McConnell Dowell

Remedial Action Plan

Kamay Ferry Wharves, Kurnell and La Perouse NSW

Purpose:

To provide a remedial action plan in consideration of the known and potential contamination at the Kamay Ferry Wharves Project at Kurnell and La Perouse, NSW (the site) to render the site suitable for the proposed development

Prepared for:

McConnell Dowell

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1. INTRODUCTION

McConnell Dowell (MCD, the client) engaged EDP Consultants Pty Ltd (EDP) to prepare a Remedial Action Plan (RAP) to manage the risks associated with asbestos contamination identified within nominated areas of the Kamay Ferry Wharves Project at Kurnell and La Perouse NSW (the Project), as shown in **Figure 1** in **Appendix A**.

This RAP was prepared based on the existing site information provided by the Client and information available in the project's Targeted Site Investigation (TSI) undertaken by Environmental Resources Management Australia Pty Ltd (ERM), as detailed in ERM report 'Kamay Wharf Project - Targeted Site Investigation', Project No.: 0564417, dated 10 June 2021 (ERM 2021).

For the purpose of this RAP, the remedial extent is defined as two excavation footprints as part of the Project within Kurnell and La Perouse, as shown in **Figures 2 and 3** in **Appendix A**. The two excavation footprints will be referred to as the 'Kurnell footprint' and 'La Perouse footprint' or collectively as 'the site'.

2. BACKGROUND

2.1 Project Appreciation

EDP understands MCD has been engaged by Transport for New South Whales (TfNSW) to complete the construction of the Kamay Ferry Wharves Project. The project will involve the construction of two new wharves measuring approximately 180 m and 230 m in length at La Perouse and Kurnell respectively. The wharves are designed to support small commercial and recreational vessels and ferries, to enable the operation of a public ferry service between Kurnell and La Perouse.

Exposure of soils during the Project will occur during vegetation clearing and earthworks for utilities, with the approximate excavation footprint shown in **Figures 2 and 3** in **Appendix A**.

2.2 Previous Investigations

2.2.1 ERM, Preliminary Site Investigation – La Perouse

ERM was engaged by Arup Australia Pty Ltd (Arup) to undertake a Preliminary Site Investigation (PSI) of the Kamay Ferry Wharves at La Perouse (Project Area). The report is detailed in 'Kamay Ferry Wharves, Preliminary Site Investigation – La Perouse Site', Project no. 0564417_PSI_LaPerouse_Rev2, dated 2 December 2020 (ERM 2020a).

The PSI aimed to refine the understanding of the Project Area and aid in assessing the potential constraints associated with site contamination that may require management during the project. To achieve this objective, ERM completed a review of available site information including NSW EPA and other relevant government data bases, as well as completing a detailed site inspection.

Based on the outcomes of the PSI, ERM considered that a potential risk to human and ecological receptors was present at the site due to the potentially complete pollutant linkages identified. These linkages were associated with uncontrolled fill materials, potential use of hazardous materials onsite, historical site and surrounding land uses including former Defence activities, sand mining etc and potential unexploded ordnance (UXO).

ERM concluded that based on the results of the PSI, an intrusive investigation of soil, sediment, surface water and groundwater should be undertaken to provide greater certainty on the contamination status of the Project Area.

2.2.2 ERM, Preliminary Site Investigation – Kurnell

ERM was engaged by Arup to undertake a PSI of the Kamay Ferry Wharves at Kurnell (Project Area). The report is detailed in 'Kamay Ferry Wharves, Preliminary Site Investigation – Kurnell Site', Project no. 0564417_PSI_Rev3, dated 2 December 2020 (ERM 2020b).

The PSI aimed to refine the understanding of the Project Area and aid in assessing the potential constraints associated with site contamination that may require management during the project. To achieve this objective, ERM completed a

review of available site information including NSW EPA and relevant government data bases, as well as completing a detailed site inspection.

Based on the outcomes of the PSI, ERM considered that a potential risk to human and ecological receptors is present at the site due to the potentially complete pollutant linkages identified. These linkages were associated with uncontrolled fill materials, historical site and surrounding uses including the adjacent Caltex Kurnell Refinery which is regulated by the NSW EPA and potential impacted surface materials as a result of illegal dumping.

ERM concluded that based on the results of the PSI, an intrusive investigation of soil, sediment, surface water and groundwater should be undertaken to provide greater certainty on the contamination status of the Project Area.

2.2.3 ERM, Kamay Wharf Project – Targeted Site Investigation

ERM was engaged by Arup to undertake a Targeted Site Investigation (TSI) of the Project, located in Kurnell and La Perouse NSW (the site), titled 'Kamay Ferry Wharves, Targeted Site', Project no. 0564417_Kamay_Final 03, dated 11 June 2021 (ERM 2021).

Based on the existing PSI for the site (ERM 2020a and 2020b), ERM concluded that further assessment should be undertaken to provide greater certainty on the potential constraints associated with contamination at the site. An intrusive investigation of soil, sediment, surface water and groundwater was recommended to accurately assess the contamination status of the site.

As such, ERM undertook a TSI involving the excavation of boreholes within offshore locations and test pits within onshore locations at both the La Perouse and Kurnell sites. ERM noted that no groundwater investigation was undertaken during the TSI due to time constraints.

The TSI concluded the following:

- Laboratory analysis of the samples returned reported concentrations of contaminants of potential concern (CoPCs), namely TRH, BTEX, Metals, Phenols, PAH, MAH, OCP, OPP, sVOCs, VOCs, PFAS, triazines, Mono/tributyltin (MBT/TBT[1]) less than the adopted screening criteria except for nickel in one sample collected from the sediments. However, the nickel concentration was considered to be representative of background concentrations;
- Laboratory analysis of sediment samples returned MBT concentrations ranging between 0.75 mg/kg to 3.8 mg/kg. ERM noted that despite the absence of screening criteria for MBT, consideration may be required for waste classification / disposal for dredging purposes;
- Fill materials encountered within the onshore test pits at Kurnell and La Perouse were identified to contain asbestos-containing material (ACM) at several locations;
- No assessment for UXO was undertaken as part of the TSI.

ERM recommended the following works be undertaken prior to the commencement of construction works:

- Should groundwater be encountered during construction works, a groundwater assessment should be completed;
- Additional sampling and analysis of soils, sediments and groundwater (if required) should be undertaken prior to offsite disposal;
- A Construction Environmental Management Plan (CEMP), Asbestos Management Plan (AMP) or Site Management Plan (SMP) will need to be prepared for the site.

2.2.4 Senversa – Site Audit Report

Based on the afore mentioned assessment works, Senversa prepared a Site Audit Report (SAR) for the project titled 'Site Audit Report – Kamay Wharf, Captain Cook Drive, Kurnell and Anzac Parade, La Perouse Audit Number: MP186', Project no. S19956_006_SAR_SectionB_230607, dated 07 July 2023 (Senversa 2023).

[1] Heavy metals - Arsenic, chromium, cadmium, copper, lead, nickel, zinc, and mercury; TRH - Total recoverable hydrocarbons; BTEXN - Benzene, toluene, ethylbenzene, and xylenes; PAHs - Polycyclic aromatic hydrocarbons; OCP/OPP - Organochlorine, organophosphate pesticides; PCBs - Polychlorinated Biphenyls; and ACM- Asbestos-containing material.

The audit was completed in order to provide an independent review of the nature and extent of contamination at the site and the nature and extent of any management of actual or potential contamination at the site. For the purpose of this RAP, EDP will only reference the evaluation of soil analytical results section of the SAR.

Senversa reviewed the soil analytical results from La Perouse and Kurnell against the human health and ecological screening criteria. It was noted that metals were detected in the fill and natural soil profiles with reported concentrations in exceedance of the ecological criteria. However, given that conservative ecological criteria were adopted, the metal concentrations were considered unlikely to pose an unacceptable risk to ecology. TRH and PAHs were also reported in fill soils however were considered to be associated with road base from a historical road. It was stated that TRH and PAHs are unlikely to indicate widespread impacts. Other CoPCs such as BTEX, phenols, OCPs, OPPs, sVOCs and VOCs were note reported above the detection limits.

Senversa noted that the soil analytical results are consistent with the site history and that the nature and extent of contamination within the soil at the site has been adequately characterised. It was concluded that the risk of contaminants, other than asbestos, to human health and the environment associated with construction and operation of Kamay Wharves is low. Remediation of asbestos is required with a recommendation that a RAP be prepared for the site and reviewed by an EPA-accredited site auditor.

3. RAP OBJECTIVES AND SCOPE

This RAP was prepared with the objective of detailing remediation and validation methodologies for asbestos contaminated soils within the site, in order to render the site suitable for the proposed future use as a public recreation area with an active ferry service. In accordance with the requirements of MCoA E65, this RAP has been prepared in consultation with and reviewed by a Certified Environmental Practitioner, Site Contamination Specialist, experienced in the assessment and remediation of asbestos in soils. Additionally, this RAP was prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the Contaminated Land Management Act 1997 and includes measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use when the RAP is implemented.

To meet the objectives, the scope of this RAP is to:

- Document the procedures and standards to be followed in order to manage any risk posed by the asbestos soil contamination identified at the site;
- Outline the remedial actions required to mitigate risks posed by known contamination to current and future site users, in consideration of the future recreational/commercial land use;
- Establish remediation acceptance criteria (RAC) that are appropriate for the intended ongoing use;
- Detail an appropriate waste management procedure for spoil materials generated as part of the proposed development (if required);
- Detail a validation strategy throughout and/or at the conclusion of the remedial works to validate the remedial works and comment on the suitability of the site for the ongoing use; and
- Outline a contingency plan to address issues which may arise during the preferred remedial scope.

Senversa 2023 provided key elements for the RAP in the site's SAR. **Table 1** presents these requirements, as extracted from Senversa 2023.

Table 1: Key Elements RAP - SAR

RAP Element	Details	Report Section
Remediation Required	Asbestos-containing material (ACM) in soil requires remediation. It is understood through discussions that further asbestos quantification assessment is not proposed and that the likely options are either excavation, validation and off-site disposal or encapsulation with a marker layer/suitable capping material under a long-term environmental management plan. The auditor considers that remediation of asbestos through these options is common practice and could be achieved.	**Section 9**

RAP Element	Details	Report Section
	The RAP must be reviewed by the Site Auditor prior to implementation. Further comment and consideration will be given following review of the RAP.	
Acid Sulphate Soil and Potential Acid Sulphate Soil	The Remediation Action Plan should consider ASS/PASS where likely to be encountered and disturbed during any proposed remedial works. The RAP must confirm the proposed extent of remedial works likely to intersect PASS/ASS, the nature and extent of testing required to confirm PASS/ASS prior to excavations, confirmation of the likely need for treatment and re-use or off-site disposal and ensure an Environmental Work Method Statement is prepared.	**Appendix C** *(extracted from the site's SWCMP)*
Off-Site Disposal	A waste classification report should be prepared and be provided to the auditor prior to implementation of the RAP, inclusive of an updated waste disposal tracking matrix. On completion of the works, all waste disposal documentation for material excavated from the audit area must be collated, reported on in an auditable format by the environmental consultant and provided to the auditor	**Section 9.2.4**
Unexpected Finds Protocol	An unexpected finds protocol (UFP) should be included in the RAP inclusive of a detailed flow chart and list roles and responsibilities of all parties involved. On completion of the works, the register should be provided to the auditor for review. Any additional RAP's prepared in response to unexpected finds would require auditor review.	**Section 16.8**
Imported Material	The RAP should confirm that imported material must either be VENM, ENM or be classified under a Resource Recovery Exemption. The density of testing would need to be commensurate with the documentation provided and the consistency of the results. Visual inspection post arrival on site is required.	**Section 12.1**
Environmental Safeguards	Environmental safeguards should be outlined specifically addressing the nature of the asbestos remedial works and disturbance of acid sulfate soils. Where additional environmental safeguards are required in response to unexpected finds of contamination, these should be provided to the auditor.	**Sections 15 and 16**

4. REMEDIAL EXTENT

Following a project meeting held between TfNSW, MCD, Senversa and EDP on 28 July 2023, the following remedial extents have been determined for the Kurnell and La Perouse sites.

4.1 Kurnell

Asbestos has been identified in one test pit location in the TSI within the vicinity of the planned trench excavation at the Kurnell site. Other test pits along or in the vicinity (within 10m) of the trench have not identified asbestos, however it should be noted that asbestos was identified in two locations south of the proposed trench. The nature and extent of asbestos contamination remains unknown, as such the true asbestos remedial extent remains unknown. The approximate excavation footprint and remedial extent is proposed to extend to depth of natural material, as per the areas depicted in **Appendix A - Figure 3**.

4.2 La Perouse

Asbestos has been identified in several test pits in the TSI and during archaeological heritage surveys within the planned excavation areas. Given these ACM findings, the remediation extent for La Perouse site is considered to be the planned excavation footprint. However, this RAP also considers there is opportunity for the remedial extent to be further refined should additional in-situ assessment be completed. The approximate excavation footprint and remedial extent is proposed to extend to depth of natural material, as per the areas depicted in **Appendix A – Figure 2**.

4.3 Supplementary Investigations

Further intrusive investigation may be undertaken to characterise the nature and extent of asbestos contamination within the planned excavation at both sites to further inform the asbestos remedial extent. If intrusive investigation is undertaken, the following investigation requirements should be met:

- The investigations should involve the advancement of investigations locations across the proposed excavation footprint at densities generally compliant with the NSW EPA Sampling Design Part 1 – Implementation for parcels of land, and approximately 30 m intervals where linear excavations.
- The investigations should target the fill material to the planned excavation depths of excavation; (up to 0.6 metres below ground level (mbgl) at Kurnell, and up to 1.0 m in La Perouse).
- Nominally, two samples should be collected from each test pit for analysis of TRH, BTEX, PAH, Metals, and asbestos (AS4964-2004) and asbestos in-field screening in accordance with the NEPM to determine w/w% asbestos concentrations. Half the collected samples should be analysed for PFAS (La Perouse only), OCP, OPP and PCBs

5. TECHNICAL FRAMEWORK

The RAP has been developed in accordance with the following legislation, industry standards, codes of practice and guidance documents, other reference documents are stated throughout this document:

- *NSW Work Health and Safety Act, 2011;*
- *NSW Work Health and Safety Regulation, 2017;*
- *Contaminated Land Management (CLM) Act, 1997*;
- *CLM Amendment Act, 2008*;
- *Protection of the Environment Operations (POEO) Act, 1997*;
- *POEO Regulation (Waste), 2014*;
- National Environment Protection Council (NEPC) Act, 1994;
- NEPC, *National Environment Protection (Assessment of Site Contamination) Measure, 1999 (Amended April 2013)* (ASC NEPM 2013);
- Department of Agriculture and Water Resources National Strategy for the Management of Coastal Acid Sulfate Soils 2000;
- NSW EPA *State Environmental Planning Policy (Resilience and Hazards), 2021*
- NSW EPA *Waste Classification Guidelines: Part 1 – Classifying Waste, 2014* (NSW Waste Classification Guidelines);
- NSW EPA *Guidelines on the Duty to Report Contamination Under the CLM Act 1997, 2015*;
- NSW EPA *Guidelines for the NSW Site Auditor Scheme (Third Edition), 2017* (NSW Guidelines for the NSW Site Auditor Scheme);
- NSW EPA *Contaminated Land Guidelines, Consultants Reporting on Contaminated Land 2020*;
- NSW EPA *Contaminated Land Guidelines, Sampling Design Guidelines Parts 1 and 2, 2022*; and
- NSW EPA *Draft Position Statement: Management of Asbestos-Contaminated Sites 2022.*

6. SITE SETTING

6.1 Site Identification

Project and site specific (where applicable) identification details are summarised in **Table 2** and the location of the site is shown on **Figure 1**, provided in **Appendix A**.

Table 2: Project Identification Details

Project Identification:	
Kurnell Site	
Address:	Captain Cook Drive, Kurnell NSW 2231
Site Legal Identification:	No lot or deposited plans available for the site portion located in Kamay Botany Bay National Park
Local Government Authority:	Sutherland Shire Council
Site Description:	The site is currently used as a public recreation area (open grass parkland, beach, and vegetated bushland), open water (Botany Bay) and public roadways.
Total Land Area:	Approximately 28.5 hectares (ha)
La Perouse Site	
Address:	Anzac Parade, La Perouse NSW 2036
Site Legal Identification:	Part of Lot 1 DP915424, part of Lot 5113 DP752015and part of 3/DP1165618
Local Government Authority:	Randwick City Council
Site Description:	The site is currently occupied as a public recreation area as undeveloped land (open grass parkland), open water (Frenchmans Bay) and public roadways.
Total Land Area:	Approximately 11.5 ha

6.2 Surrounding Land Use

6.2.1 Kurnell Site

The area in the immediate vicinity of the site predominantly comprised residential or privately owned areas and undeveloped land within the suburb of Calderwood NSW. The site was bound to the:

- **North** by Botany Bay;
- **East** by Undeveloped recreational bushland then Botany Bay;
- **South** by low density residential developments followed by the former Kurnell Refinery; and
- **West** by low density residential developments followed by undeveloped bushland / wetlands then Quibray Bay.

