Appendix E

Soil and Surface Water Management Sub-plan

Western Harbour Tunnel

April 2024

THIS PAGE LEFT INTENTIONALLY BLANK

Document control

Approval and authorisation

Approved on behalf of ACCIONA by	Andrew Marsonet
Signed	
Dated	17 December 2022

Document status

Revision	Date	Description	Approval
Rev A	16/12/2022	For TfNSW review	E. Woodward
Rev B	23/01/2023	For external consultation	E. Woodward
Rev 00	06/03/2023	For DPE review	E. Woodward
Rev 01	03/04/2023	For DPE review / approval	E. Woodward
Rev 1.1	14/08/2023	Updated to include Stage 3C. For external consultation	E. Woodward
Rev1.2	16/01/2024	Updated following external consultation	M.Lee / E.Woodward
Rev 1.3	22/02/2024	For ER review	C. Weller
Rev 02	19/03/2024	For ER endorsement & DPE review	C. Weller
Rev 03	22/04/2024	Updated following DPHI review	M. Lee / C. Weller

Contents

Figures

Tables

Glossary/ Abbreviations

Abbreviations	Expanded text
AEP	Annual exceedance probability. The chance of a rainfall or a flood event exceeding a nominated level in any one year, usually expressed as a percentage. For example, if a peak flood level has a 5% AEP, it means that there is a five per cent chance (that is one-in-20 chance) of being exceeded in any one year. The frequency of floods is generally referred to in terms of their AEP or ARI. In this Soil and Surface Water Management Plan (SSWMP) the frequency of floods generated by runoff from the study catchments is referred to in terms of their AEP, for example a 1% AEP flood.
CSSI	The Critical State Significant Infrastructure, as described in Schedule 1, the carrying out of which is approved under the terms of this approval
CEMP	Construction Environmental Management Plan
Construction	Has the same definition as Schedule 1 of the planning approval (SSI #8863)
DPI	New South Wales Department of Primary Industries
DPE	New South Wales Department of Planning and Environment
EESG	Environment, Energy and Science Group of the Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EPA	New South Wales Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
Environmental Representative (ER)	The Environmental Representative(s) for the CSSI approved by the Planning Secretary
MCoA	Minister's Conditions of Approval
MOD2	Western Harbour Tunnel and Warringah Freeway Upgrade TBM solution of crossing Sydney Harbour – Modification 2
Non-compliance	Failure to comply with the requirements of Project approval or any applicable licence, permit or legal requirements
Non-conformance	Failure to conform to the requirements of Project system documentation including the CEMP or supporting documentation
PESCP	Progressive Erosion and Sediment Control Plan
PIRMP	Pollution Incident Response Management Plan

Abbreviations	Expanded text
Planning Approval Documents	Approval documentation as listed under MCoA A1
POEO Act	*Protection of the Environment Operations Act 1997(NSW)*
Project, the	Western Harbour Tunnel project
REMM	Revised Environmental Management Measures
Roads and Maritime	Roads and Maritime Services (now Transport for New South Wales)
RtS	Response to Submissions Report
RUSLE	Revised Universal Soil Loss Equation
SAMs	Sensitive Area Maps
SDS	Safety Data Sheet
SMART	Specific, Measurable, Achievable, Realistic, and Timely principles
SSWMP	Soil and Surface Water Management Sub-plan
SWMP	Surface Water Monitoring Program
TfNSW	Transport for New South Wales (formerly Roads and Maritime)
WFU	Warringah Freeway Upgrade
WIPA	Water Pollution Impact Assessment
WHT	Western Harbour Tunnel

1 Introduction

1.1 Context

This Soil and Surface Water Management Sub-plan (SSWMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Western Harbour Tunnel (WHT) Project) component of the Western Harbour Tunnel and Warringah Freeway Upgrade project.

This SSWMP has been prepared to address the soil and surface water requirements of the Minister's Conditions of Approval (MCoA) for the Western Harbour Tunnel and Warringah Freeway Upgrade project (SSI #8863), the Western Harbour Tunnel and Warringah Freeway Upgrade Environmental Impact Statement dated January 2020 (the EIS), the Western Harbour Tunnel and Warringah Freeway Upgrade Response to Submissions report dated September 2020 (the RtS), Western Harbour Tunnel and Warringah Freeway Upgrade TBM solution of crossing Sydney Harbour – Modification 2 (MOD2), and applicable guidelines and legislation.

This Plan describes how ACCIONA propose to manage potential soil and surface water impacts during the construction of the Project.

1.2 Background and project description

The Western Harbour Tunnel and Warringah Freeway Upgrade project comprises a new motorway tunnel connection across Sydney Harbour, and an upgrade of the Warringah Freeway to integrate the new motorway infrastructure with the existing road network and to enable the future connection of the Beaches Link and Gore Hill Freeway Connection project.

The Project will connect the approved M4-M5 Link in Rozelle to the Warringah Freeway at North Sydney/Cammeray. The Project will traverse from Rozelle to Cammeray, primarily comprising twin 6.5-kilometre bored/excavated tunnels with a crossing of Sydney Harbour, supported by surface based ancillary facilities.

