Douglas PARTNERS

GROUNDED EXPERTISE

Remediation Action Plan

Proposed Residential Development

139 Teralba and 190 Brunker Roads, Adamstown NSW

Prepared for MODE Design Corp Pty Ltd on behalf of NSW Land and Housing Corporation

Project 225230.00

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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.

Signature		Date
Author		04 December 2024
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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.

Table of Contents

Appendix A: R.003 Drawing 1 – Test Location Plan

R.001 Drawing 1 – Site Features and Photograph Locations (Douglas, 2023)

R.002 Drawing 1 – Test Location Plan (Douglas, 2024)

R.002 Drawing 2 – Section A (Douglas, 2024)

Proposed Development Drawings by MODE (drawings AR-0000 to 8210 revision 10)

Appendix B: About this Report

Appendix C: **Tabulated Summary Results from Previous Report** (Douglas, 2024)

Table G1: Summary of Laboratory Results – Soil Vapour

Table G2: Summary of Laboratory Results – Land use

Table G3: Summary of Laboratory Results – Waste Classification

Table G4: Summary of Laboratory Results – Groundwater

Chain of Custody – Field and Despatch

Sample Receipts

Laboratory Report Sheets (Envirolab report 338589, 343963, 346424, 346559, 346559-B and 347211)

Appendix D: **Borehole Logs from Previous Reports**

Borehole Logs (1 to 14) (Douglas, 2024)

Borehole Logs (BH1 to BH3) - (STS, 2022)

Appendix E: Remediation Options Assessment and Evaluation

Appendix F: Site Assessment Criteria

Appendix G: Data Quality Objectives

Appendix H: Site Management Plan

Appendix I: Contingency Plan and Unexpected Finds Protocol

Remediation Action Plan
Proposed Residential Development
139 Teralba and 190 Brunker Roads, Adamstown NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has prepared this Remediation Action Plan (RAP) for a proposed residential development at 139 Teralba and 190 Brunker Roads, Adamstown NSW. The RAP was commissioned by Pallab Chakrabarty of MODE Design Corp Pty Ltd on behalf of NSW Land and Housing Corporation and was undertaken in accordance with Douglas' proposal 225230.00.P.002.Rev0 dated 20 May 2024.

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);
- 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 proposed development comprises demolition of the existing residential building and construction of two new residential buildings with four and five storeys above ground level and a partial basement (likely tanked) underneath 'Building 1' for vehicle parking and service facilities. A copy of the draft architectural plans for the proposed development are included in Appendix A.

Based on available information, it is considered that the remediation works outlined in this report constitute Category 2 Remediation under Clause 4.11 of *SEPP (Resilience and Hazards) 2021*. Category 2 remediation works require that Council must be notified at least 30 days prior to the commencement of the remediation work unless alternative conditions are applicable under the development consent. Regardless of the remediation category, Council need to review and consider this RAP as part of the development application. At this stage interim DA advice has not been received from Council.

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 B.

2. Proposed development

Reference to the supplied architectural drawings (Mode, drawings AR-0000 to 8210 revision 10) provided in Appendix A) indicates the proposed development comprises the following:

- Demolition of the existing residential building;
- Construction of two residential buildings known as 'Building 1' and 'Building 2' with four and five storeys above ground levels respectively (see Figure 1);
- Construction of a partial basement beneath Building 1 for vehicle parking and service facilities;
- Construction of landscape areas including a communal open space over the carpark slab roof in the central portion of the site; and
- Maximum cut of up to approximately 4 m is proposed in the central portion of the site as part of construction of the partial basement containing vehicle parking, pump room and on site detention (OSD) tank for Building 1.

