validation works.

18. **References**

CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Establishing Remediation Objectives.* National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019b). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment.* National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority.

NSW EPA. (2014b). *Waste Classification Guidelines, Part 2: Immobilisation of Waste*. NSW Environment Protection Authority.

NSW EPA. (2014c). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils*. NSW Environment Protection Authority.

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

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NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

NSW EPA. (2022). *Sampling Design, Part 1: Application; Part 2: Interpretation.* NSW Environment Protection Authority.

19. **Limitations**

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 72 & 82-86 Menangle Road, Camden NSW in line with Douglas' proposal dated 10 December 2025 and acceptance received from Sarah Noordhuis of Homes NSW dated 23 January 2026. The work was carried out under Homes NSW Infrastructure Advisory Services Contract – Short Form. This report is provided for the exclusive use of Homes NSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

Drawings
About this Report

LOCALITY PLAN

REV	PSI	DATE	DRAWN BY
0		24.06.2026	AJP

COORDINATE REFERENCE SYSTEM:
GDA2020, MGA ZONE56

Douglas PARTNERS
OFFICE: MACARTHUR
18 Waler Crescent, Smeaton Grange NSW 2567
(02) 4647 0075

CLIENT:
Homes NSW

NOTE:
1: Basemap from MetroMap (Dated 30.09.2025)

SCALE:
0 25 50
1:1000 @ A3

PROJECT NAME:
Proposed Redevelopment

PROJECT ADRESS:
72 & 82-86 Menangle Road, Camden NSW

DRAWING TITLE:
SITE LOCATION AND LAYOUT

PROJECT NO:
239951.00

DRAWING NO:
1

REVISION:
0

REV	PSI	DATE	DRAWN BY
0		24.06.2026	AJP

COORDINATE REFERENCE SYSTEM:
GDA2020, MGA ZONE56

Douglas PARTNERS
OFFICE: MACARTHUR
18 Waler Crescent, Smeaton Grange NSW 2567
(02) 4647 0075

CLIENT:
Homes NSW

NOTE:
1: Basemap from MetroMap (Dated 30.09.2025)

SCALE:
0 25 50
1:934.4

PROJECT NAME:
Proposed Redevelopment

PROJECT ADRESS:
72 & 82-86 Menangle Road, Camden NSW

DRAWING TITLE:
Sample Location Map and identified Areas of Environmental Concern (AEC)

PROJECT NO:
239951.00

DRAWING NO:
2

REVISION:
0

About this Report

October 2024

Introduction

These notes have been provided to amplify Douglas' report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

Douglas' reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, Douglas will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, Douglas cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, Douglas will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, Douglas requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. Douglas would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix B

Remediation Options Assessment and Evaluation

1. Introduction

The following key guidelines and technical reports were consulted in the preparation of this remediation options assessment:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM])* (NEPC, 2013); and
- CRC CARE *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment* (CRC CARE, 2019a).

The first stage of developing a remediation strategy is to establish clear and measurable remediation objectives and remediation criteria (clean-up levels). These will form the requirements against which remediation options are assessed.

The next stage of the remediation options assessment is to select technology and management options, or combinations of options, that have the potential to reduce contaminant concentrations and/or apply management controls as necessary so that the remediation objectives are achieved and no unacceptable risk is posed by the contamination in the context of the current and proposed site use. Where several viable options have been identified, an assessment of each of the options will be required to determine which option will most adequately and sustainably meet the remediation objectives (CRC CARE, 2019a).

The remediation objectives are to:

- Address potentially unacceptable risks to relevant environmental values from contamination (refer to the CSM in Section 7); and
- Render the site suitable, from a contamination perspective, for the proposed development (refer to Section 1).

2. Hierarchy of remediation options

NEPC (2013) stipulates the preferred hierarchy of options for site clean-up (remediation) and/or management which is outlined as follows:

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

or, if these two options are not practicable;

- Consolidation and isolation of the soil on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;

or,

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

3. Remediation options assessment

3.1 Introduction

The following issues have been identified at the site which require remediation:

- AEC1: Sporadic fragments of ACM on the site surface in the vicinity of the three residential dwellings on 82- 86 Menangle Road and at borehole BH102 on 72-78 Menangle Road.

3.2 Remediation options assessment

Given the straightforward nature of the contamination issues at the site and the necessary earthworks (final landform) as part of the proposed development, only three options for the soil contamination have been considered, as follows:

- Excavation and off-site disposal;
- Hand picking of fragments from site surface and offsite disposal;
- On-site management/cap and contain (consolidation and isolation by containment) , if preferred.

The following key guidelines have therefore been consulted:

- CRC CARE *Technology Guide: Soil - Containment* (CRC CARE, 2019c);
- CRC CARE *Technology Guide: Soil - Excavation* (CRC CARE, 2019b);
- WA DoH *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2021); and
- WorkCover NSW *Managing Asbestos in or on Soil* (WorkCover NSW, 2014).

Relevant technical considerations include:

- Asbestos cannot be physically destroyed; and
- Excavation is likely to be completed at the site resulting in a potential net surplus of soil/rock such that some material requires off-site disposal, irrespective of the contamination issues.