The EIS was prepared to assess the impacts of construction and operation of the WHT and WFU project. As part of the EIS development, specialist papers associated with, surface water quality and hydrology, contamination, flooding and marine water quality were prepared to address the soils and surface water issues (*Technical working paper: Surface water quality and hydrology*, Appendix O of the EIS, *Technical working paper: Contamination*, Appendix M of the EIS, *Technical working paper: Flooding,* Appendix R of the EIS and *Technical working paper: Marine water quality*, Appendix Q of the EIS). The findings of the technical papers were summarised in Chapter 16 (Geology, Soils and Groundwater) Chapter 17 (Hydrodynamics and water quality0 and Chapter 18 (Flooding) of the EIS.

A Response to Submissions Report (RtS) was prepared in response to submissions received on the EIS. The RtS includes clarifications as well as further detail relating to soils and surface water management issues of the Project. The EIS environmental management measures were revised and included in Part D of the RtS.

The Western Harbour Tunnel and Warringah Freeway Upgrade project was declared to be Critical State Significant Infrastructure (CSSI) by the Minister for Planning and Public Space (the Minister) on 9 November 2020 and approved by the Minister on 21 January 2021.

The MOD2 application proposes to modify the construction methodology across Sydney Harbour from an immersed tube tunnel (IMT) design with transition structures at both ends of the harbour crossing, to a tunnel boring machine (TBM) methodology and to include an additional construction ancillary facility at Emu Plains. MOD2 was lodged on 14 July 2023 and was approved by the Minister on 27 January 2024. The RtS environmental management measures were revised and included in Appendix B2 of the MOD2 report, with specific soil and surface water measures contained in this Plan.

This Plan covers management of potential impacts on soils and surface water associated with construction of the Project identified within the documents listed in the planning approval. Detail on

these potential impacts is provided in Section 6 and will be managed through the implementation of mitigation and management measures detailed in Section 7.

1.3 Scope of the Sub-Plan

The scope of this Plan is to describe how ACCIONA will manage potential soil and surface water impacts during construction of the Project.

As described in Transport for New South Wales (TfNSW) Staging Report, this Project will be managed in stages with the CEMP. This document applies to the WHT Package 3B and 3C which includes the following scope:

Stage 3B – WHT Northern Tunnelling and Integration works

- Excavation of twin mainline tunnels about 2.5 kilometres long and each accommodating three lanes of traffic in each direction, connecting portals adjacent to the Cammeray Golf Course to the Harbour Crossing section of the tunnel at Berrys Bay.
- Excavation of Falcon Street off-ramp tunnel.
- Excavation of Berry Street on-ramp tunnel.
- Cut and cover infrastructure surface construction at the Ridge Street North construction support site (WHT9), Berry Street and the Warringah Freeway portals.
- Integration works including Mechanical and Electrical (M&E) fit out for the Southern and Northern tunnelling sections, paving, surface connections, ventilation cavern fitout, integration and fitout of the Motorway Operation Centre (MOC) and Motorway Control Centre (MCC)
- Establishment and operation of White Bay (WHT3 – southern portion. The northern portion of WHT3 as described in the EIS will not be used); Ridge Street North (WHT9), and Cammeray Golf Course (WHT10) construction support sites.
- Operation of the City West Link Portal tunnelling support site (WHT12) after the completion of Stage 3A.
- Installation of acoustic structures.
- Utilities connections including but not limited to power, potable water, sewerage.
- Carrying out of surveys, test drilling, test excavations, geotechnical or contamination investigations or other tests or surveys, sampling or investigation.

Stage 3C – WHT Sydney Harbour Crossing

- Excavation of about 1.8 km of twin mainline tunnels using Tunnel Boring Machine (TBM) methodology.
- Construction of launch chambers beneath Birchgrove, and receival chambers and burial beneath the Waverton Peninsula.
- Establishment and operation of an underground slurry treatment plant within an existing ventilation cavern (constructed by the Stage 3A contractor).
- Establishment and operation of an underground Water Treatment Plant.
- Establishment and operation of an underground grout batching plant.
- Access and egress via City West Link Portal (WHT12) for:
    - Spoil removal.
    - Materials and equipment delivery, including concrete tunnel segments and box culverts.
- Use of Ridge Street North (WHT9) as a tunnelling support site, including the construction of an acoustic shed.

- Construction and operation of an additional construction ancillary facility at Emu Plains (WHT13), primarily for the prefabrication and storage of tunnel lining segments, box culverts and other pre-cast concrete elements.

Requirements triggered by the 3B and 3C scope of works are identified in Table 3-1 and Table 3-2.

For more details on staging refer to the Staging Report, which has been prepared in accordance with MCoA A10.

1.4 Interface with other planning documents

This Plan is a component of a suite of documents, prepared as part of the implementation of the Project's Environmental Management System. The Environmental Management System overview is described in Section 4.1 of the CEMP.

The key documents that interface with this Plan are outlined in Table 1-1.

Table 1-1 Key interfaces with the SSWMP

Plan	Interface
CEMP	• The CEMP provides details on: ◦ Overall Project staging, interactions between the CEMP and other plans, and management of cumulative impacts. ◦ A framework for how the construction works will be managed. ◦ Procedures, processes and management systems that will apply in relation to construction activities. ◦ Environmental planning and controls for construction including environmental risk assessment, regulatory requirements, protection measures and sustainability requirements.
Surface Water Monitoring Program (SWMP)	• Provides details of ongoing surface water monitoring required throughout Project construction to compare actual construction impacts to predicted impacts.
Water Reuse Strategy	• Details how water (including groundwater) encountered during construction is to be reused if practicable.
Sustainability Management Plan	• Details the Project's sustainability strategy. • Details how the Project will achieve an adequate Infrastructure Sustainability Council Infrastructure Sustainability (IS) rating.
Waste & Resource Management Sub-plan	• Details how potential waste and resource use impacts during construction of the Project will be managed
Groundwater Management Sub-plan (GMP)	• Details the requirements for management and mitigation measures for the discharges of treated water from the wastewater treatment plants during Construction.
Community Communication Strategy (CCS) and Complaints Management System (CMS)	• Describes how community and stakeholder engagement will be managed and facilitates communication about construction of the project with the community as well as relevant councils and agencies. • Specifies the process for receiving, addressing, resolving and recording complaints as well as outlines the process required in the escalation of a complaint to an independent mediator.