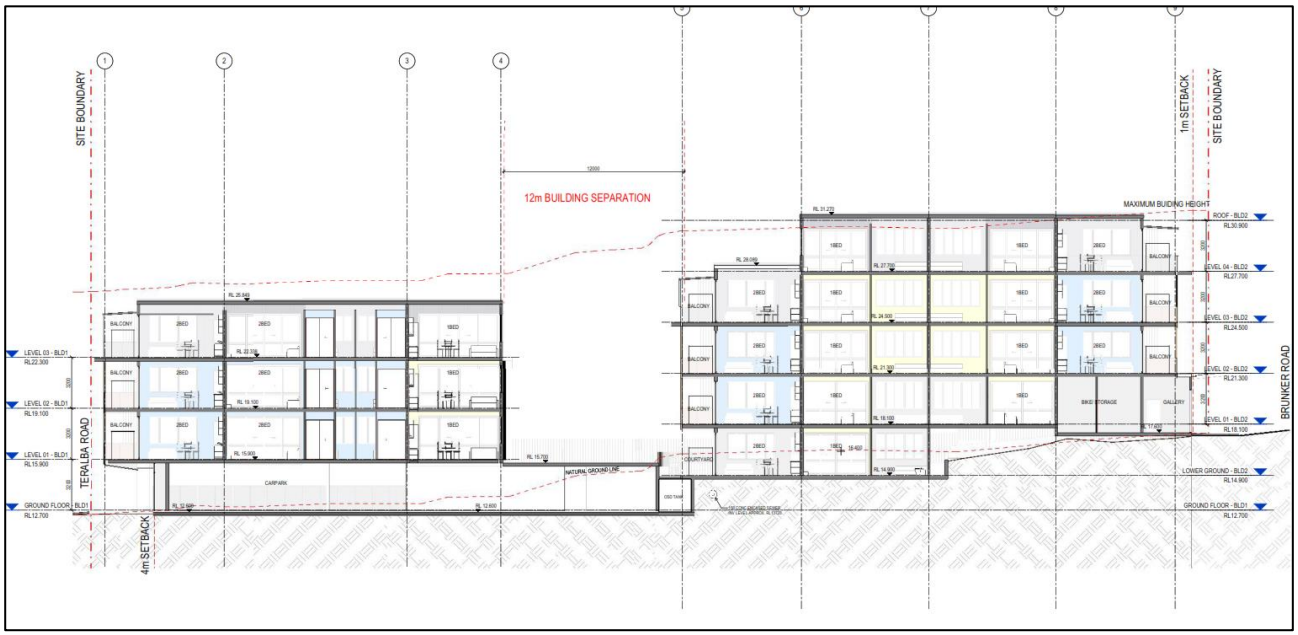

Figure 1: Proposed development, 'Sections' drawing by Mode AR-3000 revision 6.

3. Scope of work

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

- Summarise the findings of previous investigations used to inform the status of contamination and contamination risk at 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;
- Outline additional investigation requirements post demolition to determine the extent of remediation required;

- Define the anticipated extent of remediation which may be reduced/refined pending the outcome of the additional investigation;
- Assess, select and justify a preferred approach to remediation 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;
- Select an appropriate remediation strategy 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;
- Include contingency plans and an unexpected finds protocol; and
- Identify the need for, and nature of, any long-term management and/or monitoring following the completion of remediation and, if required, provide an outline of an environmental management plan.

4. Site description

The site comprises three allotments with an approximate area of 1415m^2. It generally has a rectangular shape and is accessed from the east off Brunker Road and to the west off Teralba Road.

Further site information has been summarised below, The site location shown in Figure 1 and site photographs shown in Figure to Figure 6.

Site address	139 Teralba and 190 Brunker Roads, Adamstown NSW
Legal description	Lot 1 DP318448 Lot 1885 DP666968 Lot 1892 DP755247
Approximate Area	1415 m^2
Zoning	R3 medium Density Residential and R4 High Density Residential
Local council area	City of Newcastle (CoN)
Current use	Residential – one residential building comprising 10 units
Surrounding uses	Residential, except for commercial development to the north-east (liquor store)

Figure 2: Site location shown in red

Figure 3: Site condition, southern boundary of the site (Brunker Road), looking north-west.

Figure 4: Site condition, southern boundary of the site (Brunker Road), looking north-west.

Figure 5: Site condition, northern boundary of the site (Teralba Road), looking south-east.

Figure 6: Site condition, northern boundary of the site (Teralba Road), looking south-east.

5. Environmental setting

Regional Topography	Reference to NSW 2 m contours indicates the regional topography in the vicinity of the site generally dips to the north/north-west, with the highest elevation of approximately RL 26 (hilltop to the south) and as low as RL 8 (concrete lined drain adjacent to railway to the north).
Site Topography	Reference to detailed survey by RPS Australia East Pty Ltd dated 14/07/2022 indicates the site levels range from approximately RL 12.4 to RL 17.8 with the general site slope dipping to the north-west.
Soil Landscape	Reference to NSW Soil Landscapes of Central NSW index indicates the site is underlain by two soil landscapes: • Eastern portion of the site – 'Killingworth' soil landscape – typically undulating to rolling hills and low hills on the Newcastle Coal Measures – typical limitations include: high water erosion hazard, mine subsidence, foundation hazard, shallow soils, seasonal waterlogging, sodic/dispersive soils, very strongly acidic soils of low fertility; and Western portion of the site – 'Hamilton' soil landscape – typically level to gently undulating well-drained plain on Quaternary deposits – typical limitations include: wind erosion hazard, groundwater pollution, strong acidity and non-cohesive soils.

Geology	Reference to NSW Seamless Geology mapping indicates the site is underlain by Lopingian aged shale of the Bar Beach Formation of the Newcastle Coal Measures which typically comprise shale, siltstone, sandstone and minor conglomerate/claystone/tuff.
Acid Sulfate Soils	Reference to NSW Acid Sulfate Soil risk mapping indicates the site is outside of the mapped area of acid sulfate risk. The nearest mapped area is 100 m to the north which is mapped as low probability of occurrence (greater than 3 m below ground surface). Typically, acid sulfate soils occur in coastal areas at elevations of RL 5 and lower.
Surface Water and Groundwater	The regional groundwater regime is generally expected to flow to the north/north east towards Styx Creek, which is approximately 700 m from the site. A stormwater drain located approximately 100 m north west of the site, which is a tributary of Styx Creek, is considered to be the nearest sensitive receptor. Search of NSW registered groundwater bores indicates no registered groundwater bores within 500 m of the site.
Regional Topography	Reference to NSW 2 m contours indicates the regional topography in the vicinity of the site generally dips to the north/north-west, with the highest elevation of approximately RL 26 (hilltop to the south) and as low as RL 8 (concrete lined drain adjacent to railway to the north).