6.2.2 La Perouse Site

The area in the immediate vicinity of the site predominantly comprised residential or privately owned areas and undeveloped land within the suburb of Calderwood NSW. The site was bound to the:

- **North** by Frenchmans Bay, low density residential developments and recreational parkland;
- **East** by undeveloped recreational bushland then Botany Bay;
- **South** by Botany Bay; and
- **West** by Botany Bay followed by industrial land comprising fuel / chemical storage.

6.3 Site History

The following site history review has been paraphrased from previous investigations (ERM 2020a and 2020b).

The Kurnell site is known to be used for recreational purposes, with Kamay Botany national park and Botany Bay surrounding the site. Historical aerial imagery and available database information gathering indicates the site has remained undeveloped since 1980, with surrounding areas consisting of residential landuses, Botany Bay and Kamay Botany national park. A small area of development can be noted prior, in 1955, although details were unable to be determined.

The La Perouse site and surrounding areas are known to be used as undeveloped recreational land (open grass parkland), open water (Frenchmans Bay) and public roadways (Anzac Parade). A brief review of historical aerial imagery indicates the site was comprised of undeveloped land with rock outcroppings. In 1943, buildings were constructed in the central

portion of the site and are likely to be associated with Defence activities. Overtime, various building and structures were demolished until 1975. Anzac Parade appears in its current alignment in 1965. The monument located within the western portion of the site is visible in 1971.

7. ENVIRONMENTAL SETTING

The following subsection have been adapted from previous investigations (ERM 2020a and 2020b):

Table 3: Environmental Setting

Item	Details
Kurnell	
Topography	The topography of the site at Kurnell is generally flat with a gentle slope towards the north and north-east in the direction of Botany Bay.
Surface and Groundwater	Surface water is anticipated to flow into stormwater infrastructure within Captain Cook Drive, infiltrate exposed surfaces of the site, or flow into the adjacent Botany Bay.
Regional Geology	Geology mapping provided by NSW Planning and Environment – resources and energy indicates the Project Area is underlain by an unnamed Quaternary formation comprising coarse quartz sands, varying amounts of shell fragments and clean to muddy, shelly, mostly marine sand overlying the Triassic Hawksbury Sandstone Formation comprising medium to coarse-grained quartz sandstone with minor shale and laminite lenses.
Acid Sulfate Soils	The western portion of the site was comprised of class 1, class 3 and class 5 acid sulfate soils (ASS) indicating there is a high potential for ASS occurring within subtidal marine sediments.
La Perouse	
Topography	The topography of the site at La Perouse is generally flat with a gentle slope towards the south and south-east in the direction of Frenchmans Bay. The central portion of the site is located approximately at 15 m AHD and slopes to the south, east and west in the direction of Frenchmans Bay.
Surface and Groundwater	Surface water from the site is anticipated to discharge to stormwater infrastructure within Anzac Parade, flow to the adjacent Botany Bay or infiltrate unsealed surfaces within the site.
Regional Geology	A review of NSW Resources and Energy (2015), indicates that the site is located within Mesozoic formation comprising medium to coarse grained quartz and sandstone, very minor shale and laminate lenses and an unnamed Quaternary formation comprising coarse quarts sand and shell fragment. Soils within the site are described as shallow discontinuous sand and yellow earths on crests and insides of benches. Shallow siliceous sands on leading edges, shallow to deep leached sands, grey sands and gleyed podzolic soils in poorly drained areas ad localised yellow podzolic soils associated with shale lenses.
Acid Sulfate Soils	The western portion of the site was comprised of class 4 and class 5 ASS indicating there is a potential for ASS occurring within subtidal marine sediments.

8. UPDATED CONCEPTUAL SITE MODEL

EDP has reviewed the background information and previous site investigations, in summarising the ERM TSI revised conceptual site model (CSM), it was determined the likely primary sources of contamination at the site are uncontrolled historical filling, historical onsite and surrounding land uses and hazardous building materials and unexploded ordnances for both sites.

Moderate or moderate to high-risk source, pathway, receptor potential linkages were identified for a range of contaminants in soil, surface water and sediment to current and future human or ecological receptors, which can be reviewed in detail in the ERM TSI.

In the SAR, site auditor has reviewed the TSI report and associated risk assessment of contaminants to marine ecosystems conducted by Environmental Risk Sciences (EnRisks) titled '*Response to RFI – Kamay Ferry Wharves' dated 25 April 2023 by Environmental Risk Sciences Pty ltd (EnRisk) (Assessment of Protected Matters)*'.

With consideration to the available reports and data, the Auditors Opinion (paraphrased) is as follows:

The auditor concludes that the risk to marine ecosystems, including the listed species, associated with the construction and operation of the ferry wharf is low.

Based on assessment of results against relevant guidelines and consideration of the overall investigation, it is the auditor's opinion that the contamination risk (other than asbestos) to human health and the environment associated with construction and operation of Kamay Wharves is low.

As a source pathway receptor linkage is considered to still exist for asbestos, the refined CSM for the Kurnell and La Perouse sites is provided in **Table 4**. With regards to contamination status relating to asbestos, the TSI identified ACM in six test pits (four at La Perouse and three at Kurnell) at depths ranging between 0.15 and 0.5 metres below ground level (mbgl). Given the heterogeneous nature of the fill materials at the site, the ACM observations could not be isolated with confidence and as such:

- Further assessment was deemed to be required to characterise the nature and the extent of asbestos contamination identified within fill material to identify contaminated and potentially uncontaminated areas; and
- If no further assessment is undertaken, the fill material identified within the excavation footprint of the project in its entirety must be considered asbestos impacted.

Table 4: Updated CSM

Source	CoPC	Pathway	Receptor	Risk*
Uncontrolled Fill (Kurnell and La Perouse sites)	Asbestos (non-friable)	▪ Inhalation of contaminated dust / fibres. ▪ Transport of contaminants through mechanical transport	▪ Current and future site users; and ▪ Workers carrying out development, installation or maintenance works within the Project Area.	Moderate to High

Noted to Table: *Risk rating adopted from the TSI (ERM 2021)

9. REMEDIATION DESIGN

The goal of the remediation is to manage the known and widespread potential asbestos contamination in order to mitigate the unacceptable risk posed to human health and the environment and render the excavation footprint at the site suitable for the future development and use as a public recreation area.

9.1 Remediation Hierarchy

The preferred order of options for remediation and management is detailed in Volume 1 of the NEPM 2013. The NEPM *Assessment of Site Contamination Policy Framework (16)* states the that the preferred hierarchy of options for site clean-up and/or management is:

- **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.

If the above are not practicable, other remediation options include:

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

9.2 Review of Remedial Options

Several remediation options have been considered for the site. An assessment was made based on environmental impacts, time constraints, site logistics and cost. The possible remediation options considered were:

- Do Nothing;
- Monitored Natural Attenuation;

- On-Site Treatment;
- Excavation and Off-site Disposal; and
- On-Site Management.

9.2.1 Do Nothing

The "Do Nothing" approach involves leaving the contaminated soil materials in its current locations and either continue the development without concern for the remediation of contaminated soils or continue the existing use. Do nothing approach **is not considered to be appropriate** due to the requirement for excavation works and mechanical disturbance within areas of identified contamination, most notably asbestos.

9.2.2 Monitored Natural Attenuation

Natural attenuation is the degradation, immobilisation or destruction of hydrocarbons, or other potential contaminants, by natural processes. The natural attenuation process is controlled by the CoPC and the physical, chemical, biological and hydro geological properties of the site.

Natural attenuation is **not considered to be appropriate** as the contamination present within the soils at the site will not naturally degrade (asbestos).

9.2.3 On-Site Treatment

On-site treatment methods include both *in-situ* and *ex-situ* treatments of soils. Treatment may be physical, chemical, mechanical or biological. On-site treatments have the potential to be cheaper than off-site disposal alternatives. The main disadvantages of some on-site treatment are the time constraints, or the inability to treat the contaminants to an acceptable level.

On-site treatment is **not considered to be appropriate**, as some contaminants present at the site (specifically asbestos) cannot be easily or effectively treated.

9.2.4 Excavation and Off-site Disposal

This method includes the excavation of the fill material and the disposal off-site to an appropriately licensed landfill.

This approach has the advantage of removing the contaminated soils from the remediation area (to an extent practicable) and removing land use restrictions associated with contaminated soils. It also has the advantage of being relatively fast and may not further impact other areas of the site. The main disadvantage of excavation and disposal is the expense associated with off-site disposal of contaminated materials to a licensed landfill in addition to the limited space available in landfills. Additionally, mechanical disturbance of ACM may potentially mobilise asbestos fibres increasing the risk associated with asbestos via dust loading.

Excavation and off-site disposal **is considered appropriate** for the remediation of the site although the inherent disadvantages remain.

9.2.5 On-Site Management

On-site management of the known contamination would involve selective remediation across the remediation area to mitigate the risk posed to human health and long-term management of any remaining contamination.

On-site management would primarily involve the placing of a permeable surface marker layer (such as geo-fabric material) across the remediation area following excavation works, and then covering with soil layers or encapsulating the contaminated materials with hardstand, or other media. Excavated materials that are relocated on site would also need to be covered with soil layers or encapsulated with hardstand, or other media. The site would then require a site-specific Long-Term Environmental Management Plan (LTEMP) to prevent the exposure of the contamination to the users or future workers of the site.

The disadvantages of such a strategy would be the imposing of a LTEMP, associated notification obligations on the land title and ongoing management of the site for compliance with the LTEMP.

On-site management **is considered appropriate** as a remedial method for the site.

9.3 Preferred Remedial Strategy

Combined Excavation & Off-site Disposal and On-site Management:

Through discussion with MCD, it has been determined that the preferred remedial strategy will involve excavation and off-site disposal of the materials located within the excavation footprint. Should further contamination be identified within the site but outside the excavation footprint, on-site management will apply. On-site management will be carried out in accordance with the site's Asbestos Management Plan (AMP) extracted from the site's Soil and Water Contamination Management Plan (SWCMP), presented in **Appendix B**.

This approach allows flexibility in the handling of material as the implications of disposal quantities measured against on-site management which will trigger ongoing management responsibilities is yet to be finalised.

9.4 Rationale Behind the Selection of Remediation Strategy

The selection of an appropriate remediation strategy needs to be cognisant of the contaminants of concern being remediated, the extent of the remediation area and the ongoing land use as well as their behaviour (e.g. mobility, bioavailability, persistence) in the environment. Other considerations included the time required to achieve remediation, impacts of remediation such as ecological or aesthetic values, overall cost and future management effort.

The combined remedial option was selected based on the following:

- The immobile nature of the identified soil contamination (asbestos) at the site which are generally straightforward to dispose or encapsulate on-site;
- The limited opportunity to encapsulate contamination at the site;
- Impracticalities and costs associated with on-site remediation of asbestos contaminated soils; and
- Inappropriateness of other remedial methods.

10. COMPLIANCE WITH REGULATORY REQUIREMENTS

10.1 Environmental Planning and Assessment Act and Regulations

Remedial works at the site are not considered to present a designated development under Schedule 3 of the *Environmental Planning and Assessment Act 1979*. Furthermore, the program of rehabilitation works described in this RAP have been designed so that works shall not adversely affect the environment and will be an improvement to the environment. For these reasons the remediation works should not require the preparation of an Environmental Impact Statement (EIS), however EDP notes an EIS already exists for the site.

10.2 State Environmental Planning Policy (Resilience and Hazards)

State Environmental Planning Policy (Resilience and Hazards) - Remediation of Land under the *Environmental Planning and Assessment Act 1979* (applies to works involving remediation or management of contaminated land in NSW). The objective of this planning policy is to provide a state-wide planning approach to the remediation of contaminated land. In particular, the policy aims to promote the remediation of contaminated land for the purpose of reducing risk of harm to human health or any other aspect of the environment.

Remediation can be Category 1 work requiring consent of the relevant planning authority or Category 2 not requiring consent. Both Category 1 and Category 2 remediation require notification 30 days prior to the planned commencement of remediation to the consent authority. As this remediation work is considered ancillary to designated development which requires consent, under Section 4.12 of the Policy, this remediation program is also considered Category 1.

10.3 SafeWork NSW

Due to identification of non-friable asbestos within the fill materials at the site, it is the requirement that a SafeWork NSW asbestos removal notification be submitted, and all works are conducted in accordance with Class A or B asbestos removal conditions.

10.4 NSW Protection of the Environment Operations Act 1997

The objective of the *POEO Act 1997* is to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development and to increase opportunities or public involvement and participation in environmental protection. The *POEO Act 1997* prohibits the contamination of land through any means including the improper application of waste and prescribe the requirements for triggering which sites require an environmental protection license to operate. The objectives of the RAP align with the *POEO Act 1997* by focusing on an improved human and environmental amenity of the site and providing details of community consultation requirements.

11. ROLES AND RESPONSIBILITIES

For the purposes of the remedial work the roles and responsibilities are presented in **Table 5**.

Table 5: Roles and Responsibilities

Role	Reports to	Responsibilities
Site Owner (TfNSW)	Regulatory Authorities (as required)	Engage Principal Contractor. Liaises with regulatory and approval bodies (e.g. Council or NSW EPA) Provide funding for remedial works. Review documentation provided by the Principal Contractor. Review documentation provided by the Environmental Consultant.
Principal Contractor (MCD)	Council & Regulatory Authorities	Liaises with regulatory and approval bodies (e.g. Council or NSW EPA) Review the RAP and any other report developed by consultants. Ensure the RAP is implemented correctly. Engage an Environmental Consultant. Engage a Class B (non-friable) Licensed Asbestos Removal Contractor (LARC) to undertake asbestos remedial works and/or provide supervision to non-asbestos contractors during earthworks. Comply with all legislative requirements and the Environmental Consultant requirements for this project.
LARC/ Remediation Contractors (TBC)	Principal Contractor	Hold a NSW SafeWork Class B (non-friable) Asbestos Removal Licence. Develop and implement a Construction Environmental Management Plan (CEMP) for the works. Develop and implement an Asbestos Removal Control Plan (ARCP), incorporating a Safe Work Method Statement (SWMS) for the asbestos related earthworks in consultation with the Environmental Consultant and Principal Contractor representatives. Establish an asbestos work zone including installation of appropriate signage, exclusion zones and work areas. Arrange for the transport and dispose of waste in accordance with applicable state legislation, standards, guidelines, and waste classification.
Environmental Consultant (EDP Consultants)	Principal Contractor & Council	Hold a current NSW SafeWork LAA or be deemed competent and have appropriate qualifications and experience in asbestos identification and management in the context of conducting environmental site assessments. Hold NATA accreditation for airborne asbestos fibres monitoring and fibre counting. Ensure works are being undertaken in accordance with this RAP and current legislative requirements. Provide WHS and environmental consultancy to the Principal Contractor and Council. Provide asbestos fibre air monitoring and clearance certification.

Role	Reports to	Responsibilities
		Note: The Environmental Consultant has the right to stop the works if they are not being carried out in accordance with the contract, regulations and relevant codes of practices. The Environmental Consultant also has the right to request that a worker be removed from the site and be replaced after a serious safety breach, subsequent to discussion with the Principal Contractor and Council. Preparation of Site Remediation and Validation Report (SRVR). Preparation of LTEMP.

12. REMEDIATION ASSESSMENT CRITERIA

The remediation assessment criteria (RAC) used in NSW to evaluate soil analytical results are based on the NSW EPA Guidelines for the *NSW Site Auditor Scheme, 3rd Edition, 2017*, the NEPM 2013, the *NSW EPA Waste Classification Guidelines: Part 1 – Classifying Waste, 2014* and other relevant resource recovery orders. These combined guidelines present a range of human health and ecological based assessment and disposal criteria for the application to various land use scenarios in NSW and are detailed in the subsections below:

12.1 Imported Material

All soils imported onto the site must be characterised as either a quarried product, Virgin Excavated Natural Material (VENM) in accordance with the definition of VENM as stated in the *Protection of Environment Operations (POEO) Act 1997* or Excavated Natural Material (ENM) in accordance with the *NSW EPA Excavated Natural Material Order 2014* or another material compliant with NSW EPA approved resource recovery orders, which can be used at the site in accordance with the corresponding exemption.