2 Purpose and objectives

2.1 Purpose

The purpose of this SSWMP is to describe how ACCIONA will manage and protect soils surface water quality during construction of the Project.

This SSWMP has been prepared to address the applicable statutory requirements and aims to ensure that commitments made, in the planning approval are met with regards to the protection of soils and surface water quality conditions.

2.2 Objectives

The objective of the SSWMP is to ensure that all avoidance, mitigation, and management measures relevant to the protection of soils and surface water quality are properly implemented.

To achieve these objectives, ACCIONA will undertake the following:

- Ensure appropriate controls and procedures are implemented during Project construction activities to address potential soil and surface water impacts, as well as manage risks from analysis of relevant construction activities.
- Ensure appropriate measures are implemented to address the relevant MCoA requirements outlined in Table 3-1, as well as the relevant revised environmental management measures outlined in Table 3-2.
- Implement relevant legislation and other requirements detailed in Section 3.1 of this Plan.

Furthermore, ACCIONA will meet the performance outcomes from Table 28-4 of the EIS that are relevant to soil and surface water impacts, as required by MCoA C2(d)(i), as identified in Table 2-1 below.

Table 2-1 Performance outcomes identified in the EIS relevant to this Plan

Performance outcome	How performance will be addressed	Records
Water – Hydrology Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources	In respect to water (hydrology), the project has been developed such that: • Design and construction of the tunnels would minimise groundwater inflow • Opportunities for reuse of treated water during construction has been considered throughout project development • The environmental values of nearby, connected and affected water sources would be improved and/or maintained.	Environmental inspection records Detailed design Compliance Tracking and Environmental Auditing Water Pollution Impact Assessments Surface Water Monitoring Program

Performance outcome	How performance will be addressed	Records
Water – Quality The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project, to the extent of the project impact including estuarine and marine waters (if applicable).	In respect to water (quality), the project has been developed such that it: • Would operate under water quality discharge criteria with consideration of NSW Water Quality Objectives • Would effectively treat water to meet water quality discharge criteria.	Environmental monitoring records Compliance Tracking and Environmental Auditing Water Pollution Impact Assessments Surface Water Monitoring Program
Flooding The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure	In respect to flooding, the project has been developed such that: • Construction would be carried out in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of environmental management measures • Construction support sites and construction sites would be laid out such that flows are not significantly impeded • The project would maintain or reduce flood levels within and adjacent to the alignment.	Environmental inspection records Detailed design

Performance outcome	How performance will be addressed	Records
Soils The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.	In respect to soils, the project has been developed such that: • Erosion and sediment controls would be implemented in accordance with Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (DECC 2008), commonly referred to as the 'Blue Book' • Acid sulfate soils would be managed in accordance with good practice measures • Contamination would be managed to protect environmental values and human health.	Progressive Erosion and Sediment Control Plan Section 7.10 of this Plan Unexpected Finds Procedure

2.3 Targets

The following targets have been established for the management of soil and surface water impacts during the project Construction activities:

- Ensure full compliance with the relevant legislative requirements and the Planning Approval Documents.
- Environmental values of nearby, connected and affected water sources are improved and/or maintained
- Water discharged from construction sites meets discharge criteria that has been developed in consideration of the NSW Water Quality Objectives
- Construction support sites and construction sites are laid out such that surface water flows are not significantly impeded.
- Erosion and sediment controls are implemented and comply with Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (DECC 2008)
- The management measures and strategies defined in this document are implemented throughout construction.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

The main legislation and government policy requirements relevant to this Plan include:

- *Water Act 1912 and Water Management Act 2000*
- *Protection of the Environment Operations Act*
- *Waste Avoidance and Resource Recovery Act 2001*.

Other relevant legislation to this SSWMP is included in Appendix A1 of the CEMP.

3.1.2 Additional approvals, licences, permits and requirements

Additional approvals, licences, permits and requirements to this Plan include the Environment Protection Licence (EPL).

3.1.3 Guidelines and standards

The main guidelines, specifications, and policy documents relevant to this plan include:

- Acid Sulfate Soil Guidelines, Acid Sulfate Soil Management Advisory Committee, August 1998
- (National) Acid Sulfate Soil Sampling and Identification Methods Manual, Department of Agriculture and Water Resources, June 2018
- Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018
- DEC, Guidelines for Assessment and Management of Groundwater Contamination, 2007
- DEC, Environmental Best Management Practice Guideline for Concreting Contractors, 2004
- DPI, NSW Aquifer Interference Policy, 2012
- Managing Urban Stormwater: Soils and Construction (4th Edition) Volume 1 (the “Blue Book”), Landcom, 2004
- Managing Urban Stormwater: Soils and Construction (4th Edition) Volume 2A: Installation of Services, DECC, 2008
- Managing Urban Stormwater: Soils and Construction – Volume 2D: Main Road Construction, DECC, 2008
- NSW EPA, Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, 2004
- NSW EPA, Contaminated Land Guidelines – Consultants reporting on contaminated land, 2020
- NSW EPA, Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997, 2015
- NSW EPA, Waste Classification Guidelines, 2014
- Roads and Maritime Environmental Direction – Management of Tannins from Vegetation Mulch, 2012