6. Summary of previous investigations

6.1 Previous reports

The following previous reports are relevant to this RAP:

- STS, Geotechnical Investigation and Acid Sulfate Soil Assessment, 139 Teralba and 190 Brunker Roads, Adamstown, New South Wales (STS, 2022);
- Douglas, Report on Preliminary Site Investigation (contamination), Proposed Adamstown Multi-Residential, 139 Teralba and 190 Brunker Road, Adamstown NSW (Douglas, 2023); and
- Douglas, Report on Detailed Site Investigation (contamination), Proposed Residential Development, 139 Teralba and 190 Brunker Road, Adamstown NSW (Douglas, 2024).

6.1.1 Geotechnical Investigation (STS, 2022)

STS Geotechnics Pty Ltd (STS) has previously undertaken a geotechnical investigation and acid sulfate soil assessment for the site (STS, 2022).

Subsurface investigation comprised drilling boreholes (BH1 to BH3) to depths up to 7.5 m below ground level. Fill was observed in all bores up to 0.8 m depth overlying natural clay soils to 4.0 m depth overlying shaley clay to the limit of investigation. Brick was observed within fill materials at BH2 (central portion of the site).

Groundwater was not observed in any of the bores during drilling. It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and therefore vary with time.

Two existing groundwater monitoring bores were located during the site walkover by Douglas (Douglas, 2023), which approximately aligned with the location and depth of BH2 and BH3, although the STS report did not mention the well installation. Details of the construction of these wells is unknown.

6.1.2 Preliminary Site Investigation (Douglas, 2023) and Detailed Site Investigation (Douglas, 2024)

Douglas has previously undertaken a preliminary site investigation (contamination) (PSI) at the site in 2023 (Douglas, 2023).

The investigation included a review of proposed development plans, a brief desktop / site history review (including review of previous contamination assessments by Douglas on the adjoining former service station to the northeast in 2009 (Douglas, 2009) and 2010 (Douglas, 2010) at 184 Brunker Road, Adamstown), site walkover and laboratory testing of material fragments.

The PSI identified a number of potential sources of contamination at the site as follows:

- Potential hazardous building materials (HBM) including asbestos from demolition of former site buildings / structures and potential renovations of the current building. One fibro fragment (sample F1) observed within surface fill adjacent to waste disposal area was found to contain asbestos. The extent of asbestos impact in this area and more broadly across the site is unknown;
- Contaminants associated with site levelling, retaining wall construction and general filling (source unknown);
- Contaminants from potential spills and leaks associated with storage, disposal and use (ie vehicle servicing) of oils and coolants by the current occupiers and possibly similar chemical storage and use/spills within former garages / sheds;
- Vehicle parking;
- Landscape maintenance; and
- Former service station to the north-east. Potential USTs, fuel infrastructure, workshop and lube bay and potential migration onto site. Potential migration onto site may be exacerbated by preferential flow paths such as the presence of underground services (e.g. sewer) which are typically backfilled with a high permeability material (sand or gravel).

The results of the PSI informed the scope of work for the detailed site investigation (DSI) (Douglas, 2024), noting that the DSI was limited to accessible landscaped areas of the site.

The objectives of the DSI were to:

- Assess the contamination status of the site based on the identified potential contamination sources;
- Confirm further investigation requirements post demolition and assess whether remediation and/or management is required to render the site suitable from a contamination perspective for the proposed development.

The DSI comprised the following:

- Review of the PSI (Douglas, 2023) and preparation of a sampling, analysis and quality plan (SAQP);
- Installation of 4 soil vapour pins to assess the risks of on-site migration and associated soil vapour risks from the former service station;
- Drilling of 14 boreholes to depths of up to 3.1m in accessible parts of the site;
- Logging of test locations and collection of soil samples for identification and testing purposes;
- Installation and development of 3 new groundwater wells at the site;
- Gauging, Purging and sampling of the 3 installed groundwater wells and 2 existing groundwater wells previously installed on the site.
- Laboratory testing of selected soil vapour, soil and groundwater samples for the contaminants of potential concern (COPC) identified in the preliminary CSM;
    - 4 soil vapour samples (TO-15) for solvents and total recoverable hydrocarbons (TRH);
    - 26 soil samples for metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH);
    - 4 soil samples for organochlorine (OC), and organophosphorus (OP) pesticides, polychlorinated biphenyls (PCB) and PFAS;
    - 1 soil sample for asbestos ID in material (bonded asbestos fragments);
    - 12 soil samples for Asbestos ID in soil (500mL soil samples);
    - 4 groundwater samples for metals for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH) and PFAS;
    - QA/QC testing comprising replicate sampling, and trip spikes/trip blanks of both soil and groundwater samples.
- Assessment of the presence and extent of contamination and remediation requirements to render the site suitable for the proposed development.

The results of the DSI are summarised as follows:

Subsurface Conditions and Contaminant Observations

The borehole logs for the DSI (Douglas, 2024) are included in Appendix D. These should be read in conjunction with the preceding notes.

The DSI summarised the general subsurface profile as follows based on the test pits and bores.

Unit 1 – Fill

- Unit 1.1 – Asphalt;
- Unit 1.2 – Fill (roadbase) - generally comprising brown/dark grey gravelly sand;
- Unit 1.3 – Fill: gravel/sand/silt/clay (with building materials) - generally comprising dark brown to dark grey, inclusions of ash, brick, ceramic, coal, coal reject, concrete, fibro fragment (Bore 10 and 11 only), glass, plastic, rootlets and tile; and
- Unit 1.4 – Fill: gravel/sand/silt/clay - generally comprising dark brown to dark grey, inclusions of coal.