Imported materials must be compliant with the below items:

- Quarried products must be accompanied by and an associated compliance certificate;
- Imported materials classified as ENM must be accompanied by a classification report developed by a reputable Environmental Consultant with compliant chemical testing in accordance with the NSW EPA ENM Order 2014 (ENM Order). Refer to Section 14.2.4 and 14.2.5 for minimum testing and inspection frequencies;
- Materials imported as VENM must at minimum include analysis for heavy metals, TRH, BTEX, PAH, OCP, OPPs, PCBs and asbestos. All concentrations of analytes must be non-detect unless proven to be naturally occurring or within background concentrations. Classification reports by the supplier will be reviewed by MCD and the validation consultant to ensure suitability;
- Other exempt material must be analysed in accordance with the appropriate resource recovery order. However, should recovered aggregate be imported to the site, materials must also be tested for heavy metals, TRH, BTEX, PAH and asbestos as asbestos fines (AF) and fibrous asbestos (FA) and compared to the RAC outlined in **Table 6**; and
- Analytical results of the imported materials must also demonstrate compliance with appropriate guidelines for public open space land use.

Refer to import material validation requirements in **Sections 14.2.3** and **14.2.4** for minimum testing and inspection frequencies. Furthermore, all materials imported must be suitable from an aesthetic consideration and therefore not contain glass (as a foreign material, crushed recycled glass complaint with appropriate exemption is permitted as imported material), metal or other sharp materials.

Table 6: Recycled Products Imported Material RAC

CoPC	Adopted RAC
NEPM 2013 Health Investigation Levels:	
Total PAHs	300 mg/kg
Carcinogenic PAHs (as BaP TEQ)	3 mg/kg
Arsenic	300 mg/kg

CoPC	Adopted RAC
Cadmium	90 mg/kg
Chromium VI	300 mg/kg
Copper	17,000 mg/kg
Lead	600 mg/kg
Mercury	80 mg/kg
Nickel	1,200 mg/kg
Zinc	30,000 mg/kg
NEPM 2013 Health Screening Levels (SAND soil type):	
Bonded ACM	Nil
Fibrous Asbestos (FA) and Asbestos Fines (AF)	Nil
All forms of asbestos	Nil
Benzene	360 mg/m3 (0 to <1 m)
Toluene	No limit
Xylene	No limit
Naphthalene	No limit
TRH C6-C10 (F1)	86,000 mg/m3
TRH C10-C16 (F2)	No limit
NEPM 2013 Management Limits:	
TRH (F1 - F4)	Management Limits for coarse/fine soil for residential/parkland and public open space Schedule B1, Table 1B(7) of NEPM 2013.

12.2 Disposed Material

Materials proposed for off-site disposal must be assessed in accordance with the *NSW EPA Waste Classification Guidelines* (EPA, 2014) and *NSW EPA Sampling Design Guidelines – Part 1 and 2, 2002* (EPA, 2022).

Sampling density will be implemented to ensure that wastes can be subject to comparison of the 95% UCL mean for the soil, in accordance with EPA, 2022. The 95% UCL mean demonstrates with 95% confidence that the average contaminant concentration of the soil represented by the data set is at or below the concentration stated.

Waste classification results should incorporate historical analytical results where appropriate.

Despite not being identified as a contaminant of concern in the CSM, to support off-site waste disposal and receiving facility acceptance, the typical analysis schedule for waste classifications at the site would include: heavy metals, TRH, BTEX, PAH, OCP/OPP, PCBs and asbestos (AS4964-2004). Reduced analysis schedules are permitted with appropriate discussion or rationale.

12.3 Excavations and Soil Re-use

Validation of on-site soils for re-use, or verification of asbestos concentration below the health screening levels (HSLs) within excavations for an "Public Open Space – C" land use (NEPM, 2013) within the project, is provided in **Table 7**. This re-use includes soils which are part of the wider project proposed to be re-used within the excavation footprint, not necessarily just sourced within the excavation footprint.

Table 7: On-site soil and reuse criteria

CoPC		Adopted RAC		
NEPM 2013 HSLs:	**In-situ / stockpiled soils**	**Excavation Walls**	**Excavation Base**	
Bonded ACM		0.02%	0.02%	Nil
Fibrous Asbestos (FA) and Asbestos Fines (AF)[1]		0.001%	0.001%	Nil

CoPC	Adopted RAC		
All forms of asbestos	No visible asbestos to surface 100 mm (when in-situ)	No visible asbestos in side walls	No visible asbestos on natural ground surface

1 *Assessment only required for AF/FA if a credible friable source is identified*

Additionally, excavated soils which are intended on being re-used on site made be visually assessed to confirm the absence of visual indicators of potential acid sulfate soils (PASS) or actual acid sulfate soils (AASS).

13. REMEDIATION METHODOLOGY

The objective of the remediation design is to ensure that as far as practicable, all materials known to be contaminated are disposed of offsite, or otherwise appropriately validated, to ensure the site is suitable for the proposed use as public open space land use.

At the time of this RAP the proposed methodology was complete excavation and disposal of fill soils within the excavation footprint. As such, all fill within the excavation plan is considered to be asbestos contaminated.

There is an option within this RAP to excavate only as far as the nearest validated 'clean' sample of asbestos, as per the results of the intrusive investigation detailed in **Section 4.1**. If this strategy is considered the preferred remedial method, results and refined contamination extents must be presented in an Addendum RAP.

13.1 Work Area Establishment

Prior to undertaking remedial actions, the following steps must be undertaken to ensure the appropriate establishment of the work area in accordance with an ARCP prepared for the works:

- The contaminated areas will be marked by the Environmental Consultant in preparation for the excavation works;
- Isolate the remediation work area with appropriate exclusion using barricading and appropriate signage;
- Establish dust suppression protocols/infrastructure (fine mist water spray) to ensure contaminated/potentially contaminated soils are maintained damp during all soil disturbance; and
- Environmental Consultant or LAA to conduct asbestos-fibre air monitoring in accordance with the NOHSC *Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition 2005 [NOHSC:3003(2005)]* during all soil disturbance works.

The Remediation Contractor who undertakes the remediation work must prepare a SWMS incorporating relevant sections of this RAP into a work methodology and CEMP prepared for the remediation. Asbestos works must be supervised by a minimum Class B LARC in accordance with the ARCP developed for the works.

13.2 Excavation & Offsite Disposal

It is understood that MCD intend to conduct minor excavation works for installation of services as part of the wider Kamay Ferry Wharves Project. Contaminated materials within areas proposed for excavation will be disposed offsite. To allow for this, the following methodology should be implemented:

- A minimum Class B LARC must be engaged to prepare an ARCP and conduct/oversee the earthworks in accordance with this RAP;
- A suitably qualified Environmental Consultant or an LAA must supervise and undertake continuous asbestos-fibre air monitoring (AAM) for the duration of the earthworks;
- Prior to excavation/earth moving, warning signs at the boundaries of the site (at least 10 m from the removal areas) must be erected. Signs must conform to *AS1319-1994 – Safety Signs for the Occupational Environment;*
- The LARC must barricade the area so that only workers wearing correct Personal Protective Equipment (PPE) and experienced in handling the material are allowed in the vicinity of the works. Minimum PPE requirements are detailed in the site's AMP;

- Commence excavation in the proposed excavation areas to the depth of natural, and to the planned project excavation lateral extent;
- Contaminated excavated materials must be either direct loaded into trucks (if in-situ waste classified) or to a within a designated stockpile area for waste classification assessment. Stockpile areas should be appropriately lined to prevent cross contamination and managed in accordance with relevant control in Section 15.
- Waste classification assessments (*in-situ* or *ex-situ*) must be conducted prior to material disposal and incorporate previous chemical data;
- Spoil materials are to be loaded into trucks under dust suppression procedures in accordance with Section 15 and transported to a licensed waste facility suitable for accepting the wastes;
- At the completion of excavation validation sampling may commence. Validation soil samples (10 L field sieve) will be collected from the excavation footprint at a density of 1 sample per 10 linear m (excavation walls) and 1 sample per 25 m^2. Detailed photographs of sidewalls and footprints should be taken to support field validations. Hand picking may be required along sidewalls to remove any residual asbestos prior to attempting validation sampling.
- Details of all materials removed from or encapsulated at the site must be provided to the validating Environmental Consultant for incorporation into the Site Remediation Validation Report (SRVR), to be prepared at the conclusion of the remedial and validation works. Information required to be recorded in waste tracking registers includes: date, time, truck registration, classification, estimated volume, NSW EPA Waste Locate records and tip dockets.

13.2.1 Excavated Material Tracking

Any materials stored and relocated onsite must be tracked using the following forms with the following information recorded:

- Material Excavation Form: A record of excavated materials including the date of excavation, material type/description, classification report reference (if available), excavated quantity, source location and intended destination;
- Stockpile Register: A record of stockpiled materials must include the date of stockpiling, material type/description, stockpiled quantity, classification report reference (if available), source location and intended end use (e.g. "for backfilling" or "for offsite disposal"). Stockpiled materials will be clearly labelled with the stockpile source information and a stockpile ID; and
- Material Placement Form A record of all materials backfilled on the site (if any) must include the date, material type, quantity backfilled and source location.

The forms must be implemented throughout the excavation works program and provided as a complete set to the validation consultant for incorporation into the site validation report.

13.3 Excavation Backfill

It is understood that MCD intend on backfilling excavations with site-won material which is compliant with the re-use criteria outlined in Section 12.3... Any surplus material will be disposed offsite based on the waste classification for the subject material.

Should additional material be required to backfill the excavations which cannot be derived form site-won material, the additional material must be appropriately classified VENM or ENM satisfying the requirements in **Section 12.1**.

14. VALIDATION PROCEDURES

14.1 Validation Assessment

A suitably qualified and experienced Environmental Consultant must undertake a validation assessment, with the outcomes presented in a SRVR in accordance with this RAP and relevant NSW EPA guidelines and AS4482.1.

The validation assessment should be conducted progressively throughout the remediation works. Sufficient validation must be conducted so that the SRVR will be able to conclude that the residual accessible soils present at the site will meet the RAC and NSW EPA standards, and that the remediation area is suitable for the future open space land use.

14.2 Validation Methodology

Throughout the remediation process, a number of critical hold points must be adhered to prior to progression of the remediation works. These hold points have been established in order to assure that the required remediation steps have been appropriately completed before additional works are conducted. The sign-off of these hold points will ensure the appropriate implementation of this RAP.

Critical hold points for the required remedial works are detailed in **Table 8**.

Table 8: Critical Hold Points

No.	Critical Hold Point:	To Be Completed Prior To:
1	Preparation of relevant safety documentation and establishment of remediation site boundaries, including appropriate signage.	Commencement of work
2	Engagement of a suitable qualified Remediation Contractor to undertake remediation works at the site.	Commencement of work
3	Site development plans/drawings to be finalised to determine the sections of the site to be disturbed/excavated and to what depth.	Excavation works
4	On-site identification and marking of excavation areas and extent of remediation.	Excavation works
5	Should surplus materials require overnight storage during the off-site disposal process, establish a designated stockpile area on a hardstand surface or on a HDPE plastic liner, or geofabric layer. Stockpiled materials to be covered with geofabric during works with appropriate stockpile controls implemented as per the CEMP and Section 15.	Excavation work / earthworks which would generate a stockpile
6	Waste classification assessment conducted by Environmental Consultant (where materials are to be disposed of off-site).	Off-site disposal of site-materials
7	Asbestos clearance inspection (1m by 1m) of sidewalls and base by validating Environmental Consultant/LAA following excavation.	Prior to backfill of excavations
8	Survey of excavation extents by registered surveyor.	Prior to backfill of excavations
9	Validation and approval of materials proposed to be imported onto the site and utilised as capping soils by Environmental Consultant.	Importation of capping soils
10	If materials are re used on site, a 1x1m walkover should be conducted across the excavation area to verify no residual asbestos is present on the surface.	Following backfill with re-used material

14.2.1 Verification of Excavations in Remedial Areas

The validation of excavation and remedial areas is required to confirm that all contaminated materials are effectively removed to the surface of underlying natural material. This validation must include:

- Visual assessment of excavated footprint and side walls to document the nature of materials remaining *in-situ* and that no ACM are observed on the surfaces of the excavation footprints; and
- Asbestos sample collection of walls and base of excavated areas at a rate of 1 sample per 10 linear m (walls) and 1 sample per 25 m^2 (base), must be undertaken by the Environmental Consultant for comparison against the RAC in **Section 12.3**.
- All field inspection and sampling must be compliant with the RAC in Section 12.3 with corresponding clearance certificate.

14.2.2 Intra-Site Transportation of Materials

The validation of intra-site transportation of material is required to confirm that movement of contaminated materials from the point of excavation to the point of containment, is not at risk of creating further contamination. This validation must include:

- Documentation of truckloads, to verify quantities excavated with quantities received at the containment area; and
- Documentation of truckload activities in accordance with excavation works to be provided to the validating consultant will be required.

14.2.3 Verification of VENM / ENM Imported Materials

The verification of imported materials is required to confirm that the materials meet the definition of VENM or ENM, and that they are suitable for the site, in consideration of the future and ongoing land use. Where a VENM or ENM certificate is provided to the validation consultant, the validation consultant must undertake a verification of the VENM or ENM report and that it has adequately assessed the classified material in accordance with the POEO Act or ENM Order, 2014. This verification must:

- Be conducted on a 'per source' basis.
- Verify the sampling regime is adequate to classify the material.
  - For ENM this must comply with the ENM order requirements.
  - For VENM, a minimum of three samples per source site. This will ideally be in as representative samples from controlled stockpiles or in-situ at the source site quarantined for use on the site.
- Assessment of environment, material description, photographs and analytical results against the definitions of ENM or VENM;
- A clear statement confirming the adequacy of the report for the classified material, or comment otherwise with additional gaps or testing which may be required. The validation consultant may be engaged to conduct the gap assessment or collect additional samples to assure themselves the material is suitable for import.
- Complete a visual assessment of the materials to verify the materials are consistent with supplied documentation and do not present indicators of contamination. Visual assessment will include the collection of photographs and written field notes.
- Incorporation of the validation results and site observations into the SRVR.

14.2.4 Validation of non - VENM / ENM Imported Materials

In the event that materials do not meet the definition of VENM or ENM that require importation onto site (e.g., recovered aggregate), approval and assessment must be undertaken of such materials due to the increased risk of asbestos and other contaminants not required to be tested under the relevant EPA Orders. The required assessment must be satisfactory in confirming site suitability to ensure materials meet the adopted RAC in **Table 5**.

The assessment must be designed on a case-by-case basis, based on the nature and potential risk posed by the materials. Commercial aggregate suppliers produce a variety of product types typically distinguished by the aggregate mix or sizing, these products are created at the commercial facility which receives raw aggregate materials from a multitude of source sites, which are then blended and crushed. Moreover, a commercial aggregate supplier may have multiple production/batch facilities across a city area which they distribute products from. This complexity makes it near impossible to validate 'the source' site. In this instance, the validation process for aggregates will be on a 'per supplier' basis. Provided the supplier issues a statement of compliance for all their products, and it can be demonstrated through sampling on a representative selection of the products that the material is compliant with RAC, products provided by that supplier are considered validated. Periodical testing at the following frequencies (whichever the sooner) must be conducted to ensure quality is maintained:

- 3 x samples once per month on a selected product imported (during months where materials are imported).
- 3 x samples per 250 m^3 of import.
- In addition to the above testing frequencies, a visual assessment of the materials to verify they are consistent with supplied documentation and do not present indicators of contamination must be undertaken. Visual assessment will include the collection of photographs and written field notes.

14.3 Sampling, Analysis and Quality Plan

14.3.1 Objective

The Sampling, Analysis and Quality Plan (SAQP) describes the sampling, analytical and quality program to be undertaken during the validation assessment which will likely include sampling for waste classification in addition to validation of imported materials. The objective of this SAQP will be to:

- Detail the validation sampling methodology to be utilised by the Environmental Consultant;
- Detail the sampling program for validation and waste classification with regard to sample density and location;
- Detail analytical requirements of validation and waste classification samples, including methodologies and analytes; and
- Detail quality assurance/control (QA/QC) procedures throughout validation assessment.

14.3.2 Quality Assurance/Quality Control

Project specific quality assurance/quality control (QA/QC) procedures must be adopted for the validation assessment to improve transparency, consistency, comparability, completeness, and confidence in the data collected. The field and laboratory QA/QC procedures, and compliance with the project's data quality objectives (DQOs) and data quality indicators (DQIs), which define the acceptable level of error required for the validation assessment, are outlined as follows:

Data Quality Objectives

Systematic planning and verification is critical to successful implementation of a validation assessment to ensure that the data is reliable and representative. A process for establishing data quality Objectives (DQOs) for an investigation has been defined by the United States Environmental Protection Agency (US EPA). That process has been adopted by AS4482.1-2005 and referenced in ASC NEPM 2013.