- Roads and Maritime Environmental Procedure – Management of Wastes on Roads and Maritime Services Land, 2014
- Roads and Maritime, Guideline for the Management of Contamination, September 2013
- Roads and Maritime QA Specification G36 – Environmental Protection
- Roads and Maritime QA Specification G38 – Soil and Water Management
- Roads and Maritime QA Specification G40 – Clearing and Grubbing
- Roads and Maritime Technical Guideline – Management of Construction Site Dewatering, 2011
- RTA, Code of Practice for Water Management – Road Development and Management, 1999
- RTA, Erosion and Sediment Management Procedure, 2009
- RTA, Guideline for Construction Water Quality Monitoring, 2003
- RTA, Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze, 2005
- RTA, 'Section 8 Erosion and Sediment', Road Design Guideline, 2003
- TfNSW, Chemical Storage and Spill Response Guidelines, 2018
- TfNSW, Concrete Washout Guideline, 2019

3.2 Minister's Conditions of Approval

The MCoA relevant to this Plan are listed in Table 3-1. A cross reference is also included to indicate where and how the conditions are addressed in this Plan or other Project management documents.

3.3 Revised Environmental Management Measures

Relevant Revised Environmental Management Measures (REMMs), as identified in Appendix B2 of the MOD2, are listed in Table 3-2 below. A cross reference is also included to indicate where and how the REMMs are addressed in this Plan or other Project management documents.

Table 3-1 Conditions of Approval relevant to the SSWMP

MCoA No.	Condition Requirements	Document Reference	How Addressed
General			
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include: (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party; (c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) outline of the issues raised by the identified party and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	Section 4	Evidence of consultation will be submitted to the Planning Secretary with this document.
Construction Environmental Management Plan			

<table>
<tr><th>MCoA No.</th><th>Condition Requirements</th><th>Document Reference</th><th>How Addressed</th></tr>
<tr><td>C4</td><td>CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies as required by Condition A5.
<table>
<tr><th></th><th>Required CEMP Sub-plan</th><th>Relevant government agencies to be consulted for each CEMP Sub-plan</th></tr>
<tr><td>I</td><td>Soil and surface water</td><td>DPE Water, EESG, EPA, Sydney Water (if Sydney Water’s assets are affected) and relevant council(s)</td></tr>
</table></td><td>Section 4</td><td>This Plan has been prepared in consultation with the relevant agencies identified in this condition.</td></tr>
<tr><td rowspan="4">C5</td><td colspan="2">The CEMP Sub-plans must state how:</td><td></td></tr>
<tr><td>the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;</td><td>Section 2.2</td><td>This Plan was prepared in accordance with the environmental performance outcomes identified in the EIS and MOD2.</td></tr>
<tr><td>(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;</td><td>Table 3-2
Section 7</td><td>Relevant environmental management measures are detailed in Table 3-2 including where and how they are addressed in this Plan
Measures to achieve these requirements are detailed in Section 7 of this Plan.</td></tr>
<tr><td>(c) the relevant terms of this approval will be complied with; and</td><td>Table 3-1</td><td>Details of how ACCIONA will comply with the relevant terms of approval are listed in this Table,</td></tr>
</table>

MCoA No.	Condition Requirements	Document Reference	How Addressed
			including references to the relevant sections of this SSWMP.
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Section 7 CEMP (Environmental Risk Assessment Workshop) Appendix E2 – SWMP	Soil and surface water issues requiring management during construction of the Project have been identified through the EIS, RtS, MOD2 and Environmental Risk Assessment Workshop. These issues, including cumulative impacts, have been outlined in Appendix A2 of the CEMP. Environmental risk analysis will be ongoing and regularly reviewed in accordance with the CEMP.
C9	The CEMP Sub-plans must be submitted to the Planning Secretary for approval along with, or subsequent to, the submission of the CEMP but in any event, no later than one month before construction.	Section 2 of the CEMP	The CEMP Sub-plans will be submitted for approval to DPE with or subsequent to the final submissions of the CEMP for DPE approval at least one month before the commencement of construction.

<table>
<tr><th>MCoA No.</th><th>Condition Requirements</th><th>Document Reference</th><th>How Addressed</th></tr>
<tr><td>C10</td><td>Construction must not commence until the CEMP and all CEMP Sub-plans have been approved, unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where construction of the CSSI is staged, construction of a stage must not commence until the CEMP and sub-plans for that stage have been endorsed by the ER and approved by the Planning Secretary.</td><td>Section 2 of the CEMP</td><td>Construction of the Project will not commence until the CEMP and applicable Sub-plans as per the Staging Report have been approved, unless it is otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans will be implemented for the duration of construction.</td></tr>
<tr><td colspan="4">Construction Monitoring Programs</td></tr>
<tr><td>C11</td><td>The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP:<table><tr><th></th><th>Required Construction Monitoring Program</th><th>Relevant government agencies to be consulted for each Construction Monitoring Program</th></tr><tr><td>(c)</td><td>Surface Water Monitoring Program</td><td>DPE Water, (Sydney Water if any Sydney Water assets are impacted), EPA</td></tr></table></td><td>Appendix E2 – SWMP</td><td>The SWMP is included at Appendix E2 of this Plan</td></tr>
<tr><td>C12</td><td>Each Construction Monitoring Program must provide:
(a) details of baseline data available;
(b) details of baseline data to be obtained and when;
(c) details of all monitoring of the project to be undertaken;
(d) the parameters of the project to be monitored;
(e) the frequency of monitoring to be undertaken;</td><td>Appendix E2 – SWMP</td><td>The SWMP (Appendix E2) details the requirements to meet MCoA C12 in relation to monitoring, reporting and review. A compliance cross-referencing table is included in the SWMP to confirm where each item has been addressed.</td></tr>
</table>