Unit 2 – Natural

- Unit 2.1 – Gravelly clay / sandy clay / sandy clay / clay: generally brown / brown mottled orange / pale grey mottled orange and or brown.

Subsurface summary of units encountered at each borehole location is shown in Table 1.

Table 1: Subsurface summary BH1 to BH3 (STS, 2022) and Bore 1 to Bore 14

Unit	Location Depth Range Encountered (m below ground level)																
	BH1	BH2	BH3	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1	-	-	-	-	0 - 0.05	0 - 0.05	-	-	-	-	-	-	-	-	-	-	-
1.2	-	-	-	-	0.05 - 0.2	0.05 - 0.18	-	-	-	-	-	-	-	-	-	-	-
1.3	-	0 – 0.8	-	0 - 0.95	0.2 - 0.6	-	0 - 0.6	0 - 0.3	0 - 0.4*	0 - 0.4	0 - 0.1	0 - 1.1	0 - 0.1	0 - 0.15	0 - 0.7	0 - 0.8*	0 - 0.5
1.4	0 – 0.8	-	0 – 0.6	-	-	0.18 - 0.44	-	-	-	0.4 - 1.2*	0.1 - 0.9*	1.1 - 1.9	0.1 - 0.7	-	0.7 - 0.9*	-	-
2.1	0.8 – 6.0*	0.8 – 7.5*	0.8 – 6.5*	0.95 – 6.1	0.6 – 6.05	0.44 - 5.1*	0.6 - 5.1*	0.3 - 0.5*	-	-	-	1.9 – 3.1*	0.7 - 0.9*	0.15 - 0.3*	-	-	0.5 - 0.7*

Notes to table:
* limit of investigation
** (STS, 2022)

No free groundwater was observed during drilling of boreholes. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

No visual or olfactory evidence (e.g. staining, odours, free phase product) was observed during the investigations to suggest the presence of significant contamination within the soils at the site. The PID screening recorded values of 38 ppm to 60 ppm in well headspace in monitoring wells 1, 4 and 9 suggesting the presence of VOC in the monitoring well headspace. The PID screening recorded values of less than 1 ppm in groundwater headspace suggesting the absence, or very low concentrations, of VOC in the groundwater screened.

Key Findings

The key findings of the DSI are as follows:

- Fill materials was encountered at the 14 test locations and was noted to be up to 1.9m depth at the test locations.
- Anthropogenic inclusions were noted in the fill at the 14 test locations, including ash, brick, ceramic, coal, coal reject, concrete, fibro fragment, glass, plastic, rootlets and tile.
- Soil vapour testing indicated that concentrations of the primary target CoPC in sub-slab vapour were all below the NEPC (2013) HSL for TRH and BTEX and Tier 1 interim HIL for TCE, PCE and cis-1,2-DCE for residential land use.
- Laboratory analysis of the selected soil samples indicated soil concentrations were generally below the SAC for residential land use with the exception for concentrations of lead and asbestos (bonded and friable);
- Laboratory analysis of groundwater samples indicated groundwater concentrations were generally below the SAC except for minor metals and per/polyfluorinated substances (PFAS) which marginally exceeded ecological groundwater investigation levels. The groundwater assessment did not identify any significant impacts to groundwater from on-site or off-site activities and were considered likely to be attributed to background concentrations in the regional developed area. As such remediation of groundwater was not considered warranted at this stage;
- 12 fill samples (500ml soil samples) were assessed for asbestos fines (AF), friable asbestos (FA) and, of these 2 record AF at concentrations above the laboratory limit of reporting (LOR), however, 1 sample exceeded the HSL- A criteria for AF / FA (0.001 % w/w);
- 4 soil samples (BH9) exceeded HIL – A criteria for lead (300 mg/kg). These exceedances were less than 2.5 times the SAC and were not considered a hotspot as per (NEPC, 2013);
- Site remediation, to be detailed in a site-specific remediation action plan (RAP), was noted to be required to render the site suitable for the proposed residential development due to the identified lead and asbestos impacts in soil.

Data Gaps

The DSI addressed some data gaps regarding the contamination assessment as follows:

- Subsurface investigation beneath the buildings/pavements was not completed during contamination assessment due to lack of access.

- Preliminary waste classification had been completed, however waste classification of soils beneath the existing site structure is unknown. Additional site investigation after demolition was recommended to meet sampling design guidelines (NSW EPA, 2022) and to possibly delineate asbestos impacts to reduce cost associated with handling and disposal of asbestos impacted soils.
- Soil vapour testing indicated trace concentrations of TRH, BTEX and VOCs well below the SAC. Given the placement of vapour sampling points, there is a chance that higher concentrations of soil vapour are present beneath the existing building. The additional subsurface investigation beneath buildings was recommended include assessment of potential residual hydrocarbon impacts from the adjacent service station in addition to assessment of fill and demolition wastes from former structures.