Douglas assessed selected remediation alternatives, taking into consideration their applicability for the site, time constraints, economic feasibility, and potential environmental and health impacts. Given the relatively small volumes of fragments of ACM on the surface to be remediated hand picking of fragments of ACM and/or excavation/offsite disposal of ACM impacted surface soil are considered the most efficient and economically feasible options and would remove the known contamination legacy associated the ACM fragments. A remediation strategy has also been provided for onsite management/cap and contain, if preferred.

4. Preferred remediation strategy

Based on the outcome of the options assessment, the recommended preferred remediation strategies are hand picking of ACM fragments from the surface of the site and / or excavation/offsite disposal of ACM impacted surface soil. A remediation strategy has also been provided for onsite management/cap and contain, if preferred and / or if required in the event further investigations and /or unexpected finds identify additional contamination that is suitable for such a remediation / management strategy.

5. References

CRC CARE. (2019a). *Remediation Action Plan: Development - Guideline on Performing Remediation Options Assessment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019b). *Technology Guide: Soil - Excavation*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

CRC CARE. (2019c). *Technology Guide: Soil - Containment*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. WA Department of Health.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil*. March 2014: WorkCover NSW, NSW Government.

Appendix C

Site Assessment Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [the 'NEPM']* (NEPC, 2013);
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011); and
- HEPA *PFAS National Environmental Management Plan (the 'NEMP')* (HEPA, 2025);

1.2 General

The SAC applied in the current investigation are informed by the conceptual site model (CSM) which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: Residential; and
  - Corresponding to land use category 'A', residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry)), also includes children's day care centres, preschools and primary schools.
- Soil type: clay.

2. Soils

2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are presented in Table 1 and Table 2.

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-A
Metals	
Arsenic	100
Cadmium	20
Chromium (VI)	100

Contaminant	HIL-A
Copper	6000
Lead	300
Mercury (inorganic)	40
Nickel	400
Zinc	7400
PAH	
B(a)P TEQ	3
Total PAH	300
Phenols	
Phenol	3000
Pentachlorophenol	100
OCP	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
OPP	
Chlorpyrifos	160
PCB	
PCB	1

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-A&B	HSL-A&B	HSL-A&B	HSL-A&B
CLAY	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	0.7	1	2	3
Toluene	480	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	110	310	NL	NL
Naphthalene	5	NL	NL	NL
TRH F1	50	90	150	290
TRH F2	280	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are presented in Table 3.

Table 3: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-A	DC HSL-IMW
Benzene	100	1100
Toluene	14 000	120 000
Ethylbenzene	4500	85 000
Xylenes	12 000	130 000
Naphthalene	1400	29 000
TRH F1	4400	82 000
TRH F2	3300	62 000
TRH F3	4500	85 000
TRH F4	6300	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
IMW intrusive maintenance worker

2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2025). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled.

An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 5 of HEPA (2025) are presented below in Table 4.

Table 4: Health investigation levels (mg/kg)

Contaminant	HIL-A
PFOS and PFHxS *	0.003
PFOA	0.06

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

2.3 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are presented in Table 5.

Table 5: Health screening levels for asbestos

Form of asbestos	HSL-A
ACM	0.01%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.
* Based on site observations at the sampling points and the analytical results of surface samples.

Where insufficient sample recovery is possible for FA and AF analysis the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) will be adopted for the assessment as an initial screen.

2.4 Ecological investigation levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website, are shown in Table 7, with inputs into their derivation shown in Table 6.

Table 6: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	Given the potential sources of soil contamination are from historical land use, the contamination is considered as "aged" (>2 years).
pH	7.4	Three selected samples were tested during the DSI for pH. The average pH value has been used as an initial screening value.
CEC	83 $cmol_c/kg$	Three selected samples were tested during the DSI for CEC. The average CEC value has been used as an initial screening value.
Clay content	10 %	Conservative value for initial screen
Traffic volumes	low	The site is considered to be located within a low traffic area
State/Territory	NSW	

Table 7: Ecological investigation levels (mg/kg)

Contaminant	EIL-A-B-C
Metals	
Arsenic	100
Copper	260
Nickel	700
Chromium III	410
Lead	1100
Zinc	1300
PAH	
Naphthalene	170
OCP	
DDT	180

Notes: EIL-A-B-C urban residential and public open space

2.5 Ecological screening levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 8.

Table 8: Ecological screening levels (mg/kg)

Contaminant	Soil type	ESL-A-B-C
Benzene	Fine	65
Toluene	Fine	105
Ethylbenzene	Fine	125
Xylenes	Fine	45
TRH F1	Coarse/Fine	180*
TRH F2	Coarse/Fine	120*
TRH F3	Fine	1300
TRH F4	Fine	5600
B(a)P	Fine	0.7

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ESL-A-B-C urban residential and public open space

2.6 Ecological soil guideline values

The interim ecological soil guideline values (EGV) derived from Table 6 of HEPA (2025) are presented in Table 9.