MCoA No.	Condition Requirements	Document Reference	How Addressed
	(f) the location of monitoring; (g) the reporting of monitoring results and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Conditions C13 to C14.		
C17	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C11. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	Section 2 of the CEMP Section 4	This Program has been prepared in consultation with the relevant agencies identified in condition C11. Evidence of consultation will be provided to the Planning Secretary as a separate document.
C18	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one month before the commencement of construction.	Section 2 of the CEMP	The Construction Monitoring Programs will be submitted for approval to DPE with or subsequent to the final submissions of the CEMP for DPE approval at least one month before the commencement of construction.
C19	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been	Section 2 of the CEMP	Construction of the Project will not commence until the Construction Monitoring Programs have been approved,

MCoA No.	Condition Requirements	Document Reference	How Addressed
	approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.		and all relevant baseline data for the specific construction activity has been collected.
C20	The Construction Monitoring Programs, as approved by the Planning Secretary including any minor amendments approved by the ER must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 2 of the CEMP	The Construction Monitoring Programs will be implemented for the duration of construction and for any longer periods set out in the respective program.
C21	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Appendix E2 – SWMP	The SWMP defines the monitoring reporting requirements.
Soils			
E114	Prior to the commencement of any work, erosion and sediment controls must be installed and maintained, as a minimum, in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book'.	Section 7.1 Table 7-6 SWMM03, SWMM04	Progressive ESCP will be established (in consultation with a qualified Soil Conservationist) and implemented on an ongoing basis to manage potential erosion and sediment issues.
Contaminated sites			
E115	Prior to the commencement of any work that would result in the disturbance of moderate to high risk contaminated sites as identified in the documented listed in Condition A1, Detailed Site Investigations must be undertaken by a Contaminated Land Consultant certified under either the Environment Institute of Australia or 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.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document.

MCoA No.	Condition Requirements	Document Reference	How Addressed
E116	A Detailed Site Investigation Report must be prepared and submitted to the Planning Secretary for information following the completion of Detailed Site Investigations required by Condition E115. The report must be prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997 (NSW)* and prepared by a Contaminated Land Consultant certified under either the Environment Institute of Australia or 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. Nothing in this condition prevents the Proponent from preparing individual Site Contamination Reports for separate sites.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document.
E117	The Detailed Site Investigation Report must provide details on: (a) primary sources of contamination, for example potentially contaminating activities, infrastructure (such as underground storage tanks, fuel line, sumps or sewer lines) or site practices; (b) contaminant dispersal in air, hazardous ground gases, surface water, groundwater, soil vapour, separate phase contaminants, sediments, infrastructure (e.g. concrete), biota, soil and dust; (c) contaminant characterisation and behaviour (volatility, leachability, speciation, degradation products and physical and chemical conditions on-site which may affect how contaminants behave); (d) potential effects of contaminants on human health, including the health of occupants of built structures (for example arising from risks to service lines from hydrocarbons in groundwater, or risks to concrete from acid sulphate soils) and the environment; (e) potential and actual contaminant migration routes including potential preferential pathways;	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Detailed Site Investigation as described by this condition.

MCoA No.	Condition Requirements	Document Reference	How Addressed
	(f) the adequacy and completeness of all information available for use in the assessment of risk and for making decisions on management requirements, including an assessment of uncertainty; (g) the review and update of the conceptual site model from the preliminary and detailed site investigations; (h) nature and extent of any existing remediation (such as impervious surface cappings); and/or; (i) whether the land is suitable (for the intended final land use) or can be made suitable through remediation.		
E118	Should remediation be required to make land suitable for the final intended land use, a Remediation Action Plan must 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. The Remedial Action Plan must be 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. The Remedial Action Plan must be submitted to the Planning Secretary for information prior to undertaking remediation.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Remedial Action Plan as described by this condition.
E119	The Remediation Action Plan must include measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use and detail how the environmental and human health risks will be managed during the disturbance, remediation and/or removal of contaminated soil/sediment or groundwater. Nothing in this condition prevents the preparation of individual Remediation Action Plans for separate sites.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Remedial Action Plan as described by this condition.