Recommendation for Remediation

The DSI recommended the following regarding remediation:

- Interim management, of the identified asbestos and lead impacts, due to the risk of exposure for current users of the site. Interim management measures could include:
    - Surface clearance of any potential HBM fragments by a qualified occupational hygienist / licensed asbestos assessor (LAA). Locations of additional fragments to be recorded to assist with future detailed asbestos assessment;
    - Surface soil sampling across the site to assess presence / extent of AF/FA;
    - Asbestos air monitoring by an occupation hygienist or licensed asbestos assessor (LAA) to help inform current risks from the identified asbestos impacts; and
    - Temporary capping and maintenance of a cap in areas of identified impact to reduce the risk to residents until the site is vacated and demolition of the buildings is undertaken. Temporary capping options may include a geofabric marker layer and nominal soil/mulch capping, maintenance of adequate grass cover where acceptable etc in addition to an awareness program for residents and minimisation of soil disturbance. An interim environmental management plan would be recommended to facilitate these works.
- Complete a hazardous building materials survey of the existing building prior to demolition to inform the necessary controls for demolition. Where hazardous building materials (HBM) are identified, validation of removal works by an LAA should be undertaken following removal of HBM materials and following completion of demolition;
- Undertake a post-demolition subsurface investigation beneath existing buildings to assess the extent of contamination, confirm remediation requirements and to confirm waste classification of soils required to be removed. The requirements for additional subsurface investigation could be incorporated as an initial step in the remediation process in the site specification RAP for the site or undertaken prior to RAP preparation if development approval for demolition only was proposed initially; and
- Preparation of a site specific RAP.

7. Conceptual site model

The data collected during previous investigations generally confirmed that for certain potential contaminant sources outlined in the preliminary CSM in (Douglas, 2023) potentially complete exposure pathways to the identified receptors exist, whereas for others, they do not. No other sources of contamination have been identified as a result of the testing results to date. The identified source (and associated contaminants of potential concern (CoPC)), pathway and receptor linkages are summarised in Table 2 from the DSI (Douglas, 2024).

Table 2: Summary of Potentially Complete Exposure Pathways (excerpt from (Douglas, 2024))

Source and CoPC	Exposure pathway	Receptor	Risk Management Action
S1: Demolition of former buildings / sheds / fences and potential renovations: heavy metals and asbestos	**HP1:** Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours	**HR1:** Current users [residential land use] **HR2:** Construction and maintenance workers **HR3:** End users [residential land use]	Some asbestos impacts have been identified within the vicinity of former buildings. An existing building covers the central portion of the site which covers or partly covers the footprint of former buildings. No subsurface investigation has been undertaken from within the current building footprint to date. Inspection and an intrusive investigation is recommended after building demolition to assess the presence and extent of impacts. Options for the management of asbestos and heavy metal impacted soil which exceed the relevant land use criteria include cap and contain and off-site disposal. The proposed management option should consider the proposed development.
	HP2: Inhalation of dust and/or vapours	**HR4:** Adjacent site users [residential and commercial land use]	
	EP4: Inhalation, ingestion and absorption	**ER3:** Terrestrial ecosystems	
S2: Fill: Bonded asbestos fragment at surface of Bore 10 (fragment F1). FA/AF detected in fill at 13/0.3m above SAC and detected at 4/0.5m. Possibly more widespread given the presence of trace construction rubble in the fill across the site, and in unobserved portions of the site (beneath existing buildings).	**HP2:** Inhalation of dust and/or vapours	**HR1:** Current users [residential land use] **HR2:** Construction and maintenance workers **HR3:** End users [residential land use]	Controls should be in place in the event that significant quantities of ACM are disturbed during construction (HP2). Further detailed asbestos investigation would be required with reference to (NEPC, 2013) and (WA DER, 2021) to quantify the concentration and extent of bonded ACM and FA/AF impacts in soil/fill across the site. Licensed Asbestos Assessor (LAA) to confirm following the additional detailed investigation whether asbestos removal would constitute bonded or friable removal works with reference to SafeWork NSW requirements. Options for the management of asbestos impacted fill which exceed the relevant land use criteria include cap and contain, remediation (emu picking / mechanical screening) of impacted soil (bonded ACM only) and off-site disposal. The proposed management option should consider the proposed development. Interim control measures are recommended to be implemented to manage risks to existing residences prior to development

Source and CoPC	Exposure pathway	Receptor	Risk Management Action
S2: Fill: metals (lead) within fill at Bore 9 (9/0-0.1m, 9/0.5m, 9/1.3m, 9/1.8m)	**HP1:** Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours	**HR1:** Current users [residential land use] **HR2:** Construction and maintenance workers **HR3:** End users [residential land use]	Further investigation would be required with reference to (NEPC, 2013) and (NSW EPA, 2020) to confirm the extent of lead impacts in soil/fill across the site. Options for the management of lead impacted fill which exceed the relevant land use criteria include cap and contain and off-site disposal. The proposed management option should consider the proposed development. Interim control measures are recommended to be implemented to manage risks to existing residences prior to development
	HP2: Inhalation of dust and/or vapours	**HR4:** Adjacent site users [residential and commercial land use]	
	EP4: Inhalation, ingestion and absorption	**ER3:** Terrestrial ecosystems	
S6: Former service station: metals, TRH, BTEX, PAH, phenols and VOC.	-	-	Testing of soil/ soil vapour / groundwater indicates that contaminants associated with S6 do not appear to be significantly impacting the site, however, residual impacts are present which suggest contaminant migration from the adjacent service station has occurred in the past. Further inspection and assessment is recommended beneath the existing building footprint following demolition as a precautionary measure to assess if any residual impacts beneath the slab exist which require management.