Table 9: Ecological soil guideline values (mg/kg) – all land uses

Contaminant	Direct exposure	Indirect exposure
PFOS	1	0.003
PFOA	10/0.005	0.003
PFHxS	NC	NC

Notes: NC no criterion
*For intensely developed sites with no secondary consumers and minimal potential for indirect ecological exposure, a higher criterion of up to 0.14 mg/kg PFOS may be appropriate.

2.7 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

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

The adopted management limits are in Table 10.

Table 10: Management limits (mg/kg)

Contaminant	Soil type	ML-A-B-C
TRH F1	Fine	800
TRH F2	Fine	1000
TRH F3	Fine	3500
TRH F4	Fine	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-A-B-C residential, parkland and public open space

3. References

ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australia and New Zealand Environment and Conservation Council.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater*. Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

HEPA. (2025). *PFAS National Environmental Management Plan (NEMP)*. Version 3.0: Heads of EPAs Australia and New Zealand.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water*.

NHMRC. (2019). *Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water*. National Health and Medical Research Council.

NHMRC, NRMMC. (2022). *Australian Drinking Water Guidelines 6 2011, Version 3.7*. Canberra: National Health and Medical Research Council, National Resource Management Ministerial Council.

Warne, M., Batley, G., van Dam, R., Chapman, J., Fox, D., Hickey, C., & Stauber, J. (2018). *Revised Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants*. Canberra: Australian Government Department of Agriculture and Water Resources.

Appendix D1

Data Quality Objectives (Soil)

1. Data quality objectives

The objective of the validation plan is to assess the results of validation testing against the site acceptance criteria (SAC) stated within Section 11 assess the resultant suitability of the site for the intended land use, and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives process (DQO) as outlined in NEPC (2013), described below.

Table 1: Data quality objectives

Step	Summary
1: State the problem	The site requires remediation and validation of remediation in order to render it suitable for residential land use. The objective of the validation plan is to confirm the successful implementation of this remediation action plan. A conceptual site model (CSM) for the proposed development has been prepared (Section 7).
2: Identify the decisions/goal of the study	The CSM identifies the contaminants of potential concern (CoPC) and the likely impacted media. The validation sampling results will be compared against the SAC. The success of the remediation and subsequent validation will be based on a comparison of the analytical results for all CoPC to the adopted RAC and, if necessary, compared to the 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL) concentrations.
3: Identify the information inputs	Relevant inputs to the decision include: • The CSM, identifying the CoPC and affected media; • Analysis for the relevant CoPC using NATA accredited laboratories and methods, where possible; • Field and laboratory QA/QC data to assess the suitability of the environmental data for the validation assessment; • Results compared with the RAC; • Assessments of aggregates, soil, etc imported as part of the permanent remediation works; and • A photoionisation detector (PID) to screen soils on site for VOC. PID readings will be used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The lateral boundaries of the site are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment, site observations and previous investigations used to inform the RAP.

Step	Summary
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the RAC. Initial comparisons will be with individual results then, where appropriate, summary statistics (including mean, standard deviation and 95% UCL), to further assess potential risks posed by the site contamination. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field and laboratory duplicate results, RPDs should generally be below 30%; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Section 16.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site and/or statistical analysis of data exceed the RAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site and statistical analysis of data complies with the RAC and therefore, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it will be assumed that the baseline condition is true.
7: Optimise the design for obtaining data	Sampling design and procedures to be implemented to optimise data collection for achieving the DQO include the following: • Sampling frequencies in accordance with Sections 13.4 to 13.6; • Analysis for the CoPC at NATA accredited laboratories using NATA endorsed methods where possible; and • Adequately experienced environmental scientists/engineers conducting field work and sample analysis interpretation.

2. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix D2

Data Quality Objectives (Cap and Contain)

1. Introduction

The objective of the validation plan is to assess whether the capping layer has been constructed in accordance with the RAP, assess the resultant suitability of the site for the intended land use, and to provide information on any environmental impacts which may have resulted from the works.

The validation assessment will be conducted with reference to the seven step data quality objectives process (DQO) as outlined in NEPC (2013), described below.

2. Data quality objectives

Table 1: Data quality objectives

Step	Summary
1: State the problem	The site requires remediation and validation of remediation in order to render it suitable for residential land use. The objective of the validation plan is to confirm the successful implementation of this remediation action plan. A conceptual site model (CSM) for the proposed development has been prepared (Section 7).
2: Identify the decisions/goal of the study	The decision is to determine if the site is suitable for the proposed residential land use following remediation of the site. The CSM identifies contamination at the site which posed potentially unacceptable risks to human health and groundwater. The remediation strategy requires the removal of surface soil which posed an unacceptable risk which was confirmed to contain bonded asbestos or it can be retained on site beneath a marker layer and a capping layer. The decision is to establish whether the capping layer has been placed in general accordance with the RAP and whether the site has been remediated in general accordance with the RAP.