MCoA No.	Condition Requirements	Document Reference	How Addressed
E120	Prior to commencing remediation, a Section B Site Audit Statement(s) must be prepared by an NSW EPA-accredited Site Auditor that certifies that the Remediation Action Plan is appropriate and that the site can be made suitable for the proposed use. The Remedial Action Plan must be implemented and any changes to the Remedial Action Plan must be approved in writing by the NSW EPA accredited Site Auditor. Nothing in this condition prevents the Proponent from engaging the Site Auditor to prepare Site Audit Statements for separate sites.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Section B Site Audit Statement as described by this condition.
E121	A Section A1 or A2 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary and Council after remediation and no later than prior to the commencement of operation of the CSSI. Nothing in this condition prevents the Proponent from obtaining Section A Site Audit Statements for individual parcels of remediated land.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Section A1 or A2 Site Audit Statement as described by this condition.
E122	Contaminated land must not be used for the purpose approved under the terms of this approval until a Section A1 or A2 Site Audit Statement is obtained which states that the land is suitable for that purpose and any conditions on the Section A Site Audit Statement have been complied with.	Section 7.10	A contaminated investigation and verification process has been identified for implementation as described within this document. This process describes the requirements of a Section A1 or A2 Site Audit Statement as described by this condition.
E123	An Unexpected Finds Procedure for Contamination must be prepared before the commencement of work and must be followed should unexpected contamination or asbestos (or suspected contamination) be excavated or otherwise discovered. The procedure must include details of who will be responsible for implementing the unexpected finds procedure and the roles and responsibilities of all parties involved. The procedure must be submitted to the Planning Secretary for information.	Appendix E4	An Unexpected Finds Procedure has been prepared and is included within this document as Appendix E4. This Procedure will be implemented for the entirety of construction.

MCoA No.	Condition Requirements	Document Reference	How Addressed
E124	The Unexpected Finds Procedure for Contamination must be implemented throughout construction.	Appendix E4	An Unexpected Finds Procedure has been prepared and is included within this document as Appendix E4. This Procedure will be implemented for the entirety of construction.
Water			
E206	The CSSI must be designed, constructed and operated so as to maintain the *NSW Water Quality Objectives* where they are being achieved as at the date of this approval, and contribute towards achievement of the *NSW Water Quality Objectives* over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the *NSW Water Quality Objectives*, in which case those requirements must be complied with.	Section 7.8	The mitigations described in this document are intended to meet the requirements of this condition, unless otherwise approved under an EPL.
Water – Construction Requirements			
E207	The Proponent must consider the *Guidelines for controlled activities on waterfront land Riparian corridors* (Department of Industry 2018) when carrying out work within 40 metres of a watercourse, including its bed.	-	Not applicable. No works occurring within 40m of a watercourse, with the exception of Glebe Island (WHT3) construction support site. However there are no riparian corridor or vegetated area between the site and the nearest watercourse.
E208	Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from construction water treatment plants to surface waters must not exceed:	Section 7.8 CEMP Appendix F – Groundwater Management Sub-plan	The EPL will specify appropriate discharge criteria. Prior to receiving an EPL any discharges will comply with requirements of this MCoA.

MCoA No.	Condition Requirements	Document Reference	How Addressed
	(a) the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018* (ANZG 2018) default guideline values for toxicants at the 90 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*; and (c) for bioaccumulative and persistent toxicants, the ANZG 2018 values at a minimum of 95 per cent species protection level. Where the ANZG 2018 does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG 2018 for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.		
E210	If construction stage stormwater discharges are proposed, a water pollution impact assessment will be required to inform licensing consistent with section 45 of the POEO Act. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk.	Section 7.8 Section 8.4 Table 7-6 SWMM06	WPIA to be prepared during establishment of project to inform discharge criteria to be updated in the EPL on approval, and monitored during plant operation.

MCoA No.	Condition Requirements	Document Reference	How Addressed
E211	Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from operation water treatment plants to surface waters must not exceed: (a) the ANZG 2018 default guideline values for toxicants at the 95 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000); and (c) for bioaccumulative and persistent toxicants, the ANZG 2018 guideline values at a minimum of 99 per cent species protection level. Where the ANZG 2018 does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG 2018 for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.	Section 7.8 Section 8.4	The specified guidelines will be utilised unless otherwise approved and accepted by the EPA and forming part of the Project EPL.

Table 3-2 Environmental management measures relevant to this SSWMP

Ref #	Commitment	Document Reference	How Addressed
SG5	Erosion and sediment measures will be implemented at all work sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2D (NSW Department of Environment and Climate Change, 2008), commonly referred to as the 'Blue Book'.	Section 7.1	Progressive ESCP will be established and implemented on an ongoing basis to manage potential erosion and sediment issues
SG6	Potentially contaminated areas directly affected by the project will be investigated and managed in accordance with the requirements of guidance endorsed under section 105 of the *Contaminated Land Management Act 1997*.	Section 7.10	Contractor to follow CLM Act, NEPM and requirements outlined in Section 7.10.