DQOs ensure that:

- The study objectives are set;
- Appropriate types of data are collected (based on potential sources of contamination and CoPC); and
- The tolerance levels are set for potential decision-making errors.

The DQO process is a seven-step iterative planning approach used to plan for environmental data collection activities. It provides a systematic approach for defining the criteria that a data collection design should satisfy, including when, where and how to collect samples or measurements, determination of tolerable decision error rates and the number of samples or measurements that should be collected. The seven-step process for this investigation is discussed and summarised in **Table 9.**

Table 9: Data Quality Objectives

Process	DQO
Step 1: State the Problem	Contamination, in the form of non-friable asbestos, is known to exist at the site and require remediation to render the site suitable for the proposed final land use as public open space.
Step 2: Identify the Decisions	The decisions to be made based on the results of the validation assessment are as follows: • Is there a potential risk to human health and the environment in light of the ongoing of land use and sensitive receptors after remediation? • If residual contamination is identified following remediation, does this pose a potentially unacceptable risk to human health and the environment? • If residual contamination is present, is this likely to preclude the use of the site as a recreational/public open space? • What is the waste classification of soils requiring off-site disposal?
Step 3: Identify Inputs in the Decision	The inputs required to make the above decisions were as follows: • Site setting, available background information and previous analytical data; • Selection of appropriate Tier 1 soil assessment criteria; • Visual observations; and • Field analytical results.
Step 4: Define Boundaries of the Study	The boundaries of the remediation are identified as the excavation footprint at Kurnell and La Perouse. As per current plans, the excavation footprints for each site are depicted in **Figure 2** and **Figure 3** in **Appendix A**.
Step 5: Develop a Decision Rule	• The adopted RAC within the remediation area to be assessed during validation assessment should be based on the future land use (residential).

Process	DQO
	• The RAC must be complied with to confirm that validation has been successfully achieved, otherwise robust discussion, risk assessment and/or statistical assessment as outlined in bullet points below must be provided. • Where the data sets were not sufficiently populated to allow calculation of the 95% upper confidence limit (95% UCL mean) then the individual results must be less than the adopted criteria. If all the individual results are below the adopted criteria, then no additional assessment and/or management is required. Where individual results exceed that adopted criteria, then further assessment and/or management is required. • In accordance with the NEPM 2013, where 95% UCL mean of the average concentration for each soil analyte can be calculated, then the 95% UCL mean must be below the adopted criteria; no single analyte concentration exceeds 250% of the adopted criteria; the standard deviation of the results must be less than 50% of the adopted criteria; and the normal distribution will only be used where the coefficient of variance is not greater than 1.2. • Allowances to these decision rules apply where alternative 95% UCL mean methods that are not based on normal or log-normal distributions are adopted. • Where 95% UCL mean results exceed the aforementioned criteria, then further assessment and/or management is required.
Step 6: **Specify Limits on Decision Errors**	The acceptable limits on decision errors applied during the assessment at the site and the manner of addressing possible decision errors were developed based on the DQIs of: • **Accuracy:** a quantitative measure of the closeness of reported data to the true value. • **Comparability**: a qualitative parameter expressing the confidence with which one data set can be compared with another. • **Completeness:** a measure of the amount of useable data (expressed as %) from a data collection activity. • **Representativeness:** the confidence (expressed qualitatively) that data are representative of each media present on the site. • **Precision:** a quantitative measure of the variability (or reproducibility) of data. **Acceptance Limits for Decision Errors** The acceptable limits were as follows: • Individual or 95% UCL mean concentrations are below the adopted criteria; and • 95% of the data satisfies the DQIs which were determined for completeness, representativeness, precision and accuracy of both field and laboratory data. Therefore, the limit on the decision error will be 5% that a conclusive statement may be incorrect.
Step 7: **Optimise the Design**	A suite of CoPC adopted for assessment to provide characterisation of the status of soil contamination based on review of previous investigation. The validation will be based on visual confirmation that the contaminated soils have been suitably removed offsite and any residual contamination is suitably encapsulated onsite beneath a marker layer and capping soils consist of VENM and/or ENM.

Data Quality Indicators

EDP considers the majority of these DQIs will not be applicable given the inert and non-volatile nature of asbestos as the primary contaminant of concern. However, these DQIs are retained to govern additional imported material testing if required, or ancillary assessment if unexpected contamination (other than asbestos) is identified during the remediation.

EDP has selected the following DQIs for the validation assessment to ensure that the data obtained are of sufficient quality to be used to draw reliable and representative conclusions in regard to the decision rules adopted. The DQIs for the validation assessment are presented in **Table 10.**

Table 10: Data Quality Indicators

DQO:	Requirement:	DQI:
Precision		

DQO:	Requirement:	DQI:
Standard operating procedures appropriate and complied with	The sampling methods comply with industry standard and guidelines	Meet requirement
Field duplicates	1 per 20 primary samples analysed	Relative Percentage Differences (RDPs) <30% (raised for low concentrations)
Laboratory duplicates	1 per batch per analyte	RPDs <30%
Accuracy		
Trip and field blanks	1 per batch of samples	Results <Practical Quantitation Limits (PQLs)
Trip spikes	1 per batch of samples	Recoveries 70 to 130%
Laboratory matrix spikes	1 per batch per volatile/semi-volatile analyte	Recoveries 70 to 130%
Laboratory surrogate spikes	1 per volatile/semi-volatile analyte sample (as appropriate)	Recoveries 70 to 130%
Laboratory control samples	At least 1 per batch per analyte tested	Result <PQL
Representativeness		
Sampling methodology – preservation	Appropriate for the sample type and analysis	Meet requirement
Samples extracted and analysed within holding times	Specific to each analyte	Meet requirement
Field equipment calibration	All field equipment calibrated, and calibration records provided	Meet requirement
Laboratory method blanks	At least 1 per batch per analyte tested	Result < PQL
Comparability		
Sampling approach	Consistent with each sample	Meet requirement
Analysis methodology	Consistent methodology for each sample	Meet requirement
Handling conditions and sampler	Consistent for each sample	Meet requirement
Field observations and analytical	Field observations support analytical results	Meet requirement
Consistent laboratory reporting limit	Consistent for each sample	Meet requirement
Completeness		
Sampling staff	Consistent sampling staff used	Meet requirement
Laboratory accreditation	NATA accredited laboratories and methods used	Meet requirement
Accredited methods	NATA accredited methods used appropriate for each analyte	Meet requirement
ASC NEPM 2013 laboratory methods	Laboratory methods consistent with the ASC NEPM 2013	Meet requirement
Chain of custody documentation	Appropriately completed	Meet requirement
Field sampling decontamination	Appropriately completed	Meet requirement

In the event if any of the DQIs are not met, the following steps should be undertaken:

- Review information provided or obtained to identify the non-conformances.
- Determine the cause of the non-conformances.
- Identify the course of action required to rectify the non-conformances.

In the event the non-conformances cannot be rectified, determine how the non-conformance will significantly affect the usefulness of the data to determine if the data will be used with discretion or marked as invalid.

14.3.3 Field Quality Assurance Sampling Procedures

Fieldwork is to be undertaken by qualified and experienced Environmental Consultants in accordance industry accepted standard practice and NEPM 2013.

Sampling is to be conducted in accordance with the sampling methodology detailed in **Section 14.3**, in addition to the following quality assurance procedures:

- Phosphate-free detergent to be used to clean re-usable sampling instruments between sampling locations.
- Sampling instruments to be rinsed in deionised water and sprayed with deionised water to minimise the potential for cross contamination to occur.
- Samples to be collected from soils not in direct contact with hand tools or machinery (where possible).
- Samples to be placed directly into laboratory supplied sampling jars with Teflon lined lids (soils) and sample bags (asbestos).
- Samples to be stored on ice before being transported to laboratory under chain of custody procedures.

14.3.4 Field Duplicate Samples

The purpose of field duplicate samples is to estimate the variability of a given characteristic or contaminant associated with a population.

Field duplicate soil samples should be collected from soil immediately adjacent to the primary sample by placing approximately equal portions of the primary sample into two sample jars. The duplicate samples must be labelled so as to conceal the relationship to the primary sample from the laboratory.

RPDs are to be calculated for each of the duplicate samples analysed. RPDs are calculated by dividing the difference between the primary sample and duplicate sample by the average of the two.

When calculating the RPDs, the following procedures are to be considered:

- RPDs are only considered when a concentration is greater than the PQL; and
- In instances where results are greater than the PQL for the one sample, but below PQL for the corresponding primary or duplicate sample, a result equal to the PQL value is adopted where necessary in order to make a calculation possible.

14.3.5 Blank and Spike Samples

Rinsate blanks are to be used to assess the potential for cross contamination between sampling points by the equipment used. Rinsate blank samples (from an item of sampling equipment) will be collected and analysed at a rate of one per piece of re-useable equipment per day of sampling (for soil sampling). Concentrations of analytes are to be less than PQLs.

Trip blanks should be used to assess the potential for cross contamination between transit from the site to the laboratory. Field blanks should be used to assess the potential for cross contamination due to atmospheric sampling conditions. Trip spikes should be used to assess the potential loss of volatile constituents from samples whilst in transit from the site to the laboratory.

Spike and blank samples must be analysed for volatile compounds and prepared by the primary laboratory, carried to the field unopened and subjected to the same preservation methods as the primary field samples.

14.3.6 Sampling Methodology

Sampling locations for the validation assessment should be selected on:

- Systematic sampling (gridded) pattern – judgement should be used on number of samples required to adequately validate excavation floors and may be as little as one sample depending on the excavation footprint. Sample analysis should be collected relevant to the specific contaminant of concern.
- Where there are exposed walls to an excavation area, wall validation samples should be collected at 1 sample per 10 linear metres and 1 sample per 25 m^2 of the base of an excavation;
- Visual inspection for indications of contamination during site inspection; and

- Accessibility of the proposed sampling location.

Samples shall be collected using the following methodology:

- Soil samples will be recovered from accessible soils in each sampling location utilising hand or plant equipment where required, ensuring QA procedures are adhered to as detailed in **Section 14.3.3**;
- Soil samples will be collected in sampling containers provided by the analysing laboratory, ensuring sufficient sample is collected for the required analysis;
- All containers will be clearly labelled with unique sample identification; and
- All samples will be stored on ice prior to dispatch and during transportation to the nominated laboratory under chain of custody procedures.

For waste classification:

- A minimum of 3 samples per each classification assessment and 1 sample / 25 m^3; and
- For larger classifications a minimum of 10 samples per 2,500 m^3 and one sample per 250 m^3 thereafter and must be assessed against a 95% UCL for homogenous material, except for asbestos. Statistics must fall within the statistical ranges provided in the NEPM 2013.

14.4 Site Remediation and Validation Report

Following the conclusion of the remedial works, the Environmental Consultant must prepare a SRVR. This SRVR must meet the requirements of the *NSW EPA Contaminated Land Guidelines, Consultants Reporting on Contaminated Land 2020 and* detail:

- The methodologies used in the remediation of the subject proposed development;
- Site validation inspection and sampling events conducted throughout the remedial works;
- Compliance of the remedial works with the RACs;
- Compliance with the critical hold points as detailed in **Table 8;** and
- The findings of the validation assessment.

The SRVR must be prepared in consideration of the Sampling, Analysis and Quality Plan (SAQP) provided in *NSW EPA Contaminated Land Guidelines, Consultants Reporting on Contaminated Land 2020*. The SRVR must come to a conclusion as to whether the site can be considered suitable for the ongoing use following the completion of the remedial works, in accordance with the adopted legislative guidelines.

To verify the validation works conducted, the SRVR must include:

- Visual inspection by the Environmental Consultant of the remediation area pre and post fill removal, including photographic evidence;
- Validation sampling and analysis in accordance with the SAQP detailed in this RAP (**Section 14.3**);
- Validation evidence, including photographic evidence of asbestos removal works;
- Validation of documentation and analytical data for all imported materials;
- Summary tables of analytical results compared with adopted criteria;
- All waste classification certificates (if applicable);
- Evidence of waste disposal (if applicable); and
- Reconciliation summary identifying waste classification certificate, disposal volume from dockets, and Environmental Protection Licence (EPL) number of receiving site.

14.5 Construction Environmental Management Plan

A CEMP provides information to control and manage site activities during the implementation of the RAP.

The CEMP manages the remediation staff, contractors and public risk associated with the identified contaminants at the site under current land use practices and throughout the remediation program. The CEMP is prepared to manage the potential risks to human health and the environment posed by the contaminants currently present in the soil materials on the site.

The CEMP will provide information on procedures required to ensure the protection of staff, contractors and visitors to the site under normal operating conditions and exception circumstances requiring engagement with the contaminated materials on site, and to provide clear details of the location of contamination for appropriate management during remediation.

The CEMP must be adhered to by the remediation contractor throughout the remedial works and must be incorporated into the contractors work method statements and any relevant documentation.

15. SITE ENVIRONMENTAL CONTROLS

15.1 Overview

The remediation of the site must be carried out in a manner that does not harm or degrade the environment (both on-site and off-site). All people involved in the project must ensure the protection of the environment throughout the duration of the works with special consideration of the following:

- Work procedures;
- Control of fugitive emissions;
- Dust control measures;
- Erosion, sediment and surface water management;
- Equipment cleaning and operation; and
- Stockpiles.

15.2 Work Procedures

15.2.1 Establishment and Site Preparation

Prior to commencement of remediation activities, the Principal Contractor shall prepare a work site management plan. The objectives of the work site management plan are:

- To protect the health of site workers, adjacent landowners and the general public during remediation works; and
- To ensure workers do not negatively impact on potential environmental receptors and comply with applicable environmental legislations.

A control strategy must be proposed within the plan for the management of all possible sources of exposure or dust release on the site.

The following are the major points that need to be considered in the work site management plan:

- Safety of personnel both on and off site.
- Responsibility for the supply and application of isolating materials (e.g. ropes, barriers, plastic screens, waste containers, warning signs, etc), if required.
- Limiting access to remediation area.
- Perimeter/security fencing and erosion control.
- Transport facilities.
- Availability of water and drainage.
- Staff amenities.
- Protection of adjacent residential structures.
- Waste disposal responsibilities and clean-up requirements.
- Notification to, and approval from, regulating authorities where necessary.
- Cleanliness standards that much be achieved to fulfil the contract.

The site management plan must comply with the site's development consent conditions and other applicable guidelines or legislations.

15.2.2 Site Boundaries and Fencing

Warning signs at the boundaries of the remediation areas (at least 10 m from the removal areas) should be labelled "NO UNAUTHORISED ENTRY". Signs must conform to *AS 1319-1994 – Safety Signs for the Occupational Environment.*

Entry to the remediation area shall be restricted to personnel directly engaged in the soil remediation. Other persons entering the area shall be required to observe the appropriate safety precautions for that area.

15.2.3 Supervisory Personnel

Supervisory personnel shall have a detailed knowledge of the precautions and procedures demanded by contaminated soil remediation and clean-up. In light of this knowledge and personal experience, supervisors shall assume the following responsibilities:

- The total remediation procedure; the setting up, the actual remediation (i.e. excavation and offsite disposal) and final cleaning operation.
- Ensure that all necessary measures are taken to reduce the airborne dust, and that in any case workers are not exposed to levels exceeding the national exposure standards.
- Arrange for, and assess results of, air monitoring where appropriate.
- Ensure that all workers under their supervision are adequately trained in the safe working practices associated with working on constructions sites.
- Ensure that the remediation of the contaminated soil is continually supervised and that the operation is carried out in a safe and proper manner.
- Ensure that personal protection equipment (PPE) is available to all workers and maintained in good condition.
- Ensure that the remediation site is maintained in a clean condition, that waste is quickly and properly disposed of and that the personal hygiene procedures are continually observed.

15.2.4 Dust Controls

Wetting of all work areas, where active soil disturbance is proposed, shall begin prior to the start of the disturbance activities. Wetting shall be conducted as appropriate, based on the visual observations made by the supervisory personnel. This may be done by hand or using mechanical sprayers.

Maintenance wetting shall occur at the close of each workday in preparation of the following day's work zones. If maintenance wetting from the previous workday appears adequate (in other words, preliminary movement of machinery to a work zone must not yield emissions), and passes inspection, additional initial wetting will not be required. Wetting shall occur to prevent the possible emission of material during the movement of equipment to another location. Care must be taken to assure that the application of water does not produce emissions from the ground surface and that there is not excessive over-watering.

During the actual soil disturbance activity, water shall be applied to the site of the disturbance, as appropriate, to suppress any visible emission. In general, personnel tasked with misting duties must be assigned to each soil disturbance area to complete this activity. Fine spay misting shall be undertaken using a hose with spreading head to ensure even misting occurs.