Step	Summary
3: Identify the information inputs	Relevant inputs to the decision include: • The CSM identifying CoPC and affected media; • Results analysed for the relevant CoPC using NATA accredited laboratories and methods, where possible; • Field and laboratory QA/QC data to assess the suitability of the environmental data for the validation assessment; • Results compared with the SAC; • Inspections of the maker layer prior to capping works; • Assessments of aggregates, soil, etc imported as part of the capping; • Inspections of the capping; • Review of the survey of the installed capping; • An enforceable long term environmental management plan (LTEMP) for implementation during use of the land for commercial/industrial purposes; and • Details of the proposed development.
4: Define the study boundaries	The lateral boundaries of the site are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment, site observations and previous investigations used to inform the RAP.
5: Develop the analytical approach (or decision rule)	The decision rule is the construction of the capping to at least the minimum thicknesses included in Section 11.2.3. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field and laboratory duplicate results, RPDs should generally be below 30%; for field blanks, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Section 14.
6: Specify the performance or acceptance criteria	Baseline condition: The capping has not been constructed in accordance with this RAP (null hypothesis). Alternative condition: The capping has been constructed in accordance with this CMP (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it will be assumed that the baseline condition is true.
7: Optimise the design for obtaining data	Sampling design and procedures to be implemented to optimise data collection for achieving the DQO include the following: • Sampling frequencies in accordance with Section 13;

Step	Summary
	• Analysis for the CoPC at NATA accredited laboratories using NATA endorsed methods, where possible; • Adequately experienced environmental scientists/engineers will conduct field work and sample analysis interpretation; • Visual inspections of the cap construction by the Environmental Consultant in accordance with Section 13.3; and • Registered survey of the capping layer in accordance with Section 13.2.

3. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix E

Site Management Plan

1. Introduction

This general site management plan (SMP) has been developed to minimise potentially adverse impacts on the environment, and worker and public health as a result of the proposed remediation works.

The Remediation Contractor must have in place a construction environmental management plan (CEMP) (or similar) which is specific to the equipment used for the remediation and the proposed methods to be adopted by the Remediation Contractor. This SMP has been prepared to augment the Remediation Contractor's CEMP and contains general details for aspects of the work, as per reporting requirements for a remediation action plan (RAP) under NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Apart from the management principles outlined in this SMP, the Remediation Contractor must also ensure compliance with all relevant environmental legislation and regulations, including (but not limited to) the following:

- Contaminated Land Management Act 1997 NSW (CLM Act);
- Protection of the Environment Operations Act 1997 NSW (POEO Act);
- Protection of the Environment Legislation Amendment Act 2011 NSW;
- Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008 NSW;
- Environmentally Hazardous Chemicals Act 1985 NSW;
- Environmental Offences and Penalties Act 1989 NSW;
- Pesticide Act 1999 NSW and Pesticides Regulation 2017; and
- Work Health and Safety Act 2017 NSW (WHS Act) and Work Health and Safety Regulations 2017 NSW.

2. Roles and responsibilities

2.1 Principal

The Principal is responsible for the environmental performance of the proposed remediation works, including implementation of acceptable environmental controls during remediation works. The Principal will retain the overall responsibility for ensuring this RAP is appropriately implemented. The Principal is to nominate a representative (the Principal's Representative), who is responsible for overseeing the implementation of this RAP. The actual implementation of the RAP will, however, be conducted by the Remediation Contractor on behalf of the Principal.

The Principal is responsible for providing appropriate information to the Remediation Contractor to allow them to safely plan the required works. This includes the asbestos register for the site and this RAP.

The Principal is also responsible for implementing an appropriate communications plan.

2.2 **Remediation Contractor**

The Remediation Contractor will be the party responsible for daily implementation of this RAP and shall fulfil the responsibilities of the Remediation Contractor as defined by SafeWork NSW. It is noted that the Remediation Contractor may appoint appropriately qualified sub-contractors or sub-consultants to assist in fulfilling the requirements of the procedures. The Remediation Contractor will appoint a Site Manager.

In addition to the implementation of the RAP, it will be the Remediation Contractor's responsibility to:

- Obtain/ensure relevant sub-contractors obtain specific related approvals as necessary to implement the earthworks including permits for removal of asbestos-containing material, SafeWork NSW notification etc;
- Develop or request and review any site plans to manage the works to be conducted;
- Ensure that all remediation works and other related activities are undertaken in accordance with this RAP;
- Maintain all site records related to the implementation of this RAP including but not limited to;
    - Tracking of all movement of soil within the site, on to site and off-site from cradle to grave;
    - Transportation Record: comprising a record of all truckloads of soil (including aggregate) entering the site, including truck identification (e.g. registration number), date, time, source site, load characteristics (e.g. type of material, i.e. quarried aggregate, etc.), approximate volume, use (e.g., general site raising, service trenches, etc.);
    - Disposal dockets: for any soil disposed off-site including transportation records, spoil source, spoil disposal location, receipt provided by the receiving waste facility/site;
    - Imported materials records: records for any soil imported onto the site, including source site, classification reports, inspection records of soil upon receipt at site and transportation records;
    - Records relating to any unexpected finds and contingency plans implemented;
    - Photographic records by all contractors and consultants of the works undertaken within their purview of responsibilities;
    - Surveys pre- and post-installation of geotextile marker layer and clean fill cap (if required);
    - Airborne asbestos monitoring records (in the event that asbestos works are undertaken);
    - Interim/final visual and sampling clearances for any asbestos related works (in the event that asbestos works are undertaken);
- Ensure sufficient information is provided to engage or direct all required parties, including sub-contractors, to implement the requirements of the RAP other than those that are the direct responsibility of the Remediation Contractor;
- Manage the implementation of any recommendation made by those parties in relation to work undertaken in accordance with the RAP;