The following sources were identified previously:

- S3 - Storage, disposal and use (vehicle servicing) of oils and coolant: metals, TRH, BTEX, PAH and phenols.
    - Testing of soil/ soil vapour / groundwater indicates that contaminants associated with S3 do not appear to be significantly impacting the site.
- S4 - Parked vehicles: metals, TRH, BTEX, PAH and phenols.
    - Testing of soil/ soil vapour / groundwater indicates that contaminants associated with S4 do not appear to be significantly impacting the site.
- S5 - Maintenance of landscape areas: metals, OCP, OPP, TRH.
    - Testing of soil to date indicates that contaminants associated S5 do not appear to be significantly impacting the site.

8. Additional investigation

Additional investigation is recommended to further assess the site conditions in order to assess site conditions beneath existing building slabs post demolition, assess data gaps identified in the previous investigations, appropriately delineate the area requiring remediation and confirm the most appropriate remediation option/s. The additional investigation should include:

- Additional subsurface investigation beneath existing buildings as previously recommended (Douglas, 2024) to further assess extent of contamination, confirm remediation requirements and to confirm waste classification of soils to be removed. This investigation will assess extent of identified asbestos impacts within demolition waste fill, as well as potential residual hydrocarbon impacts from the adjacent former service station;
- Field sieving of selected bulk fill samples (10L) for asbestos containing materials (ACM) with reference to WA Department of Health guidelines for assessment of asbestos (WA DER, 2021);
- Additional subsurface investigation within the south-eastern area of the site to further delineate the identified lead impacts;
- Laboratory testing of hydrocarbons, metals and asbestos from selected soil samples to assess the suitability of the materials to remain on site and to confirm waste classification (if off-site disposal is required);
- The sampling density within the areas of additional investigation is to be confirmed by the environmental consultant and detailed in a sampling analysis quality plan (SAQP). Based on current site knowledge, indicative test locations showing the minimum testing locations requirements is provided on Drawing 1, Appendix A;
- Reference should be made to relevant guidelines such as NSW EPA sampling design guidelines (NSW EPA, 2022), WA Department of Health guidelines for assessment of asbestos (WA DER, 2021) and National Environment Protection (Assessment of Site Contamination) (NEPC, 2013). Additional step-out testing may be required to delineate the extent of impact where identified.

The additional investigation should be undertaken following completion of hazardous building materials (HBM) removal, demolition works and validation of removal works by a licensed

asbestos assessor (LAA). The investigation should include a walkover of the site to assess for any additional areas of potential contamination which require assessment (ie potential residual impacts from demolition works or potential contamination which may have become exposed during demolition works).

9. Remediation extent

Based on current investigations, absence of investigations beneath existing buildings/pavements or detailed asbestos investigation, the extent of contamination is considered to comprise:

- All fill materials across the site, impacted by asbestos; and
- Fill and natural soils in the vicinity of Bore 9 to a depth of 2.5 m impacted by lead.

The remediation extent will be confirmed following the additional investigations as outlined in Section 8 above. It is possible that the remediation extent may increase or decrease following the results of these additional investigations (i.e. non asbestos impacted filling may be encountered and the remediation extent may decrease as a result).

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 remedial options which may be viable and then assessment each option based on a number of evaluation criteria including client requirements. 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 E.

11. Preferred remediation strategy

11.1 Rationale

The rationale for the selection of the preferred remediation strategy is outlined in Appendix E. The preferred remediation strategy is for off-site disposal of asbestos and lead contaminated soils (Option 2).

If additional investigations (Section 8) confirmed that the extent of contaminant impact was found to be extensive, re-assessment of remediation options may be warranted. If an alternative remediation approach was proposed, this RAP would need to be amended, and approved by the regulator.

11.2 Sequence of remediation

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.

Site remediation will be integrated with site development and the sequence of remediation should align with the proposed development staging.

Due regard should be given to geotechnical requirements for site development so that site works are compatible with remediation requirements.

The general sequence of remediation should consider the following recommended sequence:

- Task 1: Contamination delineation:
  - Post-demolition subsurface investigation to delineate the vertical and lateral extent of impacted fill/soils across the site to confirm remediation requirements and waste classification of soils required to be removed. The post demolition investigation should be undertaken following demolition by the contractor and clearance by the LAA.
- Task 2: Excavation and off-site disposal of contaminated soils throughout site:
  - Waste classification of unsuitable / surplus fill/soils (where required).
  - Disposal of unsuitable / surplus fill/soils.
  - Validation of remediation excavation.

Roles and responsibilities are outlined in the site management plan (Appendix H).

11.3 Task 1: Contamination delineation

This task is for identifying the extent of contaminated fill/soils at the site including fill/soils beneath the current buildings/pavements. The procedures include:

- Site walkover post demolition to assess for additional areas of potential contamination requiring assessment;
- Additional subsurface investigation of the fill/soils (including soils/fill beneath current buildings/pavements post demolition) and testing of fill/soil materials to assess the extent of contamination requiring remediation as described in Section 8
- Analysis of the results to confirm in-situ waste classification of materials requiring remediation and off-site disposal to a licensed landfill; and
- Preparation of an investigation report with a refined remediation area (if possible) based on the results of the additional investigation;
- Update of this RAP (if required) and regulatory approval prior to commencement of remediation.