15.2.5 Wind Speed Work Stoppage

The application of a wind speed work stoppage requirement is designed to control fugitive emissions due to increased air velocity. In the event of high wind speeds, excavation work must be stopped at the site until wind speeds are reduced to a speed that shall not generate visible emissions from the site. For the purposes of this site, work must be stopped when:

- Wind speeds reach a sustained 40 km/h; OR
- Any wind speed at which particulates are observed by site personnel to be entrained in the air stream.

If site-specific weather creates conditions that may result in fugitive emissions, work stoppage may occur at wind speeds less than specified above based on decisions of the site supervisor. The site supervisor shall make the decision as to when it is appropriate to restart.

15.2.6 Dust Control Measures

Prior to any intrusive works or other disruptive activities carried out on site, consideration must be given to how the work or activity can be undertaken with minimal dust generation. All works should be undertaken with control of dust as a priority. The dust control or avoidance measures should be documented in a SWMS, or similar, prepared for the proposed works. Secondary controls, such as the wearing of respirators should also be considered during potential dust exposure.

Should any unexpected hazards arise, the client should be contacted immediately so that the risks (health or safety) can be re-evaluated and the appropriate level of management and/or protection can be implemented prior to the recommencement of any works.

The following procedures and techniques will aid to control dust generation:

- Erection of dust screens around the perimeter of the site;
- A tarpaulin (or equivalent) will securely cover all loads of soil material entering or leaving the site (if applicable);
- Water sprays should be used across the site over unsealed or bare surfaces;
- Plastic sheeting should be used by the Principal Contractor to cover excavation faces and stockpiles where necessary; and
- Materials at the site should be processed, handled, moved and stored in a proper and efficient manner in order to minimise exposure.

If the above procedures and techniques are not sufficient to control dust, then further contingency measures may include:

- Reducing the area of disturbed surfaces;
- Installation of perimeter sprays on the remediation site boundary fencing;
- Conducting work in more favourable weather conditions;
- Modifying the manner in which excavation work is conducted at the site;
- Using different equipment which generates less dust; and
- Using equipment in more favourable weather conditions.

15.2.7 Spills and Leaks

On site control measures must be in place throughout the remediation works to protect the surrounding environment from spills and leaks:

- Construction of stormwater retention basins or diversion drains (if required);
- Presence of an emergency supply spill control equipment, such as oil absorbent materials; and
- Containment of any storage tanks or drums within bunded areas, which have the capacity of 110% of the largest tank contained, or 25% of the total volume of all drums, whichever is greater.
- Works required within this RAP do not contain activities that will require any liquids to be stored on site, with the exception of fuels for machinery. These shall be kept to a minimum at all times.

15.3 Erosion, Sediment and Surface Water Management

15.3.1 Approach

An important part of the remedial works shall be the management of erosion, sediment and surface water. The strategy to be adopted must aim to:

- Prevent soil erosion at the site; and
- Protect off site waters and sediment from being polluted by onsite sources.

The strategy shall involve the installation and operation of a number of environmental control measures that shall be progressively implemented as work progresses across the site. The design approach adopted must satisfy the following principles:

- Control water flow from the top of the site, through the works and out the bottom of the site via the construction of earthen bunds to regulate water flow;
- In the case of an extreme rainfall event, overflow water from unpremeditated areas shall be filtered through straw bales and silt fences prior to discharge from the fill area. Given the short duration of the remediation program, the probability of an extreme event occurring is considered to be low; and
- Rehabilitate disturbed lands as quickly as possible.

Regular maintenance of all erosion, sedimentation and pollution control devices shall be undertaken to ensure their continuing effective and efficient operation.

15.4 Noise and Vibration Control Measures

Noise and vibration levels must be controlled throughout the project. Special precautions must be taken to avoid nuisance in neighbouring areas, particularly from machinery, vehicles, and warning sirens. The control measures to be implemented shall include the following:

- All construction vehicles involved in the remediation project must generally enter and leave the site in accordance with specified site entry controls; and
- Use of suitable construction techniques and methodologies.

15.5 Equipment Cleaning and Operation

Throughout the remediation works, controls must be placed on the operation and movement of equipment. General procedures that shall be implemented include the following:

- Equipment working within an excavation area must be washed inside the area so that any wash water shall run into the excavation. Wash waters shall be allowed to naturally evaporate or be removed from the excavation area along with ponded surface water;
- Equipment washing facilities must be provided for the effective cleaning of equipment after they have been exposed to contaminated fill, and prior to their leaving the site. The facilities shall also be used to clean other earthmoving plant and equipment used on site;
- All vehicles transporting materials on site shall be operated in a manner so as to prevent any loss of materials during loading, transport and unloading activities; and
- Any storage tanks or drums used for fuels or liquids shall be bunded and bund shall contain at least 110% of the largest tank contained or 25% of the total volume of all drums, whichever is the greater, and the bund shall not be penetrated by any services.

15.6 Stockpiles

- Exposed or excavated fill materials or soils containing or suspected of containing significantly contaminated materials must not be left unattended;
- If it is necessary to leave the site unattended, the fill materials or soils must be dampened to prevent generation of dust and placed back in the excavation and the surface cover reinstated to prevent exposure to these materials from users of the site;
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered; and
- All stockpiles of contaminated soil shall be stored in a secure area and be covered with weighted geofabric or high-density polyethylene sheeting if remaining more than 24 hours.

15.7 Remediation Schedule

It is recommended that site remediation activities be coordinated with other trades to prevent unauthorised personnel from being present in the remediation area. Works are not considered complete until the SRVR is provided.

15.7.1 Hours of Operation

This remediation process must be conducted in normal site hours only. No machinery or trucks must operate on site outside of the following times unless authorised by the Council:

Monday to Friday:	7 am to 6 pm
Saturday:	8 am to 1 pm
Sundays:	Subject to development consent
Public Holidays:	Subject to development consent
Night Work:	Subject to development consent

15.7.2 Potential Effects on Community and Environment

There is a potential for fugitive dust generated during the excavation and loading of trucks. The site supervisor must arrange the following dust control measures:

- Hosing with fine spray of water on exposed surfaces particularly during hot windy days.
- Hosing vehicles and covering loads prior to movement on site and especially prior to leaving the site (if required).
- Ensure all public roadways are kept as clean as possible.

All noise producing equipment should meet the requirements of *POEO Act 1997* and *POEO Act (Noise Control Regulations) 2008*. All contractors must ensure work times are adhered to.

The control of odours during excavations must be monitored during the remediation process. Should odours be detected beyond the site boundary, suppressant equipment must be deployed immediately to control odours entering nearby properties. All work must cease upon the detection of odours outside the property boundary. Commencement of work may take place once odours are controlled and validated by a suitably qualified professional.

15.7.3 Personnel

Prior to commencement of the remediation works the Principal Contractor must prepare a complete list of remediation contacts including site personnel. Personnel must hold the required certificates to complete the works required.

16. CONTINGENCY PLANNING

16.1 Overview

The unexpected conditions that could feasibly occur at the site include:

- Validation criteria failure;
- Surplus of contaminated materials;
- Unknown types of materials / unexpected finds (e.g. Coal Tar, liquid wastes);
- The generation of unacceptable dust;
- The generation of unacceptable odours;
- The generation of unacceptable noise and or vibration levels; and
- Spills or leak of hazardous materials.

Procedures that shall be used to address these contingencies are provided in the following sections.

16.2 Validation Criteria Failure

In the event that any of the validation criteria are not met, or that validation assessment determines that remedial actions have not mitigated the risks posed by the identified contamination, additional remediation and/or assessment will be required.

16.2.1 Remediation Acceptance Criteria Exceedance – Residual Materials

In the event that validation sampling and analysis shows exceedance of the RAC for CoPCs, or asbestos is unable to be reasonably removed by hand picking methods, the following must occur:

- Inspection of the site and the area of exceedance by an Environmental Consultant;
- Conduct additional excavation at approximately:
  - Minimum 0.5 m depth for 5 m either side of failed location if found in a side wall.
  - 0.1 m deeper within the 25 m^2 of the excavation base. This is not considered to be likely given the extent of excavations will be advanced to natural surfaces.
- Complete validation sampling of the final excavation footprint as per **Section 14.3.6**.

16.2.2 Remediation Acceptance Criteria Exceedance – Imported Materials

In the event that validation sampling and analysis of imported material shows an exceedance of the RAC the following must occur:

- Rejection of materials (materials must not be imported to site).
- Identify suitable ENM and/or VENM materials in consideration of the RAC specified in this RAP; and
- Complete sampling and analysis of newly sourced materials to sampling and analysis in accordance with this RAP.

16.3 Unknown Types of Materials / Unexpected Finds

If any unknown materials are encountered during remedial works by the observation of any unusual physical/sensory characteristics of the material (i.e. odours), the following process must be implemented:

- Work must immediately stop and the unexpected find area must be isolated;
- Environmental Consultant must inspect the area to identify the CoPC that has been observed;
- The extent of the unexpected find must be delineated;
- Develop a plan to manage any identified unacceptable risk associated with the unexpected find;
- Consult with the Environmental Consultant, Council and any other stakeholder, as appropriate;
- Amend the RAP as necessary to include the additional remediation and validation of the unexpected find; and
- Implementation of the amended RAP.

16.4 Generation of Unacceptable Dust

Dust levels and potential asbestos fibre content should be monitored at all times during the remediation works. Dust suppression must occur throughout all earthworks conducted at the site as part of the remedial works. Consideration should be given to weather conditions (e.g. wind) throughout the remedial works with regard to the potential to generate dust. Should community complaints be registered regarding dust throughout the works, all works must cease, and dust mitigation measures should be revised.

16.5 Generation of Unacceptable Odour

Monitor ambient air levels and ensure site workers are using appropriate respirators if required. Ensure odour management procedures in place including (but not limited to):

- Covering of stockpiles;
- Mist sprays; and
- Hydrocarbon odour suppressants.

If odours are detected at areas around the site during the remediation works, photo-ionisation detector (PID) measurements should be obtained by the onsite environmental consultant. If PID readings above 30 parts per million (ppm) are recorded, respiratory protection should be worn by workers in the vicinity of the odour, and if readings above 300 ppm are recorded, odour suppressants should be applied.

Due to the nature of the identified contaminants and EDP's understanding of the site, it is not expected that unacceptable odours will be generated throughout the remedial works.

16.6 Generation of Unacceptable Noise/Vibration

Monitor noise levels during the works and implement mitigation measures if exceedances of the adopted criteria are recorded.

All machinery and equipment used onsite must be in good working order fitted with appropriate silencers when necessary and all equipment will be operated in an efficient manner. The Remediation Contractor must adopt suitable methodology to ensure that vibrations will not cause damage to structures located at the site and on adjoining land. In addition, the relevant provisions of the *POEO Act 1997* must be satisfied at all times.

16.7 Spills or Leaks of Contaminated Materials

In order to mitigate the potential risks associated with spills and leaks of contaminated materials, the Remediation Contractor must ensure that a suitable 'Spill Kit' is present at the site throughout the remediation, and that site supervisors are familiar with the use of said kit.

In the event that a leak or spill occurs, the following procedure must be adhered to:

- Identify and stop source of soil/leak;
- Clean up spill/leak with spill kit (as appropriate);
- If appropriate, engage environmental consultant to assess impact of spill/leak;
- Isolate impacted material and store in designated area until it can be appropriately disposed of; and
- Review procedures to reduce future spill/leak incidents.

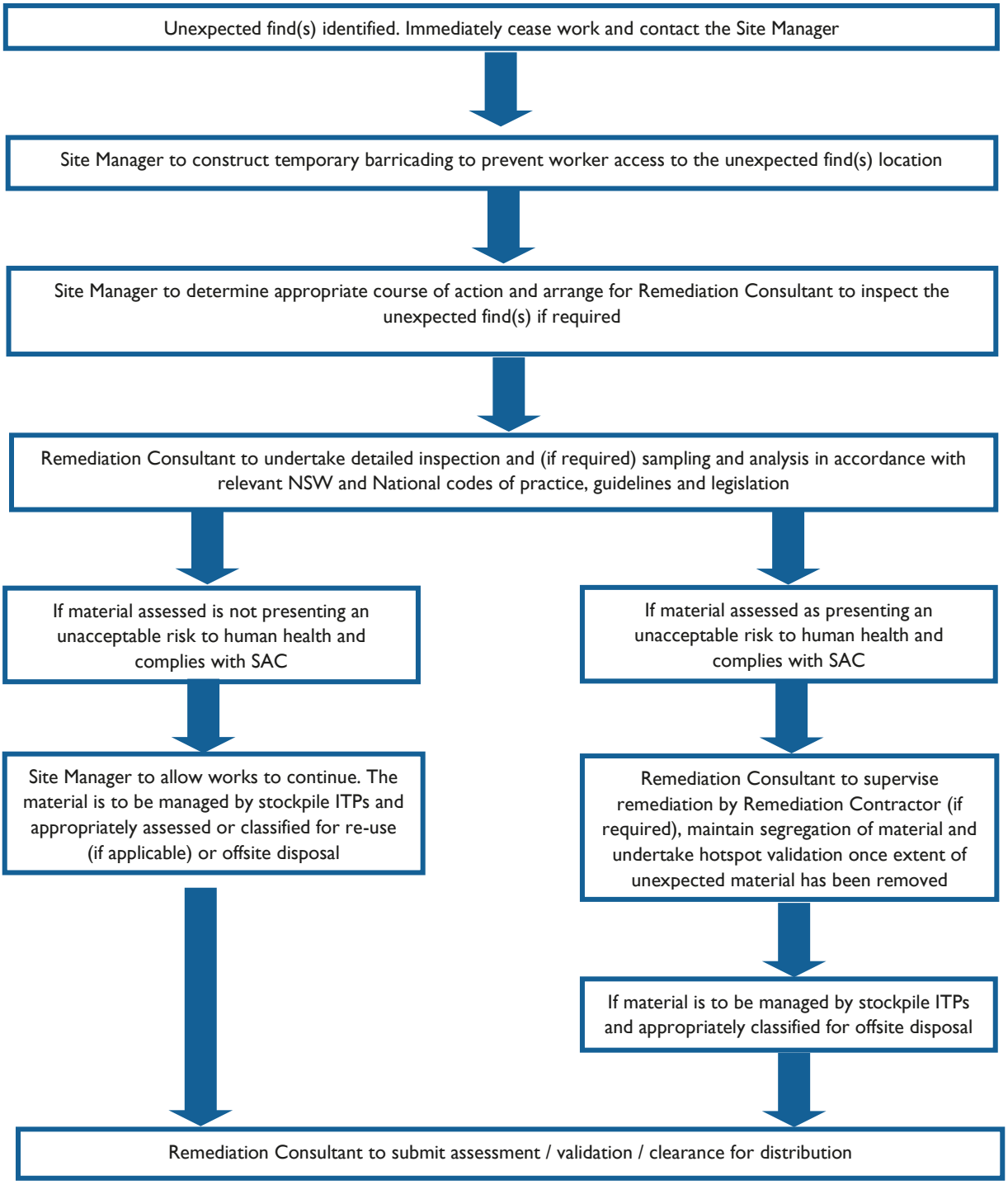
16.8 Unexpected Finds/Events

As a precautionary measure to ensure the protection of the workforce and the surrounding community, should any unexpected potentially hazardous substance/event be identified, the procedure summarised in **Table 11** are to be followed.

The sampling strategy for each unexpected find shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – if it is hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment?

Whether the substance if hazardous or not shall be determined by collection and chemical analysis of representative samples of the substance by the Environmental Consultant. The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013). Validation following removal of an unexpected find must follow all quality protocols outlined in the SAQP.

Table 11 – Unexpected Finds Procedure



17. WORK HEALTH AND SAFETY

The Remediation Contractor must prepare a Work Health and Safety Plan to establish standard health and safety procedures for the personnel involved in the remedial works at the site.

Areas to be addressed in the plan include but are not limited to:

- Identification and management of hazards, including:
- Onsite and offsite exposure of potential airborne asbestos fibres
- Exposure and possible absorption through skin of contaminants;
- Inhalation of volatile contaminant vapours;
- Slips, trips, bumps, falls, falling objects, crushing injuries typical of every construction related job site;
- Fire or explosion;
- Physical hazards, noise and hot weather.
- General work procedures for personal hygiene;
- PPE requirements; and
- Emergency management.

18. COMMUNITY CONSULTATION

To ensure the local community that has the potential to be impacted by the proposed works has the option to consult throughout the project, EDP recommend provision of site contact information be provided at the site, with communication and complaints to be managed by the principal contractor and Council. In consideration of the nature of the required works, EDP recommends that the key stakeholders for the project have a robust complaints process.

19. CONCLUSION

Subject to the successful implementation of the measures detailed in this RAP and appropriate validation reporting following the remedial works, it is considered that the excavation footprint within the Kurnell and La Perouse sites can be rendered suitable for the proposed recreational / public open space land use.