- Inform, if appropriate, the relevant regulatory authorities of any non-conformances with the procedures and requirements of the RAP in accordance with the procedures outlined in this document;
- Retain records of any contingency actions;
- On completion of the project, to review the RAP records for completeness and update as necessary; and
- Recommend any modification to general documentation which would further improve the environmental outcomes of this RAP.

2.3 Surveyor

The project surveyor will be a registered surveyor engaged by the Remediation Contractor to undertake surveying works as required by this RAP.

2.4 Asbestos Contractor

The Asbestos Contractor will be responsible for undertaking all asbestos work involving any asbestos impacted filling and will hold a Class A or Class B licence for the removal of asbestos (issued by SafeWork NSW), on the basis that the asbestos identified at the site to date has included bonded asbestos.

The Asbestos Contractor can be the same entity as the Remediation Contractor.

2.5 Sub-contractors

All sub-contractors will be inducted onto the site, informed of their responsibilities in relation to this RAP and sign their agreement to abide by the RAP requirements. Where necessary, sub-contractors will also be trained in accordance with the requirements of this document. All sub-contractors must conduct their operations in accordance with the RAP as well as all applicable regulatory requirements.

2.6 Environmental Consultant

The Environmental Consultant will provide advice on implementing the RAP. The Environmental Consultant will be responsible for:

- Undertake any required assessments where applicable (e.g. waste classification, validation);
- Provide advice and recommendations arising from monitoring and/or inspections, including unexpected finds; and
- Notify the Client with any results of assessments, and any observed non-conformances.

2.7 Licenced Asbestos Assessor

A Licenced Asbestos Assessor will be required for any friable asbestos works (if encountered) to be engaged independently of the Asbestos Contractor to undertake the following:

- Review and approve documentation prepared by the Asbestos Contractor;
- Prepare any WHS plans and advice required by the Remediation Contractor;
- Undertake airborne asbestos monitoring;
- Undertake clearance inspections;
- Provide advice and recommendations arising from monitoring and/or inspections; and
- Notify the client with the results of any assessments and any observed non-conformances.

2.8 Site workers

All workers on the site are responsible for observing the requirements of this RAP and other management plans. These responsibilities include the following:

- Being inducted on the site and advised of the general nature of the remediation/environmental issues at the site;
- Being aware of the requirements of this plan;
- Wearing appropriate personal protective equipment (PPE) as required by this plan;
- Only entering restricted areas when permitted; and
- Requesting clarification when unclear of requirements of this or any other plans (e.g. safe work method statements (SWMS)).

3. Water management

3.1 Stormwater

Stormwater must be managed during the remediation works such that potential adverse impacts from surface runoff (e.g. cross contamination, mobilisation of contaminants in soil particles, etc.) are appropriately mitigated. Accordingly, the Remediation Contractor will take appropriate measures which may include:

- Construction, where necessary, of stormwater diversion channels, bunding and linear drainage sumps with catch pits in and around the remediation areas to divert stormwater from the contaminated areas;
- Provision of appropriately located sediment traps including geotextiles; and
- Discharge of excess water in excavations/low points on a regular basis to limit the potential for flooding.

3.2 Dewatering of excavations

Any runoff or seepage water accumulated in site excavations that requires removal must initially be sampled and tested for suspended solids, pH and any contaminants of potential concern (CoPC) as identified by the Environmental Consultant. The options for management of excavation pump-out water, dependent upon the test results, are for disposal of the water as follows:

- Discharge to stormwater with prior approval from Council. Provided the test results comply with relevant ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018), or any other compliance requirements stipulated by Council. The Environmental Consultant must consider the most appropriate criteria to be used; or
- Discharge to sewer, as industrial trade wastewater, with prior approval from Sydney Water. This option would require the analysis of a larger list of analytes, and compliance with the Sydney Water acceptance standards; or
- Pumping by a liquid waste contractor for removal of the water off-site, in accordance with regulatory requirements.

Note that, depending on the type and scale of the dewatering required, a permit (water use approval) may need to be obtained through NSW Water.

4. Soil management plan

The Remediation Contractor will develop a plan to mitigate cross contamination as part of the CEMP to be implemented throughout the works.