11.4 Task 2: Excavation and Off-site disposal of contaminated soil

This task is for the excavation / stripping of all identified contaminated fill / soils across the site and appropriate disposal off-site to a licensed landfill to ensue source removal has been achieved and the site is suitable for the proposed residential land use. Based on our current findings and as outlined in Section 9 this will require removal all fill (and localised areas of natural soil impacted by lead) such that only natural non-impacted soils remain at the surface. This remediation approach will, negate the requirements for capping. The procedures include:

- Client/remediation contractor to obtain all necessary approvals and notifications to allow commencement of the works, including Council approvals. The contractor should hold the relevant licences/approvals;
- Site inception meeting between environmental consultant, the remediation contractor, and the site owner to discuss remediation methodologies and responsibilities, prior to commencement. During remediation activities, it is recommended that the contractor/site manager inform nearby occupants of the proposed remediation activities and provide contact details of the site manager (including after-hours contacts);
- It is the remediation contractor's responsibility to devise a SWMS or construction environmental management plan (CEMP), or other equivalent document incorporating health and safety aspects of the proposed remedial works. See site management plan (Appendix H) for more details regarding site work health and safety plans;
- Environmental consultant and remediation contractor to conduct an initial inspection to identify remediation area / extent based on findings from Task 1;
- Excavation/stripping of the fill/contaminated soils by the remediation contractor based on visual observations by the environmental consultant (full time inspection/supervision) to ensure that underlying soils comprise natural soils only with no visual observations of contamination and lead impacted soils have been chased out to the nearest previously validated test location;
- Validation of the impacted fill/ contaminated soils (environmental consultant) including sampling and testing of the stripped surface as outlined in Section 13;
- Stockpiling of excavated fill/soil for waste classification (where required) prior to off-site disposal;
- Inspection and confirmation of the waste classification by the environmental consultant prior to disposal of stockpiled fill;
- Loading, transport, and disposal of contaminated materials to a licensed facility including the use of the NSW EPA Integrated Waste Tracking Solution (IWTS) tracking records for all asbestos impacted fill disposed off-site. See site management plan (Appendix H) for more details regarding loading, transport and disposal;
- Survey by registered surveyor to confirm site levels and lateral extent of areas stripped;
- Where validation test results indicate residual impacts remain, additional stripping and validation as above would be required until validation results meet the remediation acceptance criteria (RAC);

- If excavations extend below the groundwater table and hydrocarbon sheens or free phase hydrocarbons are identified, absorbent booms/pads should be utilised to remove the bulk of free phase impacts and the requirement for localised pump and treatment remedial measures assessed. If localised dewatering is required to facilitate the remediation works, the remediation contractor should implement appropriate techniques (e.g. sheet pile installation, staged excavation etc), to minimise the volume of groundwater extraction required. Extracted groundwater should be disposed in accordance with regulatory and statutory requirements/approvals;
- Inspection and analysis by the environmental consultant of all fill materials proposed to be imported to site to re-instate or raise site levels in order to confirm concentration are within RAC and are classified as VENM/ENM or an appropriate resource recover order as required (i.e. where a certificate from the supplier is not available).
- Where required, place approved “clean” materials (i.e. from on-site or imported material) in areas where fill/contaminated soils have been removed for remediation, with due regard to geotechnical considerations and compaction requirements;
- Record source and destination of excavated on-site materials and imported materials on the Materials Management Plan (MMP);

Consideration must be given to site boundaries, infrastructure and mature trees proposed to be retained. The stability of the structures and adjacent features must be maintained at all times. If the field assessment or validation data indicates that contamination in the soil extends beyond a point where stability may be threatened, advice should be sought from a qualified geotechnical / structural engineer or qualified arborist (in relation to trees) before any further excavation is undertaken in this direction. Temporary retaining structures may be recommended, however, in any event, excavation will not progress beyond the site boundary or within a reasonable proximity to existing structural elements or mature trees. Validation samples will be taken at the limit of excavation notwithstanding that there may be residual contamination present.

12. Assessment criteria

12.1 Remediation acceptance criteria

The overarching remediation acceptance criteria (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, 2024) protective of human health and ecology.

The following table provides a summary of the RAC for the currently identified soil contaminants requiring remediation.

Table 3: Remediation acceptance criteria

Item	Remediation acceptance criteria
Lead	300 mg /kg[1]
Asbestos containing materials (ACM)	0.01%[2]
Friable asbestos (FA) / asbestos fines (AF)	0.001%[2]
ACM, FA and AF	No visible asbestos for surface soil (i.e. top 10 cm) [2]

Notes to table:
[1] NEPC HIL A for residential land use (NEPC, 2013)
[2] NEPC HSL A for residential land use (NEPC, 2013)

12.2 Site assessment criteria

Additional area(s) of contamination encountered beyond those identified, during the course of the remediation and site redevelopment will be subject to the contingency plan or unexpected find protocol (Appendix I) and assessed using the SAC in Appendix F. The SAC are the same as the Tier 1 SAC adopted for (Douglas, 2024). 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 F.

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 garden / accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry)) land use scenario. The derivation of the SAC is included in Appendix F and the adopted SAC are listed in the summary analytical results tables 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) and site management plan, Appendix H.

13. Validation plan

13.1 Data quality objectives

The data quality objectives (DQO) for the validation plan are included in Appendix G.

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 an accredited surveyor comprising:
  - Survey of the extent and levels of the base of the excavations.
- Laboratory analysis of validation samples at a NATA accredited laboratory for:
  - The CoPC relevant to the remediation area;
  - Quality control (QC) samples;
- Comparison by the environmental consultant of the laboratory results with the SAC and/or RAC as appropriate; 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 (as appropriate for the remediation) must be removed prior to validation sampling.