Documentation of the success of remediation is required in a subsequent SRVR at the conclusion of remedial works.

STATEMENT OF LIMITATIONS

This document has been prepared in response to specific instructions from the Client to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards and practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by the Client. To avoid misuse of this report, EDP advise that the report should only be relied upon by the Client and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part. EDP should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

Reliance on Information Provided by Others

EDP notes that where information has been provided by other parties in order for the works to be undertaken, EDP cannot guarantee the accuracy or completeness of this information. The Client waives any claim against the company and agrees to indemnify EDP for any loss, claim or liability arising from inaccuracies or omissions in information provided to EDP by third parties. No indications were found during our investigations that information contained in this report, as provided to EDP, is false.

Appendix A: Figures

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Kamay Ferry Wharves Project, Kurnell and La Perouse NSW

Remedial Action Plan

Not to scale

LEGEND:

	Approximate La Perouse Project Boundary
	Approximate Kurnell Project Boundary

Image courtesy of Nearmap: dated 31 May 2023

DETAILS:

Figure Name:	Figure 1: Project Boundary
Client Name:	McConnell Dowell
EDP Reference:	S-05009.RAP.001
Date:	03 August 2023

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Kamay Ferry Wharves Project, Kurnell and La Perouse NSW

KEY PROJECT FEATURES (KURNELL)

Not to scale

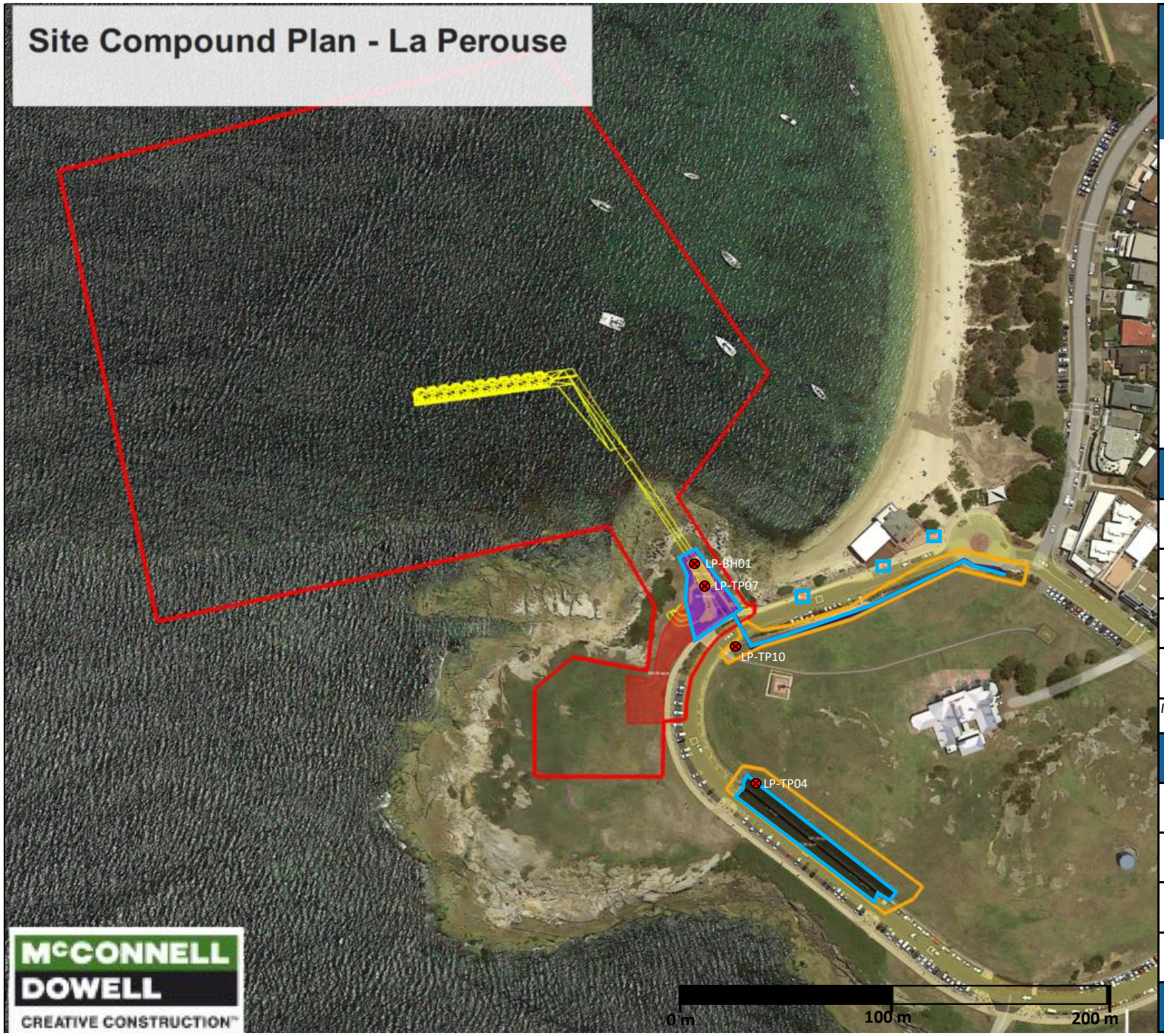
LEGEND:

	Approximate Kurnell Project Boundary
	Approximate Kurnell Construction Boundary
	Approximate Proposed Excavation and Remedial Footprint
⊗	Approximate location of historical test pit found to contain asbestos

Image courtesy of Nearmap: dated 31 May 2023 and MCD

DETAILS:

Figure Name:	Figure 2: Key Project Features (Kurnell)
Client Name:	McConnell Dowell
EDP Reference:	S-05009.RAP.001
Date:	03 August 2023



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Kamay Ferry Wharves Project, Kurnell and La Perouse NSW

KEY PROJECT FEATURES (LA PEROUSE)

Not to scale

LEGEND:

/	Approximate La Perouse Project / Construction Boundary
	Approximate Proposed Excavation and Remedial Footprint
	Fromerly proposed excavation area. No longer included.
⊗	Apprximate location of historical test pit found to contain asbestos

Image courtesy of MCD

DETAILS:

Figure Name:	Figure 3: Key Project Features (La Perouse)
Client Name:	McConnell Dowell
EDP Reference:	S-05009.RAP.001
Date:	03 August 2023

Appendix B: Asbestos Management Plan

Attachment D – Asbestos Management Plan

D-1 Introduction

Where earthworks are required, there is potential to expose unexpected forms of contamination within the surface and subsurface. In such instances, action is required to mitigate potential contaminated soil/material encountered during excavation or Construction activities. If potentially contaminated material is encountered, the Unexpected Contaminated Finds Procedure (Attachment C of the SWMP) will be followed.

Unexpected finds of material suspected or confirmed to be contaminated by asbestos / ACM will be managed in accordance with the Asbestos Management Plan (this plan) and the McConnel Dowell Safe Operating Procedure (SOP) for Asbestos (REF-HSEQ-HS-SOP022-GEN-ALL).

Works in the vicinity will be stopped or modified and will not recommence until the material has been analysed and management measures developed.

Where contamination of the Project site is encountered or is required to be managed, McConnell Dowell, in consultation with contamination specialists, will develop site methodologies and risk controls in accordance with the relevant legislative requirements and guidelines as required. This will include, but not be limited, to:

- Work Health and Safety (WHS) requirements
- Safe Work Australia – Code of Practice – How to safely remove asbestos (July 2020).
- Safe Work NSW – Code of Practice – How to Manage and Control Asbestos in the Workplace (August 2019).
- Protection of the Environment Operations Act 1997;
- Community, agency and stakeholder notification, where required
- Identification of contamination extent
- Appropriate controls for on-site material management and/or off-site disposal
- McConnell Dowell Safe Operating Procedure (SOP) (HSEQ-HS-SOP022-GEN-ALL) Asbestos
- NSW Waste Classification Guidelines Part 1 Classifying Waste
- Site validation.

D-1.1 Purpose

This Asbestos Management Plan (AMP) has been prepared to document the procedure to be undertaken to manage areas of asbestos containing material (ACM) or actual asbestos or in the event that it is uncovered during Construction of the Project. Implementation of the AMP will ensure that asbestos is managed in such a way as to avoid harm to site personnel, visitors and the community.

Asbestos / ACM fragments that are remnant from previous activities may be scattered throughout the Project area or present in existing stockpiled material. Asbestos- contaminated ground may be encountered when undertaking excavation at unknown locations.

This AMP has been developed in accordance with relevant legislation, EPA-endorsed guidelines (including the waste guidelines), industry codes of practice and Transport for NSW MCD specifications.

D-1.2 Objectives

The key objectives of this AMP are to:

- Provide the procedure for assessment of asbestos / ACM in the Project area
- Maintain accurate records of the type of asbestos and location it was encountered in an Asbestos Register
- Avoid or minimise asbestos-related risks by implementing control measures
- Ensure control measures are effectively implemented
- Ensure asbestos removal is performed by a licensed asbestos removalist under the direction / recommendation of by a suitably qualified and experienced person / licensed asbestos assessor.
- Ensure that all waste contaminated with asbestos is appropriately classified and removed from the site to an appropriately licenced landfill.

D-1.3 Scope

Work involving, or likely to involve the disturbance of asbestos is considered a high-risk Construction activity. Implementation of the AMP will be done in addition to EWMS and Safe Work Method Statements (SWMS) for the management of materials containing asbestos. EWMS and SWMS will be completed and reviewed by the Transport for NSW Environmental Manager (or delegate) and ER prior to the commencement of activities to which they apply. EWMS and SWMS will support the implementation of this AMP.

D-1.4 Targeted Site Investigation – Detected Asbestos

During the development of the EIS, a Targeted Site Investigation (TSI) was undertaken by ERM to refined the current understanding of the Project Area and assisted in assessing potential constraints associated with site contamination that may require consideration prior to or during development of the proposed Kamay Ferry Wharf.

Investigation works involved the excavation of boreholes within offshore locations and test pits within onshore locations at both the Kurnell and La Perouse Sites.

The TSI unidentified that some fill materials within the onshore test pits located at Kurnell and La Perouse sites were identified to contain Asbestos Containing Materials (ACM) at several locations as outlined below in Figure D-1 and D-2.

As outlined in the TSI, following these results ERM recommended that prior to the commencement of construction works, an Asbestos Management Plan (this plan) will be required to outline the required processes / procedures to be adopted for the remediation and / or management of asbestos within the Site.

Procedures outlining the process for managing asbestos onsite is further outlined in Section D-2 and Section D-3 of this Asbestos Management Plan. Remediation of Asbestos is addressed in Section D-3.3.

Figure D-1 Targeted Site Investigation – ACM Detections – La Perouse

Figure D-2 Targeted Site Investigation – ACM Detections – Kurnell

D-1.5 Induction / training

All site personnel (including sub-contractors) will undertake an induction to ensure that they understand the types and location of ACM/potential ACM on site and control measures and safe work methods before they commence work. Site personnel will be adequately trained to recognise the health risks of asbestos, use of the Asbestos Register, processes and safe work procedures to be followed to prevent exposure and correct use of PPE.

Prior to commencement of each shift, or change in shift, the Construction Manager (CM) will inform all site personnel of any works disturbing asbestos impacted soils on site.

A copy of the AMP will be kept at the Construction work site where the work is being carried out.

D-1.6 Roles and responsibilities

All site personnel are responsible for ensuring they are familiar with the Asbestos Register and the locations where asbestos / ACM is identified. Any suspected asbestos / ACM finds will be reported to the CM and the Environment & Sustainability Lead.

Contamination Specialist

If required McConnell Dowell will engage a Contamination Consultant to provide a Contamination Specialist, who is appropriately degree qualified and has a minimum of five years' experience in contaminated land, asbestos in soil assessments and remediation.

The Contamination Specialist will be responsible for taking samples of suspected asbestos / ACM, arranging air monitoring and testing.

The Contamination Specialist will be on site:

- as required during advance contamination assessments (refer Section 2 below)
- at other times required within McConnel Dowell Safe Operating Procedure (SOP) for Asbestos (REF-HSEQ-HS-SOP022-GEN-ALL).

Removal of asbestos must be undertaken by the holder of a Class A or Class B Asbestos Removal Licence issued by SafeWork NSW, as required.

D-1.7 Review

Throughout Construction of the Project the location of any asbestos / ACM discovered on site will be documented. This plan will be updated which any changes to Construction methodologies and subsequent additional management measures. The AMP will be reviewed annually, or as required in accordance with the continuous improvement process described in Section 3 of the CEMP.

A register of known contamination will be recorded with reference to, *Kamay Wharf Project - Targeted Site Investigation report by Environmental Resources Management Australia Pty Ltd (KFW01-ARUP-BPW-EN-RPT-000056).*

D-2 Unexpected asbestos / ACM find procedure

In the event that a person on site identifies or disturbs asbestos / ACM that is not already identified in the Asbestos Register, McConnell Dowell will follow all reporting and notification requirements in the Transport for NSW Environmental Incident Classification and Reporting

Procedure, including notifying the ER. McConnell Dowell will also undertake the following actions:

1. Stop work in the area potentially impacted by ACM as soon as it is safe to do so and move to the upwind side of the area, or away from the area.
2. Assess the potential immediate risk to human health posed by the unexpected find and assess if evacuation is necessary.
3. Delineate an exclusion zone around the affected area using fencing and/or appropriate barriers and signage. Keeping soil damp will minimise the release of fibres to air.
4. Contact the Contamination Specialist for advice and request a site visit (as required) to undertake a risk assessment of the unexpected find and determine what further assessment and/or remediation works are required.
5. If the material determined for re-use presents an unacceptable risk to human health or ecology, then a Contamination Specialist is to supervise the appropriate remediation works and undertake validation/clearance in accordance with relevant NSW codes of practice and guidelines.
6. Implement advice and validate outcomes are assessed by the Contamination Specialist to be satisfactory. Document outcome, presenting recommendations to McConnell Dowell.
7. Following the clearance and validation of the impacted areas, the Contamination Specialist to is submit assessment/validation/clearance for distribution to the McConnell Dowell and appropriate regulatory authorities
8. The McConnell Dowell Environment & Sustainability Lead to confirm that works may resume in the affected area in consultation with the ER.

Note: Where a NSW EPA Accredited Site Auditor has been engaged, Transport for NSW in consultation with the specialist Contamination Specialist, will inform the Site Auditor of the unexpected find and proposed measures to remediate/manage risks from ACM. These measures should be endorsed by the Site Auditor before implementation

The unexpected asbestos management procedure during Construction is summarised in the flow chart in Attachment 1.

Where small fragments of ACM or suspected ACM are found, and provided that:

- the total number of fragments is < 20, or
- the total surface area of the fragment/piece is < 1 m^2, or
- the fragments are spread over an area of < 10 m^2, and
- the fragments are non-friable and located on ground surface or within the topsoil layer

If the unexpected find meets the criteria above, the Contamination Specialist will collect any fragments and place it in a 200 mm polythene bag for later disposal at an appropriate waste facility. A detailed visual inspection of the area will be carried out by the Contamination Specialist which will involve wet raking of the areas to a depth of 10 cm for any further fragments. If no further fragments are identified, works can continue.

If, during the visual inspection, the Contamination Specialist determines that the criteria described above are exceeded, or if suspected asbestos / ACM continues to be identified during excavation

works and/or if it is thought that any uncovered material might be considered asbestos containing and friable, works will cease, and the Contamination Specialist will assess the situation and determine an appropriate course of action in accordance with Section 4.

The Contamination Specialist will remove samples of the material for testing at a NATA-accredited laboratory and will monitor airborne dust levels. Following testing, the Contamination Specialist will determine and report:

- If the asbestos is non-friable or friable;
- The extent of the contamination;
- Options for the appropriate remediation of the area (Section 4);
- The requirement for a licenced asbestos removalist (Section 4);
- The control measures to be implemented; and
- The requirement for health screening of workers on site.

D-3 Asbestos management principles

D-3.1 Risk control

Asbestos-contaminated material encountered during Construction of the Project will be identified, managed, encapsulated on site, or removed and disposed off-site at a licenced waste facility. McConnell Dowell will engage only appropriately licensed, accredited and insured asbestos removalists to handle, remove, encapsulate and/ or dispose of asbestos / ACM in accordance with legislation.

The following risk control methods for asbestos / ACM will be used during Construction:

- Removal and disposal of ACM
- Encapsulation of ACM
- Safe work practices, tools and equipment
- Personal Protective Equipment (PPE)
- Decontamination process.

D-3.2 Management of ACM

Factors that influence how ACM in soil is managed include:

- The form of the ACM and the likelihood that it will release fibres into the air
- The location, lateral extent and depth of ACM-impacts within the Project and
- The current and future uses of the Project, and whether these uses could affect the risk posed by ACM.