4.1 Stockpiling of contaminated material

Contaminated material shall be excavated and stockpiled at a suitably segregated location(s) away from sensitive areas (e.g. water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- An impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles of contaminated material shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight);
- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile or similar cover to prevent dust generation;
- Measures should be taken by the Remediation Contractor to prevent the migration of stockpile materials (i.e. perimeter bunds, hay bales, silt fences, etc.); and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.2 Stockpiling imported material

Imported material shall be stockpiled at a suitably segregated location(s) away from sensitive areas (e.g. water bodies, drainage lines, stormwater pits, etc.) and ongoing excavations, and in a manner that will not cause nuisance to the neighbouring properties. Soil stockpiles are to be managed as follows:

- Imported material should not be stockpiled within un-remediated areas of the site. If this is unavoidable, an impermeable membrane such as plastic sheeting should be provided at the surface by the Remediation Contractor prior to stockpiling. Plastic sheeting should be taped at joins, as necessary;
- All stockpiles shall be surrounded by star pickets and marking tape or other suitable material to clearly delineate their boundaries;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight); and
- A record of stockpile locations (stockpile register), dimensions, descriptions, environmental controls, etc. should be maintained by the Remediation Contractor.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

4.3 Transport of material off-site and on to site

Transport of contaminated material from the site and imported material to the site shall be via a clearly delineated haul route(s) and this route shall be used exclusively for entry and egress of vehicles used to transport contaminated materials within and away from the site, and onto and within the site. The proposed transport route(s) (to be determined by the Remediation Contractor) will be notified to Council and truck dispatch shall be logged and recorded by the Remediation Contractor for each load leaving or arriving the site. A record of the truck dispatch will be provided to the Environmental Consultant.

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

- Comply with all road traffic rules;
- Minimise noise, vibration and dust to adjacent premises; and
- Use State roads and minimise use of local roads as far as practicable.

The remediation work should be conducted such that all vehicles:

- Conduct deliveries of soil, materials, equipment or machinery only during the specified hours of remediation;
- Have securely covered loads to prevent any dust or odour emissions during transportation; and
- Exit the site in a forward direction.

In addition, measures should be implemented to ensure that no contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Roadways will be kept clean throughout the remediation works and will be broomed, if necessary, to achieve a clean environment.

All loads will be securely covered and may be lightly wetted, if required, to ensure that no materials or dust are dropped or deposited outside or within the site. Prior to exiting the site, each truck should be inspected by Remediation Contractor personnel and either noted as clean (wheels and chassis) or broomed prior to leaving the site. Any soil spilled onto surrounding streets should be cleaned by mechanical or hand methods, on a daily basis.

Removal of waste materials from the site shall only be carried out by contractors holding the appropriate license(s), consent or approvals to dispose the waste materials according to the waste classification and with the appropriate approvals obtained from the EPA, were required.

Materials imported onto the site shall only be carried out contractors holding the appropriate license(s), consent or approvals to transport the materials with the appropriate approvals obtained from the EPA, were required.

All movement of soil within the site is to be tracked by the Remediation Contractor, from cradle to grave. Copies of tracking records must be provided to the Environmental Consultant.

5. Noise and vibration control plan

All equipment and machinery should be operated in an efficient manner to minimise the emission of noise. The use of any plant and/or machinery should not cause unacceptable vibrations to nearby properties and should meet Council requirements.

6. Dust control plan

Dust emissions must be confined within the site boundary as far as is practicable. The following example dust control procedures could be employed to comply with this requirement, as necessary:

- Erection of dust screens around the perimeter of the site (as applicable);
- Securely covering all loads entering or exiting the site;
- Use of water sprays across the site to suppress dust;
- Stockpiles shall be lightly conditioned by sprinkler or covered by geotextile or similar cover to prevent dust generation (if remaining overnight);

- Stockpiles impacted, or potentially impacted, with asbestos must be covered by geotextile or similar cover to prevent dust generation;
- Include wheel wash (if applicable); and
- Keeping excavation and stockpile surfaces moist.

Regular checking of the fugitive dust issues is to be undertaken. Remedial measures are to be undertaken to rectify any cases of excessive dust.

7. Odour control plan

No odours should be detected at any boundary of the site during remediation works by an authorised Council Officer relying solely on sense of smell. The following example procedures could be employed to comply with this requirement as necessary:

- Use of appropriate covering techniques such as plastic sheeting, polythene or geotextile membranes to cover excavation faces or stockpiles;
- Fine spray of water and/or hydrocarbon mitigating agent on impacted areas/stockpiles or loads to lightly condition the material;
- If required, restrict uncovered stockpiles to appropriate sizes to minimise odour generation;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues to ensure compliance. Undertake immediate remediation measures to rectify any cases of excessive dust or odour (e.g. use of misting sprays or odour masking agent); and
- Adequate maintenance of equipment and machinery to minimise exhaust emissions.

8. Work health and safety plan

8.1 General

It is the Remediation Contractor's responsibility to devise a SWMS[1] (or series thereof, for various respective tasks) and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP and SMP does not relieve the Remediation Contractor or other contractors of their ultimate responsibility for occupational health and safety of their workforce and to prevent contamination of areas outside the 'remediation' workspace. This RAP and SMP sets out general procedures and the minimum standards and guidelines for remediation that will need to be used in preparing the safe work method statement.