Ref #	Commitment	Document Reference	How Addressed
	This includes, but is not limited to, further investigations in potential areas of environment interest in the project footprint, including: • Balls Head peninsula • Waverton Park • Warringah Freeway (from North Sydney to Cammeray • WFU10 (Wicks Road construction support site. Subject to the outcomes of the investigations, a Remediation Action Plan will be implemented in the event that site remediation is warranted. The Remediation Action Plan will be prepared and implemented in accordance with Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and EPA, 1998). An independent NSW EPA Accredited site Auditor will be engaged where contamination is complex to review applicable contamination reports and evaluate the suitability of sites for a specified use as part of the project.		The following areas of environmental interest investgations have been carried out by other Contractors as part of another stage of the Western Harbour Tunnel and Warringah Freeway Upgrade project. • Warringah Freeway (from North Sydney to Cammeray) • WFU10 (Wicks Road construction support site). • Balls Head Peninsula would not be impacted by Stage 3B or 3C of the Project, as such, it is not applicable to this SSWMP.
SG7	Any soil/fill materials surplus to construction will be classified in accordance with the NSW EPA (2014a) Waste Classification Guidelines.	WRMP	Refer to the WRMP
SG8	Asbestos handling and management will be carried out in accordance with relevant legislation, codes of practice and Australian standards.	Section 7.10	Asbestos will be managed on site in accordance with the relevant codes of practices and standards. Where these relate to safety processes, these will be documented in the Projects safety documents.
SG11	The discovery of previously unidentified contaminated material will be managed in accordance with an unexpected contaminated lands discovery procedure, as outlined in the *Guideline for the Management of Contamination* (Roads and Maritime, 2013a).	Appendix E4	An Unexpected Finds Procedure has been prepared and is included within this document as Appendix E4. This Procedure will

Ref #	Commitment	Document Reference	How Addressed
			be implemented for the entirety of construction.
SG12	Prior to ground disturbance in high risk acid sulfate areas at Birchgrove Park, Berrys Bay and Whites Creek, testing will be carried out to determine the presence of acid sulfate soils. If acid sulfate soils are encountered, they will be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998).	Appendix E1 Acid Sulfate Soil Procedure Table 7-6 SWMM16 and SWMM17	Further testing will be conducted prior to ground disturbance in high risk acid sulfate areas at Birchgrove Park, Berrys Bay and Whites Creek. Appendix E1 Acid Sulfate Soil Procedure will be followed if acid sulfate soils are encountered
SG13	Ground gas investigations will be carried out in Waverton Park to assess for the potential presence of landfill generated gas which could impact on the construction and/or operation of the project. Ground gas investigations will be carried out in accordance (where applicable) with the Guideline for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2012).	Table 7-6 SWMM18	Guidance will be obtained from suitably qualified contaminated lands consultant as to the requirement for ground gas investigations at Waverton Park. If an investigation is required, it will be undertaken in accordance with Guideline for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2012
SG23	Emergency Spill procedures will be developed to avoid and manage accidental spillages of fuels, chemicals, and fluids to minimise the risk of human health impacts and contamination of groundwater.	Appendix E3- Emergency Spill Response Procedure Table 7-6 SWMM02, SWMM10	An Emergency Spill Response Procedure has been prepared for the Project.
WQ1	Erosion and sediment measures will be implemented at all work sites and surface road upgrades in accordance with the principles and requirements in *Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004), Managing*	Section 7.1 Table 7-6 SWMM04	A soil conservation specialist engaged for the Project will provide advice regarding erosion

Ref #	Commitment	Document Reference	How Addressed
	Urban Stormwater: Volume 2D Main Road Construction (NSW Department of Environment and Climate Change, 2008) and relevant guidelines, procedures and specifications of Transport for NSW. A soil conservation specialist will be engaged by both Transport for NSW and the Contractor for the duration of construction of the project to provide advice regarding erosion and sediment control including review of Erosion and Sediment Control Plans (ESCPs).		and sediment control including review of Erosion and Sediment Control Plans (ESCPs).
WQ2	Emergency spill procedures will be developed to avoid and manage accidental spillages of fuels, chemicals or fluids during construction.	Section 7.5 Appendix E3 – Emergency Spill Response Procedure Table 7-6 SWMM02	An Emergency Spill Response Procedure has been prepared for the Project.
WQ3	Discharges from wastewater treatment plants during construction will be required to meet the following discharge criteria: • The relevant physical and chemical stressors set out in of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000), and • The ANZG (2018) 90 per cent species protection levels for toxicants generally, with the exception of those toxicants known to bioaccumulate, which will be treated to meet the ANZG (2018) 95 per cent species protection levels, and • The draft ANZG default guideline values for iron (in fresh and marine water, if available) and zinc (in marine water).	Appendix E2 – SWMP	The EPL will specify appropriate discharge criteria. Prior to receiving an EPL any discharges will comply with requirements of this REMM.
WQ4	A freshwater quality monitoring program for the construction of the project will be developed and implemented, with consideration of the freshwater monitoring being carried out for the M4-M5 Link and Beaches Link and Gore Hill Freeway Connection projects. The program will be developed in consultation with the Environment Protection Authority, Department of Planning, Industry and Environment (Regions, Agriculture	Appendix E2 – SWMP	Freshwater quality monitoring program has been developed and will be implemented on the Project.

Ref #	Commitment	Document Reference	How Addressed
	and Resources), Department of Planning, Industry and Environment (Water), and relevant councils. Sampling locations and monitoring methodology will be in accordance with the *Guideline for Construction Water Quality Monitoring* (RTA 2003) and ANZG (2018). If exceedances of the criteria established under the freshwater monitoring program are detected, a management response will be triggered. This response will be documented within the construction freshwater quality monitoring program.		
WQ7	The potential for scour and erosion of watercourse bed and banks will be considered during the design of new and augmented discharge outlets. Construction work activities within or next to the watercourses and drainage lines will be minimised as much as reasonably practicable to minimise disturbance of sediments in or near the waterway.	Section 7 PESCP Design reports	No natural waterways are located within close proximity to the works footprint. Location of pit inlets and drainage lines will be identified on the PESCPs. Discharge outlets will be designed to prevent scour and erosion. Construction activities will be distanced from watercourse and drainage lines where possible.
WQ13	If sediment basins are required a Water Pollution Impact Assessment (also known as a discharge impact assessment or water pollution discharge assessment), commensurate with the potential risk and consistent with the National Water Quality Guidelines (ANZG (2018)) and Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) will be prepared to inform the discharge criteria.	Section 7.8	In accordance with EPL and surface water and groundwater monitoring programs.
F3	Entries to tunnel excavations, including cut and cover sections of tunnel, will be protected against frequent flooding by locating openings outside flood prone areas, and/or the provision of local bunding and flood protection barriers.	Table 7-6 SWMM09	Controls will be established at the entries to tunnel excavations, including cut and cover sections to manage frequency flooding.