The presence of other contaminants may also affect the option selected to manage ACM. Where there is uncertainty in how to assess these factors, the Project Manager will seek advice from Transport for NSW Environmental Manager (or delegate) or Contamination Specialist.

The checklists provided in table 4-1 and table 4-2 provide a method to evaluate the feasibility of source removal and encapsulation, and the selection of the most appropriate ACM management option.

D-3.3 Remediation of Asbestos

As outlined in Section 6.6 of the Soil, Water & Contamination Management Plan, prior to impacting on any areas of known contamination, a Remediation Action Plan (RAP) will be prepared which will be:

- prepared or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme and reviewed by an EPA-accredited Site Auditor; and
- prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the Contaminated Land Management Act 1997 and must include measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use when the Remedial Action Plan is implemented.

Prior to commencing with the remediation works, Transport for NSW will submit to the Planning Secretary for information the Remediation Action Plan and an Interim Audit Advice or a Section B Site Audit Statement prepared by a NSW EPA-accredited Site Auditor which certifies that the Remedial Action Plan is appropriate and that the site can be made suitable for the proposed use.

Once reviewed by the auditor, the Remedial Action Plan must be implemented, and any changes must be approved in writing by the EPA-accredited Site Auditor.

Where remediation has taken place, a Section A1 Site Audit Statement — or a Section A2 Site Audit Statement (SAS) accompanied by an Environmental Management Plan — and a Site Audit Report (SAR) must be prepared certifying that the remediation works have made the land suitable for the intended land use. The SAS and SAR must be submitted to the Planning Secretary no later than one (1) month prior to the commencement of operation of the approved land use.

Additional RAP’s may be required following an Unexpected Contamination Find upon the advice from the Contamination Consultant or the Site Auditor.

D-3.4 Source removal and off-site disposal

Following advice from the Contamination Specialist, removal of ACM will be conducted by an appropriate asbestos removalist subcontractor.

The Contamination Specialist will attend and monitor any asbestos / ACM removal works or remediation measures undertaken for treatment of asbestos / ACM on site.

McConnell Dowell will provide appropriate validation to demonstrate removal of ACM using the above techniques has been successful.

D-3.5 Signage

McConnell Dowell will install warning signs and labels to clearly identify asbestos affected areas and where asbestos related work is being carried out. Protective barricades will be installed to delineate the asbestos related area/s and restrict unauthorised persons from entering the asbestos removal work. Stockpiles will be covered and labelled.

Signage and barricades will stay in place until all licensed asbestos removal work is complete and a clearance certificate is provided.

D-3.6 Control of airborne asbestos

An asbestos removalist may use techniques to eliminate or minimise the generation of asbestos fibres if required. The techniques include wet spraying method, saturation and water injection method and the dry method (only used if the wet spray method is not suitable due to safety reasons). McConnell Dowell will follow any directions provided by the asbestos removalist

D-3.7 Removal of asbestos / ACM

The Contamination Specialist will determine if a licensed asbestos removalist will be required for removal works. A licensed asbestos removalist will be required for removal works where there is friable asbestos, or at the discretion of the contamination specialist on whether removal needs to be conducted under licensed conditions..

There are two types of asbestos removal licences: Class A and Class B. The type of licence required depends on the type and quantity of asbestos or ACM to be removed, as outlined in Table 4-2.

Table 4-2: Asbestos removal licence classes

Licence type	What asbestos can be removed
Class A	Can remove any amount or quantity of asbestos or ACM, including: • any amount of friable asbestos or ACM • any amount of asbestos-contaminated dust or debris (ACD) • any amount of non-friable asbestos or ACM.
Class B	Can remove: • any amount of non-friable asbestos or ACM *Note: A Class B licence is required for removal of more than 10 m^2 of non-friable asbestos or ACM but the licence holder can also remove up to 10 m^2 of non-friable asbestos or ACM.* • ACD associated with the removal of non-friable asbestos or ACM *Note: A Class B licence is required for removal of ACD associated with the removal of more than 10 m² of non-friable asbestos or ACM but the licence holder can also remove ACD associated with removal of up to 10m² of non-friable asbestos or ACM*

No licence required	Can remove:
	• up to 10 m^2 of non-friable asbestos or ACM
	• ACD that is:
	  ○ associated with the removal of less than 10 m^2 of non-friable asbestos or ACM
	  ○ not associated with the removal of friable or non-friable asbestos and is only a minor contamination.

The licensed asbestos removalist will prepare an Asbestos Removal Control Plan prior to the removal of any asbestos / ACM. The Asbestos Removal Control Plan documents the specific

control measures to be implemented to ensure site personnel and others are not at risk when asbestos removal work is being conducted. It includes how the asbestos removal will be carried out, including the method, tools, equipment and PPE to be used and the asbestos ACM to be removed, including the location, type and condition of the asbestos / ACM.

The Transport for NSW Environmental Manager (or delegate) and Transport for NSW Project Manager will be informed prior to excavation or removal of asbestos or ACM.

If the removal activity is to occur in the vicinity of any occupied residence or business, McConnell Dowell's Community Relations Manager will notify the affected resident/s or business owner/s in accordance with the Community Communication Strategy.

D-3.8 Validation Report

In accordance with the Remediation Action Plan, following removal of asbestos / ACM and prior to commencing other works, a validation report will be prepared in accordance with NEPM (2013) to confirm that the remedial actions have been correctly adopted, sampling results have been collected and confirm the outcome of the site/area contamination investigation.

The Validation Report will be conducted by:

- an independent licensed asbestos assessor, for work that was carried out by a Class A licensed asbestos removalist
- an independent competent person, for asbestos work that is not required to be carried out by a Class A licensed asbestos removalist

To be independent, the licensed asbestos assessor must not be involved in the removal of asbestos for that specific job and is not involved in a business or undertaking involved in the removal of the asbestos for that specific job.

D-3.9 Disposal

The Asbestos Removal Control Plan prepared by the licensed asbestos removalist will include a waste disposal program that will detail the method of transport and location of disposal of asbestos / ACM removed from site and any other asbestos waste.

The licensed asbestos removalist will dispose of any asbestos waste at a licensed asbestos waste disposal site in accordance with NSW EPA guidelines (including *Waste Classification Guidelines* (EPA, 2014)) and relevant industry codes of practice. Disposal of ACM will be to an appropriate waste facility licenced to accept asbestos.

McConnell Dowell will notify the Transport for NSW Environmental Manager (or delegate) and Transport for NSW Project Manager at least 24 hours prior to removal of ACM from site and will provide details of the proposed method and location of disposal.

McConnell Dowell will maintain records of all asbestos / ACM disposed off site, the location of the facility at which it was disposed, and any receipt/certificate issued by the facility/disposal authority.

D-3.10 PPE & Decontamination

Decontamination of site personnel, PPE and tools used in asbestos removal work will be specified by the asbestos removalist subcontractor to minimise exposure and spread of asbestos outside of the removal area.

D-4 Monitoring, reporting and records

D-4.1 Monitoring

NATA accredited asbestos-fibre air monitoring shall be undertaken during asbestos remedial works, as required. Monitoring must be undertaken in accordance with the following:

- ISO 17025 – Test and Calibration
- *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC: 3003(2005)]* (National Occupational Health and Safety Commission, 2005)
- *How to Safely Remove Asbestos Code of Practice* (Safe Work Australia, August 2019).

D-4.2 Reporting

Reporting will be carried out in accordance with the requirements of the Asbestos Management Plan.

Any asbestos finds will be reported by the Environment & Sustainability Lead to the Transport for NSW Environment Manager (or delegate) and the EPA in accordance with the Environmental Incident Classification and Reporting Procedure (refer Appendix A7 of the CEMP).

D-4.3 Asbestos register

McConnell Dowell will maintain an Asbestos Register, that documents all identified or potential asbestos- containing material in the Project area. The Asbestos Register will contain the following information:

- Identification of any potential or asbestos-containing material
- Location, type and condition of the asbestos-containing material
- Date when the asbestos was identified
- Labelling of the asbestos
- Maps or photographs or diagrams detailing the location of the asbestos within the Project area.

The Asbestos Register will be made available to the Transport for NSW Environmental Manager on request for inclusion in Project Monthly Reports.

Appendix C: Acid Sulfate Soil Management Plan

Attachment B – Acid Sulfate Soil Management Procedure

Introduction

Context

This Acid Sulfate Soils Management Procedure (ASSMP) has been prepared to address the requirements of the Minister's Conditions of Approval (MCoA). The ASSMP has been developed following the guidance from the NSW Acid Sulfate Soil Manual (1998).

Table 1 EIS Environmental Mitigation Measures

CoA No.	Condition	How Addressed
SW3	Identify all reasonably foreseeable risks relating to soil erosion, soil contamination, asbestos, acid sulfate soils and water pollution associated with undertaking the activity. Describe how these risks will be managed and minimised including the management of potential acid sulfate soils and potential contamination.	This Procedure

Purpose

The purpose of this ASSMP is to describe how McConnell Dowell proposes to manage the possibility of acidic sulfate soils being encountered during the construction of the Project.

Objectives

The key objective of this ASSMP is to ensure that a management procedure is in place so that if any acidic sulfate soils are encountered, they are controlled in a way that minimise the impact upon the surrounding environment during the construction of the project.

To achieve this objective, McConnell Dowell will undertake the following:

- ensure appropriate controls and procedures are in place and implemented during construction activities to avoid or minimise the impact of acidic sulfate soils on the Project and;
- ensure appropriate monitoring is carried out during the project to ensure controls are being implemented and maintained.

Scope of works

The scope of construction for the Project encompasses a land and water component.

A description of the land works is as follows:

- Setting up the construction compound
- Removing existing viewing platform at Kurnell
- Constructing the wharves including piling
- Constructing the wharf tie-in area including footpaths/landscaping
- Installing / relocating utilities

- Hardscaping & landscaping
- Removing construction compound

A description of the water works includes:

- Constructing the temporary crane platform (La Perouse) and temporary causeway (Kurnell)
- Constructing the wharves

Environmental aspects and impacts

Acid Sulfate Soils

Acid sulfate soils is the common name given to naturally occurring soil and sediment containing iron sulfides. A significant issue with acid sulfate soils is that when they are exposed to air, oxidation occurs and results in sulfuric acid as a bi-product. Depending on the environmental context, sulfuric acid can drain into waterways and can cause short and long-term consequences on humans and the environment; the potential impacts include:

- The sulfuric acid bi-product can be carried into water ecosystems and kill and influence mortality rates on local flora and fauna;
- Corrosion of infrastructure and;
- Exposure to sulfuric acid can cause skin irritation, eye damage, headaches, irritation of gastrointestinal tract, serious respiratory and heart problems, insomnia and prolonged exposure may lead to paralysis or meningitis.

Site characteristics

Site setting

Refer to Chapter 4 of SWMP.

Mapped ASS

The estimated amount of disturbance on land during construction is approx. 4,390 cubic metres at La Perouse and approx. 2,723 cubic metres at Kurnell. However, as discussed in section 17.2.6 of the EIS, there is an extremely low probability (1-5%) of ASS on land at La Perouse and a low (6–75%) to extremely low (1-5%) probability Kurnell.

While there is a high probability of ASS within Botany Bay, the estimated level of sediment that would be brought to the surface is low and therefore it is unlikely that ASS will pose a significant issue if material is not exposed to oxygen.

As such, the key area of risk for ASS / PASS at Kurnell for earthwork activities conducted within the low (6–75%) probability area. If ASS or PASS is encountered onsite, this procedure is to be followed.

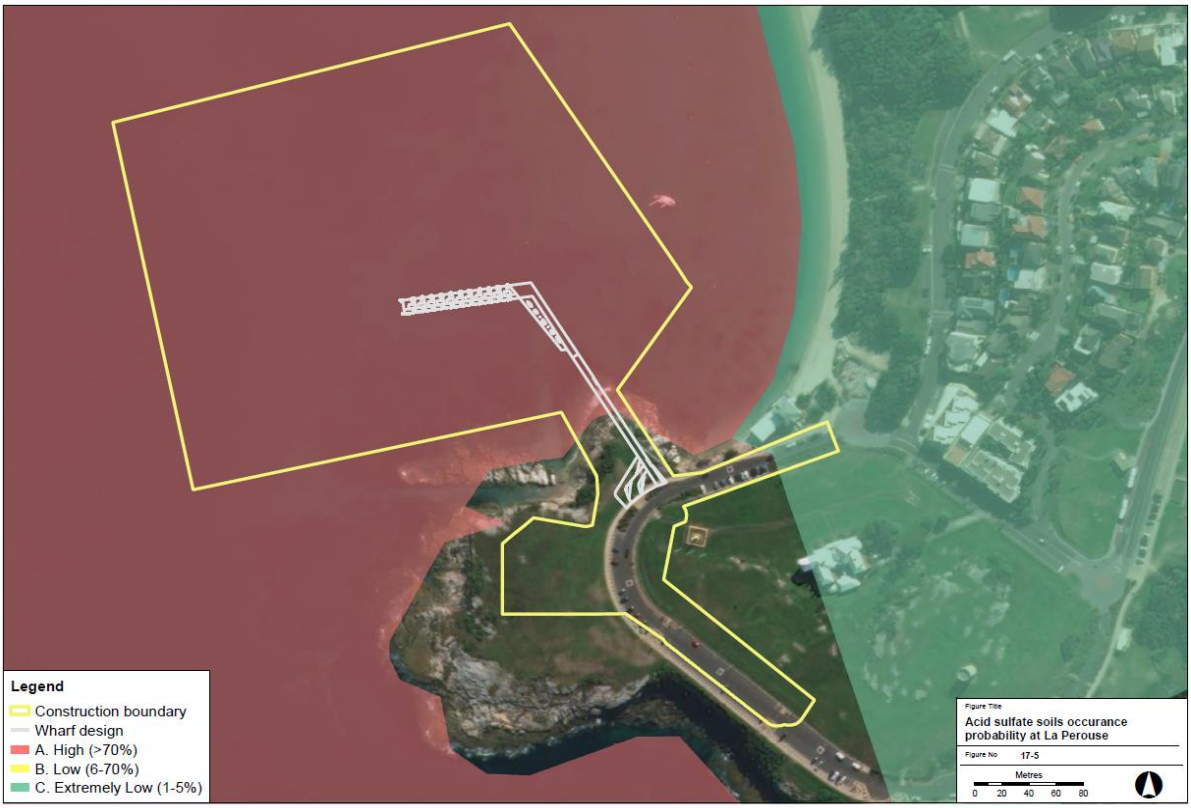

Figure B-8-1 ASS occurrence probability at La Perouse

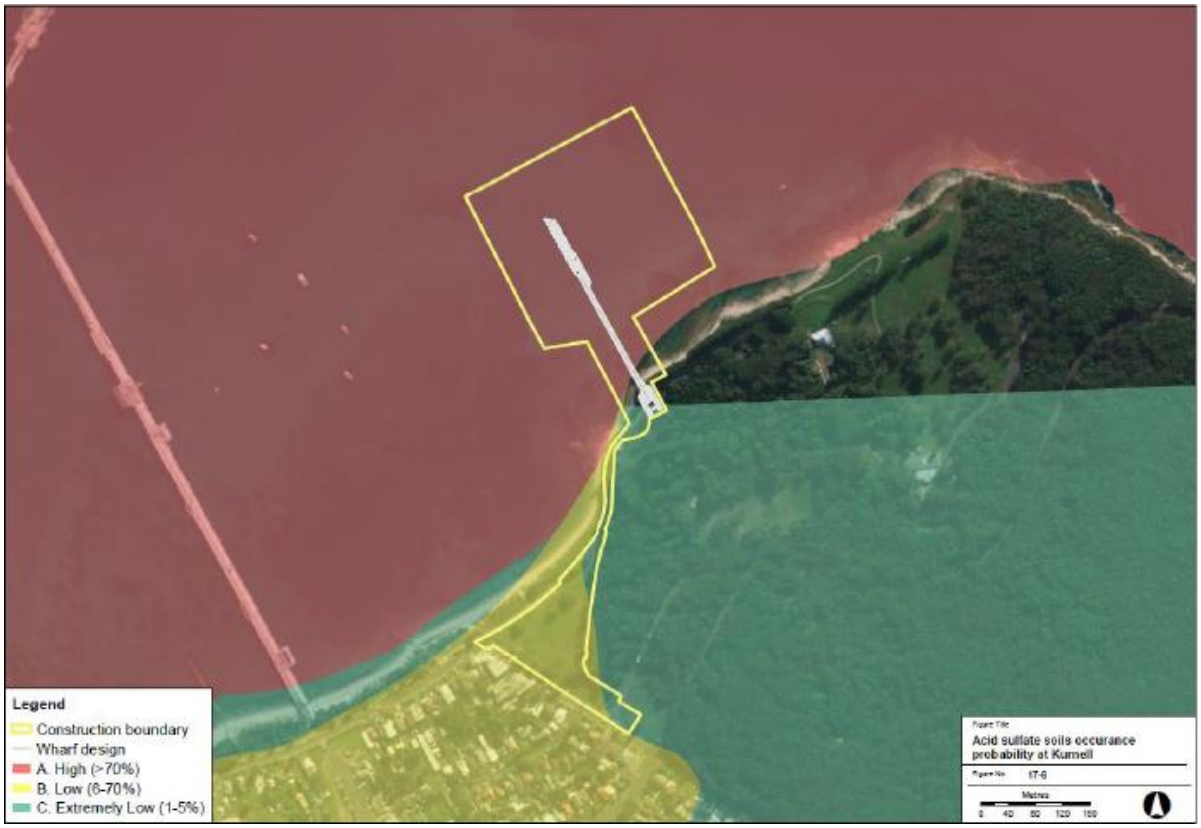

Figure B-2 ASS occurrence probability at Kurnell

Construction activities and other impacts

In general, aspects of the Project that may cause potential issues regarding acid sulfate soils include:

- Disturbing the natural state of the site through excavation works
- Temporary stockpiling of excavated materials for backfilling purposes;
- Dust suppression and/or other activities requiring the use of water where run-off is produced
- Existing stormwater drainage characteristics
- Open trenching works and human exposure to material and
- Carting-off excavated material.