This work health safety plan (WHSP) has been prepared with refence to CRC CARE *Remediation Action Plan: Implementation - Guideline on Health and Safety* (CRC CARE, 2019). The requirements of this WHSP must be incorporated into the Remediation Contractor's SWMS.

[1] Either a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works.

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. To attain this the SWMS developed by the Remediation Contractor must comply with policies specified in the Work Health and Safety Regulation 2011.

All appropriate permits, licences and notifications required for the remediation activities must be obtained prior to the commencement of remediation works.

8.2 Site access

Appropriate fencing and signage must be installed around and within the site to prevent unauthorised access and restrict access to remediation areas and/or deep excavations. Access restrictions and administrative arrangements for management of entry of workers or related personnel on site is the responsibility of the Remediation Contractor.

Any existing pits or unstable areas on site that may generate potential safety, or operational risk should be demarcated and taped off, with appropriate rectification action undertaken (e.g. backfilling of pits).

8.3 Personnel and responsibilities

Before undertaking works on site, all personnel should be made aware of the officer responsible for implementing WHS procedures. All personnel must read and understand this WHSP and over-arching SWMS prior to commencing site works and sign a statement to that effect. Contractors employed at the site will be responsible for ensuring that their employees are aware of, and comply with, the requirements of this WHSP and Remediation Contractor's SWMS.

8.4 Chemical contamination hazards

Based on the previous investigations, the primary CoPC at the site is asbestos. Other chemical compounds or substances that may be present in the soils at the site include the CoPC TRH, BTEX, PAH and metals and, given the presence of fill. There is also a lower probability of other contaminants being present.

The risks associated with the identified contaminants to site personnel and workers involved in the remediation are considered to be low due to the concentrations within groundwater and soil vapour and limited exposure durations. These risks are associated with:

- Ingestion of contaminated soil and/or water;
- Dermal contact with contaminated soil and/or water; and
- Inhalation of dusts or vapours of the CoPC.

If other CoPC are encountered in fill, this risk evaluation should be revised.

Personnel will endeavour, wherever possible, to avoid direct contact with potentially contaminated material. Workers must avoid the potential exposures listed above as far as is practicable. Appropriate personal protective equipment (PPE) must be used to mitigate potential risks.

8.5 **Physical hazards**

The following physical hazards are associated with conditions that may be created during remediation works:

- Heat exposure;
- Excavations;
- Buried services;
- Noise;
- Dust;
- Electrical equipment;
- Heavy equipment and truck operation; and
- Asbestos.

Safe work practices must be employed to manage the physical risks identified above. For the most part, these risks can be managed through appropriate demarcation, access controls and the use of appropriate PPE.

8.6 **Safe work practices**

The appropriate safe work practices should be clearly defined by the Remediation Contractor in their SWMS. As a minimum, all personnel on site will be required to wear the following PPE:

- Steel-capped boots (mandatory);
- High visibility clothing/vest (mandatory);
- Safety glasses or safety goggles with side shields requirements (as necessary);
- Hard hat (as necessary);
- Appropriate respiratory and protective equipment for any works involving asbestos (as necessary); and
- Hearing protection when working in the vicinity of machinery or plant equipment if noise levels exceed exposure standards (as necessary).

Each item of PPE should meet the corresponding relevant Australian Standard(s).

Specific safe work practices will be adopted when working with asbestos, in accordance with (but not limited to) the following codes of practice:

- SafeWork NSW *Code of Practice, How to Manage and Control Asbestos in the Workplace* (SafeWork NSW, 2019a)
- SafeWork *NSW Code of Practice, How to Safely Remove Asbestos* (SafeWork NSW, 2019b);
- WorkCover *NSW Managing Asbestos in or on Soil* (WorkCover NSW, 2014); and
- NOHSC *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed* (NOHSC, 2005).

9. Remediation schedule and hours of operation

The remediation works will be conducted within the days and hours specified in the development consent.

10. Response to incidents

The key to effective management of incidents is the timely action taken before any situation reaches a reportable or critical level. Therefore, surveillance activities are extremely important and should be conducted for the measures prescribed herein and any other measures prescribed in any additional environmental management plan developed subsequently. During construction activities on the site, the following inspection or preventative actions should be performed by the Remediation Contractor:

- Regular inspection of works;
- Completion of routine environmental checklists and follow-up of non-compliance situations;
- Maintenance and supervision on-site; and
- An induction process for site personnel involved in the remediation works that includes relevant information on the contamination status of the site, the remediation works being undertaken, worker health and environmental protection requirements and ensures that all site personnel are familiar with the site emergency procedures.

An emergency response plan will be in place for all aspects of site works. Any emergency will be reported immediately to the site office and/or the Site Manager (and Safety Officer), and the appropriate emergency assistance should be sought. The Site Manager should be responsible for initiating an immediate emergency response using the resources available on the site. Where external assistance is required, the relevant emergency services should be contacted. A table such as that below, containing contact details for key personnel who may be involved in an environmental emergency response should be completed and be readily available to personnel at all times. The table should be completed, and thereafter amended, as required.