13.4 Validation sampling

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 5 m to 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 10 m (where in fill) to 20 m (where in natural) 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 filling.

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 SAC (Appendix F) or RAC (as required), as per the DQO (Appendix G). 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 the impacted material has been fully chased out.

In the event that contamination extends beyond site boundaries or in areas that can't be practically chased out, 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.

13.5 Decomissioning groundwater monitoring wells

Decommissioning of existing groundwater monitoring wells is required to minimise the potential for preferential hazardous ground gas (HGG) and soil vapour migration from underlying formations to areas of development and to minimise cross-contamination of groundwater during development. While assessment at the site has indicated there is a low potential for HGG at the site, it is a requirement that groundwater wells are appropriately decommissioned (grouted) to minimise impacts of potential future gas migration. Grouting of monitoring wells should be conducted with reference to Minimum Construction Requirements for Water Bores in Australia (NUDLC, 2020).

The following should be considered when grouting existing boreholes:

- Grouting materials should comprise cement grout, cement bentonite grout or concrete;
- All boreholes must be sealed by pumping the cement mixture from either the base of the hole or the bottom of the previously cemented section of the hole ((e.g. via tremie from the base of the hole);
- All boreholes should be depth tested between all grouting and plug operations to determine if the level of the grout in the borehole is higher than shown in the calculations. All depth testing for this purpose shall be recorded;

Records shall be kept as follows:

- The method used to seal the hole;
- Volumes and types of materials used;
- Information on the drillhole such as depth, diameter and casing string(s) left in the hole;
- Any loss of cement mixture due to aquifers or permeable strata shall also be recorded and the method used to overcome these problems;
- Depths of plugs used to seal holes from permeable strata/workings (where relevant);
- A subsurface log of the bore decommissioning details;

Regardless of the decommissioning method used, a concrete or grout surface seal to a minimum depth of 5 m below the lowest bulk excavation level shall be installed in all decommissioned bores and/or holes.

Grouting of a borehole will be validated when:

- Records of grouting have been produced, indicating that the borehole has been backfilled, including appropriate plug installation and grouting above actual or potential more permeable strata;
- When grouting records indicate the volume of grout installed in the borehole to be approximately equal to (or more than) then borehole volume, or the equivalent volume minus any areas of bridging/plugging where required;
- Grout has observed at the surface of the backfilled borehole, subsequent to installation of sufficient volume of grout;
- The location of grouted boreholes are surveyed and checked against previous borehole location records.

14. Waste disposal

Disposal of waste must be to an appropriately licensed waste facility, as per *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).

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.

In addition, a record of the source location, type, quantity and final destination of excavated materials from the site should be maintained on the Materials Movement Plan (MMP) for the site. Requirements of the MMP and general soil management are outlined in Appendix H.

15. Imported material

Any soil, aggregate etc imported for the remediation works must have contaminant concentrations that meet the SAC (Appendix F). 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
- Have 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 resource recovery order (RRO) may also be accepted, provided the material can be used on site in accordance with the corresponding resource recovery exemption (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 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 imported recycled aggregates must be sampled at a frequency of sampling of one sample per 25 m^3, with a minimum of three samples per load. Recycled aggregate 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.

16. Quality assurance and quality control

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

- 5% sample intra-laboratory analysis, analysed for the same suite as primary sample;
- 5% sample inter-laboratory analysis, analysed for the same suite as primary sample;
- Rinsate samples (where re-useable sampling equipment is used), tested for a suite of analytes tested 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 quality assurance / quality control (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); and
- Field and laboratory duplicate, and replicate samples will have a precision average of +/- 30% relative percentage difference (RPD);
- 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).

17. Management and responsibilities

17.1 Site management plan

A general site management plan (SMP) for the operational phase of site remediation is included in Appendix H. The SMP 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).

17.2 Site responsibilities

The SMP (Appendix H) 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.

17.3 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 I.

18. Validation reporting

18.1 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 contractor, 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 post excavation and validation of contaminated fill / soil removal (remediation contractor);
- Airborne asbestos monitoring records (for asbestos works undertaken) (remediation contractor); and
- Interim / final visual and sampling clearances for any asbestos related works (remediation contractor).

18.2 Reporting

A validation assessment report will be prepared by the environmental consultant with reference to NSW EPA Guidelines for Consultants Reporting on Contaminated Land (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).

19. Conclusions

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

20. 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.

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WA DER. (2021). *Guidelines for the assessment, remediation and management of asbestos contaminated sites*. WA Department of Environment Regulation.

21. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for the Proposed Residential Development at 139 Teralba and 190 Brunker Roads, Adamstown NSW with reference to Douglas' proposal 225230.00.P.002.Rev0 dated 20 May 2024 and acceptance received from MODE Design Corp Pty Ltd on behalf of NSW Land and Housing Corporation dated 5 June 2024. The work was carried out under Douglas' Engagement Terms . This report is provided for the exclusive use of MODE Design Corp Pty Ltd on behalf of NSW Land and Housing Corporation 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.

Asbestos has been detected by observation and by laboratory analysis, either on the surface of the site, or in fill materials at the test locations sampled and analysed. Additionally, building demolition materials, such as concrete, brick, tile was located in below-ground fill and these are considered as indicative of the possible presence of additional hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling (i.e. beneath existing building). It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.