Management and mitigation strategies

Identification of ASS

The first step to managing acid sulfate soils is being able to identify whether or not there is indeed a presence of it to begin with. Acid sulfate soils can be defined as either ‘actual’ or ‘potential’.

Actual acid sulfate soils are those that are exposed to the air and hence produce sulfuric acid.

Potential acid sulfate soils are those that are waterlogged but have the potential to produce sulfuric acid if exposed to the air. Physical indicators of potential and actual acid sulfate soils are listed in Table 2.

Table 2 Indicators of the Presence of Acid Sulfate Soils

Potential Acid Sulfate Indicators	Actual Acid Sulfate Indicators
a) Presence of mangroves, reeds, rushes, salt marsh or swamp vegetation etc b) Sulfurous (rotten egg) smell after rain, following a dry spell or when the soils are disturbed c) Marine or estuarine sediments d) Soils can be described as unripe muds/sediments (soft, buttery, blue grey or dark greenish grey) which can include sands and gravels e) Milky blue/green water f) Shell fragments in the soil g) Waterlogged, scalded or backswamp areas and h) Land below 5m AHD elevation.	i) Any jarosite (a pale-yellow mineral deposit) or iron oxide (rusty) colouring j) Extensive iron stains on any drain surfaces, or iron stained drain water and ochre (natural clay earth pigment) deposits k) Corrosion of concrete and/or steel structures l) Surface or ground water on or draining from the site with a pH < 5.5, an unusually clear or milky green colour and m) Sulfurous (rotten egg) smell when soils are disturbed.

Management and mitigation during construction

Management procedures

Not disturbing ASS by adjusting depths of proposed earthworks and construction layouts are the best measures of ASS management. Construction plans may change subsequent to the release of this ASSMP and such changes should be made with best practice of managing ASS in mind.
A staged excavation process should be undertaken, which has the following advantages:

a) Further characterisation and delineation of suspected PASS can take place quickly and more accurately in smaller sized excavations
b) The quantity of PASS required to be treated will be reduced
c) Stockpiling of PASS, and the associated environmental risks will be avoided and
d) The ability to identify stratified PASS layers within the soil profile with the allowance to treat/manage individually.

PASS should be kept separate from non-PASS soil at all times. Excavation works should be conducted during dry periods, where possible, to minimise risk of overflow of treatment areas.

Any fill material deemed to be ASS needs to be excavated and treated separately from the natural strata under controlled conditions considering it may be asbestos contaminated. Controls will need to be in place and an occupational hygienist engaged to ensure the excavations and treatment of asbestos contaminated ASS does not create an exposure risk.

See Table 3 for an outline of mitigation/control measures, monitoring requirements, responsibility and frequency of various aspects regarding managing acid sulfate soils during the dry works construction of the Project.

Environmental Work Method Statement

If ASS treatment is required onsite, an Environmental Work Method Statements (EWMS) will be prepared and implemented to outline the location and design of the treatment pad, specific volume of material expected to be treated, dosing rates, training requirements and additional environmental controls that may be required.
The development of the EWMS will be conducted in consultation with the subcontractor(s) that will be undertaking ASS treatment works and will include this ASSMP.

Neutralising materials

Agricultural lime (Aglime) is a cost effective and readily available neutralisation material to treat ASS and PASS due to its ease of handling and low solubility. Aglime contains pure calcium carbonate (CaCO3) and is made from limestone which is crushed and sieved into a fine powder.

Pure calcium carbonate has a neutralisation value (NV) of 100. The neutralisation value is a term used to rate the neutralising ability of different materials against pure calcium carbonate. Aglime is typically sold with a NV of 95 – 98 and pH of 8.5 – 9.

For treatment of small quantities of water, the application of Aglime may be a suitable treatment method but is difficult to effectively mix with water due to its low solubility.

Hydrated lime Ca(OH)2 is a slightly soluble, strongly alkaline (NV of up to 135), neutralising agent, commonly used to neutralise acidity in bodies of water such as sediment or containment ponds. However, great care is required when handling and applying hydrated lime so as to not overshoot the required pH adjustment.

Sodium bicarbonate is another agent used to neutralise acidic water which is less alkaline than hydrated lime but highly soluble. Usage of sodium bicarbonate allows more accurate monitoring of water pH levels, however is generally more expensive.

Treatment pads

Small volumes of PASS material are expected to be treated from earthworks undertaken on site, in particular the land side earthworks conducted within the low (6–75%) ASS / PASS probability area at Kurnell (refer to figure B-2).

All ASS neutralisation should be carried out on a treatment pad onsite. The treatment pad must collect and isolate the leachate from the surrounding environment, while being able to effectively accommodate the size and weight of machinery as well as the PASS itself.

The design requirements for a treatment pad and treatment methodology for ASS are outlined below:

- Identify a suitable location for the treatment pad on site. The treatment pad should be located on stable ground and away from overland flow paths and water bodies.
- Prepare an impervious base of compacted non-ASS clayey material at least 0.3 m thick to prevent stockpile seepage into soil and groundwater. Have the base slightly domed to prevent pooling of acidic leachate in the centre of the pad.
- Create guard layer of Aglime on top of the base to neutralise any acidic leachate generated on the treatment pile. As a minimum, 5 kgs of Aglime per square metre of vertical fill should be used for all ASS with <0.1% oxidisable sulfur. Guard layer thickness is to be monitored and maintained.
- Suitable bund walls and leachate collection drains should be established around the treatment pad to manage any leachate or stormwater runoff from the pad
- Surfaces inside the bund area should also be layered with Aglime to neutralise any acidic runoff. Drainage channels and a retention pond will need to be installed for large quantities of runoff
- During excavation, AASS or PASS material should be placed onto treatment pads in layers up to 0.3 m thick. Excavated PASS material may need to be dried before treatment on the limed pad. Treatment of ASS should commence as soon as the material is dry enough to be mixed effectively with the neutralising agent to minimise oxidisation
- A 1 m flat area should be left between the toe of the spread soil and the containment bund/drain. Care should be taken during spreading of the first layer not to disrupt the lime guard layer
- The application of Aglime should be done in accordance with the calculated liming rate and thoroughly mixed with the layer of ASS to be treated
- Once the batch of ASS has been mixed and verification tests confirm the ASS has been neutralised, this layer may be compacted and an additional layer added, or the stockpile of treated ASS may be removed from the pad
- The process of spreading, liming, mixing and verification testing is to be repeated for subsequent layers/batches of ASS until excavation is complete.

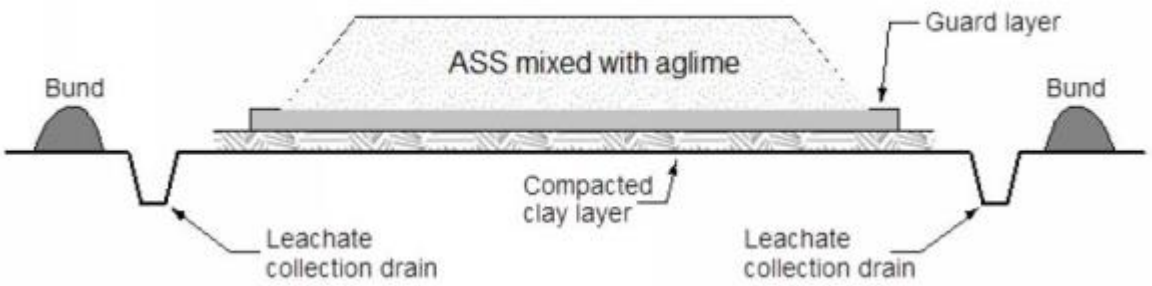

Figure 3: Schematic cross section of a treatment pad showing; base layer, guard layer and containment bunding with leachate collection drains (ASSMAC Acid Sulfate Soils Assessment Guidelines 1998).

Indicative lime rates

The below is an indicative lime application rate for treatment of ASS. A net acidity value of 28 mol H+/t for the site has been estimated. The following assumptions have been made:

- Aglime NV of 98%
- Bulk soil density of 1.3 t/m3 and
- A safety factor of 1.5.
    - = 2.1 kg aglime/ m3

It should be noted that this is an indicative liming rate only based on existing laboratory analysis conducted on the site. The lime application rate will need to be recalculated if further laboratory analysis identifies the net acidity varies from 28 mol H+/t.

Verification tests and performance

Management procedures

The recommended sample rate for treated ASS with <0.5% oxidisable sulfur is:

- A minimum of 2 samples initially, and then 1 sample per 1,000m3.
- Once a layer of ASS has been treated, sampling by Consara for analysis should be undertaken according to the above density.

The following performance criteria must all be met for soil that has been treated using neutralisation:

- Net acidity is zero or negative (neutralising capacity of the soil following treatment is greater than the sum of the existing and potential acidity)
- PH range for treated soil is 6.5<pH<8.5.

If results from the laboratory analysis do not comply with the above criteria, the ASS will require additional treatment. Following successful verification, the layer can be compacted, and another layer added on top for treatment.

Contingency plans

Failed ASS treatment

Where treatment of ASS on neutralisation pads has failed the verification test criteria, the following steps as part of this contingency plan include but are not limited to:

- Conduct additional Consara sampling and laboratory analysis on ASS (prior to treatment) to verify existing net acidity and recalculate liming rate if required
- Treat the failed ASS batch and future batches with additional Aglime

- Investigate the condition of the treatment pad and consider reconstruction or redesign
- Reduce the quantities of ASS to be treated at a time and
- Reconsider mixing methods to ensure adequate mixing

Table 3 Mitigation/Control Measures During Construction

Aspect	Controls/Mitigation Description	When to Implement	Responsibility	Monitoring Requirements
Staging Works	Construction activities during the Project will be scheduled to minimise the time acid sulfate soil material is exposed to air. This involves undertaking excavation works so that acid sulfate soil can be backfilled as quickly as possible and to minimise the exposure time of soils in open trenching works for services.	Ongoing	MCD Superintendent MCD Environment Representative	Program scheduling
Stockpile Management	Bunding to surround stockpiled material and/or appropriate battered diversion banks.	As required	MCD Superintendent MCD Environment Representative	Daily visual inspection
	Impermeable material (plastic) to be placed under and covering stockpiled material. Edges of cover to be weighed down appropriately.			
	Stockpile to be located away from overland stormwater paths, drainage infrastructure and water systems.			
	Distinct layers of excavated materials to be separated accordingly with geofabric or similar material.			
Sediment and Erosion Controls	See Attachment A of the SWMP for Sediment & Erosion Controls.	Daily	MCD Environment Representative	Daily & weekly EHS checklists
WHS	All workers on site must wear the mandatory PPE (hard hart, long sleeve shirt and long pants, steel cap boots, hi-visibility vest or clothing). In addition, during activities involving open trench works and excavation, glasses and safety glasses must be worn.	Daily	MCD Superintendent	Daily & weekly EHS checklists

Aspect	Controls/Mitigation Description	When to Implement	Responsibility	Monitoring Requirements
	Geofabric to line trench surfaces in open excavations to minimise contact with potential acid sulfate soil and/or other sources of contamination.	As required	MCD Superintendent MCD Environment Representative	Daily visual inspection

Implementation of the RAP

If required, a Remediation Action Plan (RAP) will be developed in accordance with MCoA E64, E65 E66 & E67 by a suitably qualified professional.

Unexpected Contaminated Finds Procedure

During construction works, if the material excavated is contaminated and cannot be distinguished as an acid sulfate soil and thus this ASSMP and its management and mitigation measures do not apply, the management procedures to be followed should be an outcome of the Unexpected Contaminated Finds Procedure. See Attachment C Unexpected Contaminated Finds Procedure.

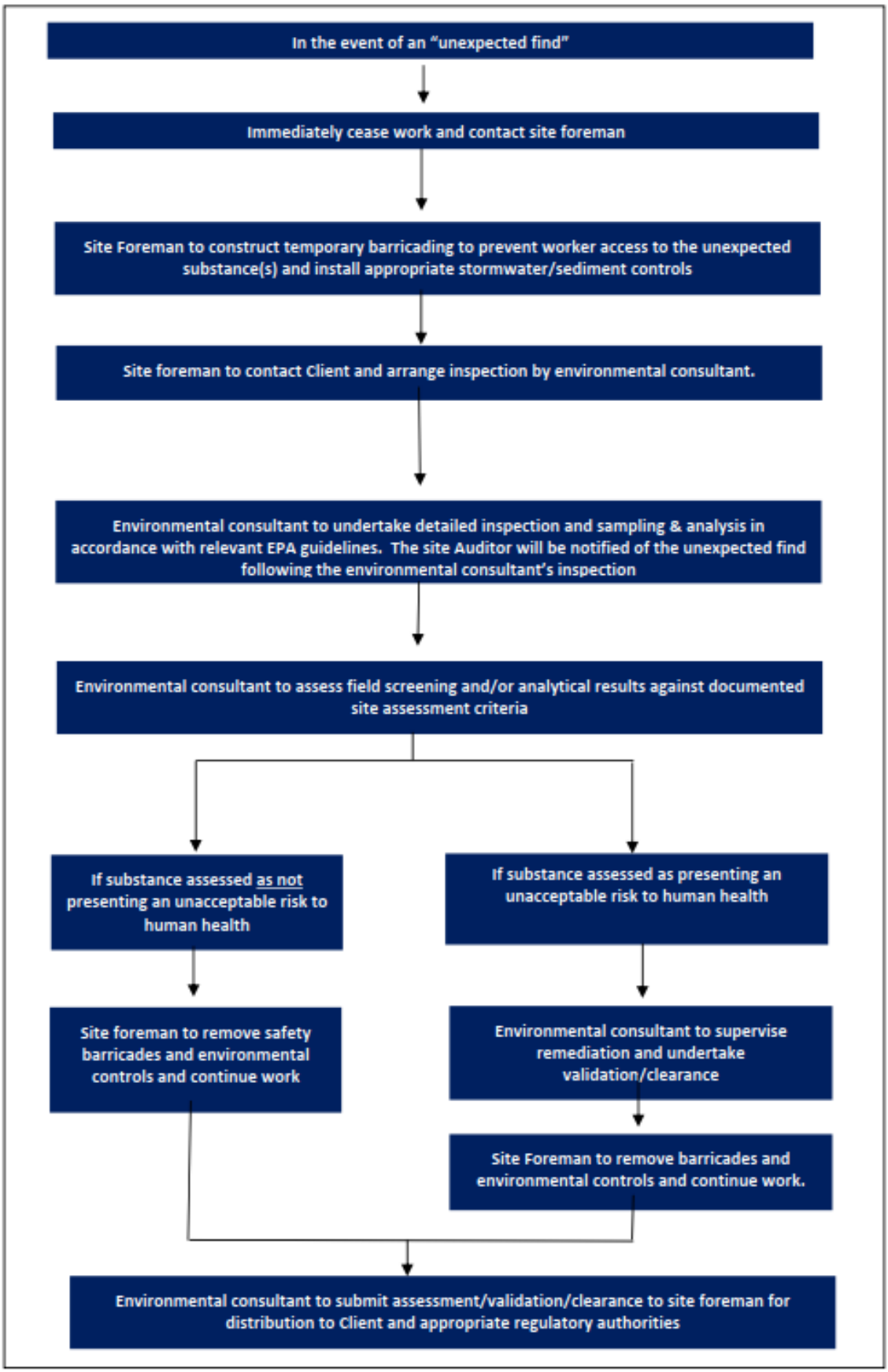

Figure 4: Unexpected Contaminated Finds Procedure

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