The Remediation Contractor will be responsible for ensuring that site personnel are aware of the emergency services available and the appropriate contact details. A site Safety Officer should be contactable, or available, on-site during remediation and development works.

Contact details for key utilities are included in the event of needing to respond to incidents. Blank cells are 'to be confirmed' and should be completed prior to works commencing when all entities are confirmed.

Table 1: Summary of roles and contact details

Role	Personnel / contact	Phone contact details
Principal		
Principal's Representative		
Site Manager		
Remediation Contractor and Builder		

Site Office		
Environmental Consultant		
Consent Authority		
Regulator	NSW EPA (pollution line and general enquiries)	131 555
Utility Provider	Water (Sydney Water Corporation)	13 20 92
Utility Provider	Power (Ausgrid)	13 13 88
Utility Provider	Gas (Jemena Limited)	131 909
Utility Provider	Telecommunications (Telstra Corporation Limited)	13 22 03
Utility Provider	Telecommunications (Optus)	1800 505 777
Utility Provider	Telecommunications (NBN Co Limited)	1800 687 626

11. References

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

CRC CARE. (2019). *Remediation Action Plan: Implementation - Guideline on Health and Safety*. National Remediation Framework: CRC for Contamination Assessment and Remediation of the Environment.

NOHSC. (2005). *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Ed.* Canberra, April 2005, NOHSC:3003: National Occupational Health and Safety Commission, Commonwealth of Australia.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

SafeWork NSW. (2019a). *Code of Practice, How to Manage and Control Asbestos in the Workplace*. August 2019.

SafeWork NSW. (2019b). *Code of Practice, How to Safely Remove Asbestos*. August 2019: SafeWork NSW, NSW Government.

WorkCover NSW. (2014). *Managing Asbestos in or on Soil*. March 2014: WorkCover NSW, NSW Government.

Appendix F

Contingency Plan and Unexpected Finds Protocol

1. General

Where the site conditions are found to be different than that anticipated during the remediation works, the proposed remediation approach may not be appropriate for the contamination encountered. In such cases the Environmental Consultant is to re-assess the contamination and remediation approach and inform a Site Auditor (if required). Where necessary the Environmental Consultant will prepare an addendum to, or revision of, this RAP. Any addendum or revision is to be reviewed and agreed by a Site Auditor (if required) before its implementation.

2. Contingency plan

This contingency plan has been developed to provide guidance on processes to follow if contamination (or indicators of contamination), other than that included in the remediation strategy, (Section 11) is encountered during the remediation works. Any such finds shall be surveyed and the location documented.

Although the site has been subject to previous investigation(s), there remains a potential for soil contamination to be present between sampled locations. In the event that signs of soil contamination, other than that included in the remediation strategy, are encountered during remediation e.g. evidence of petroleum, or other chemical odours which weren't previously identified the following protocols will apply:

- The Site Manager is to be notified and the affected area closed off by the use of barrier tape and warning signs;
- The Environmental Consultant is to be notified to inspect the area and assess the significance of the potential contamination and determine extent of remediation works (if deemed necessary) to be undertaken. An assessment report and management plan detailing this information will be compiled by the Environmental Consultant and provided to the Principal's Representative;
- The assessment results together with a suitable management plan shall be provided by the Principal's Representative to the Consent Authority (if required by the development consent) and Site Auditor (if required);
- The agreed management/remedial strategy, based on the RAP and relevant guidelines shall be implemented; and
- All details of the assessment and remedial works are to be included in the site validation report.

3. Unexpected finds protocol

This unexpected finds protocol (UFP) has been developed to provide guidance on processes to follow if any unexpected find is encountered during the remediation or future civil and construction works. Any unexpected finds should be surveyed and the location documented.

All site personnel are to be inducted into their responsibilities under this (UFP), which should be included or referenced in the Remediation Contractors Environmental Management Plan.

All site personnel are required to report unexpected signs of environmental concern to the Site Manager if observed during the course of their works e.g. presence of potential unexploded ordinance, unnatural staining, potential contamination sources (such as buried drums or tanks) or chemical spills.

Should signs of concern be observed, the Site Manager, as soon as practical, will:

- Stop work in the affected area and ensure the area is barricaded to prevent unauthorised access;
- Notify authorities needed to obtain emergency response for any health or environmental concerns (e.g. fire brigade);
- Notify the Principal's Representative of the occurrence;
- Notify any of the authorities that the Remediation Contractor is legally/contractually required to notify (e.g. EPA, Council); and
- Notify the Environmental Consultant.

The Principal's Representative is to notify any of the authorities which the Principal is legally/contractually required to notify (e.g. EPA, Council). Where appropriate the Principals Representative will also implement appropriate community consultation in accordance with the Communications Plan (refer to Section 7).

The Environmental Consultant will assess the extent and significance of the find and develop an investigation, remediation or management approach using (where possible) the principles and procedures already outlined in the RAP. Where a Site Auditor is involved, the proposed approach will be discussed and agreed with the Site Auditor prior to implementation.

4. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

WA DoH. (2021). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.* WA Department of Health.