Ref #	Commitment	Document Reference	How Addressed
F4	The flood standard adopted at each tunnel entry during construction will be developed taking into consideration the duration of construction, the magnitude of inflows and the potential risks to personal safety and the project works.	Table 7-6 SWMM10	The flood standard at each tunnel entry will consider the duration of construction, the magnitude of inflows and the potential risks to personal safety.
F5	Spoil stockpiles will be located in areas which are not subject to frequent inundation by floodwater, ideally outside the 1% AEP flood extent. The exact level of flood risk accepted at stockpile sites will depend on the duration of stockpiling operations, the type of material stored, the nature of the receiving drainage lines and also the extent to which that would impact flooding conditions in adjacent development.	Section 7.1 and Section 7.6 Table 7-6 SWMM07	Each work-site will be established in accordance with PESCP and the Heavy Rainfall and Flooding Response.
F6	Site facilities will be located outside high flood hazard areas based on a 1% AEP flood.	Section 7.7 Sensitive Area Maps Table 7-6 SWMM07	No-go areas identified, no set-down areas identified and included in SAM's.
F7	Flood emergency management measures for construction and operation of the project will be incorporated into relevant environmental and/or safety management documentation.	Section 7.6 Table 7-6 SWMM08	The requirements of this REMM are incorporated into section 7.6 of this management plan.
F8	Detailed construction planning will consider flood risk at construction sites and construction support sites. This will include: • A review of site layout and staging of construction activities to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required • Identification of measures to not worsen flood impacts on the community and on other property and infrastructure during construction up to and including the 1% AEP flood event where reasonable and feasible WHT/WFU • Measures to mitigate alterations to local runoff conditions due to construction activities.	Section 5.5 Section 7.1 Section 7.3 Section 7.7 Sensitive Area Maps	The requirements of this REMM are incorporated into various sections of this management plan.

Ref #	Commitment	Document Reference	How Addressed
F10	Stormwater from the southern upstream catchment of WHT13 will be piped under the proposed construction support site and discharged into the existing open drainage line. A diversion drain(s) would be incorporated into the Emu Plains construction support site (WHT13) layout to divert overland flows around site buildings and other sensitive facilities. The drains would also convey sufficient flows to minimise or avoid flood level increase in the upstream catchments.	Section 7.6	Installation of drainage to maintain offsite movement of upslope water.
F11	A basin(s) would be provided at the Emu Plains construction support site (WHT13) to compensate for the flood storage loss due to filling the existing basin(s) and the additional paved area. The basin(s) size would be determined by keeping the flow rate from the Emu Plains construction support site (WHT13) to the adjacent land unchanged.	Section 7.6	Installation of a basing to replace the existing basin and accommodate additional hardstand area.
F12	A Flood Evacuation Management Plan will be prepared, prior to commencement of bulk earthworks activities on Emu Plains site, for WHT13 to ensure all workers are evacuated prior to any flood emergency	Section 7.6	Preparation of a Flood Evacuation Management Plan prior to commencement of bulk earthworks activity for the Emu Plain site.
HR1	Dangerous goods and hazardous materials will be stored in accordance with supplier's instructions and relevant legislation, Australian Standards, and applicable guidelines and may include bulk storage tanks, chemical storage cabinets/containers or impervious bunds	Section 7.9	Appropriate handling and storage will be implemented on sites.

4 Consultation

4.1 Consultation for plan preparation

This Plan will be developed and finalised in consultation with Inner West Council, North Sydney Council, Penrith City Council, EESG, DPIE Water, Sydney Water (if any Sydney Water assets are impacted) and the EPA in accordance with MCoA A5. Consultation with each agency, including responses received and how any issues raised were addressed in the development of this Plan will be provided to the Planning Secretary along with this Plan.

4.2 Ongoing consultation

Any ongoing consultation with agencies, where required, will be undertaken in accordance with Section 7 of this Plan. Community feedback and complaints relating to Soil and Surface Water, will be managed in accordance with the Community Communication Strategy and Complaints Management System.

5 Existing Environment

The Project is located within the Inner West, North Sydney, Willoughby and Penrith Local Government Areas (LGAs), connecting Rozelle in the south with Naremburn in the north.

Commencing at the Rozelle Interchange, the mainline tunnels will pass under Balmain and Birchgrove, then cross Sydney Harbour between Birchgrove and Balls Head. The tunnels will then continue under Waverton and North Sydney, linking directly to the Warringah Freeway to the north of the existing Ernest Street bridge. Refer to Figure 5-1 below for the current project footprint and construction support sites.

The areas surrounding the project alignment and construction support sites are mostly residential, except for clusters of commercial and industrial receivers around the North Sydney central business district.

The following sections summarise existing Soil and Surface Water Management Plan within and adjacent to the Project Area. The key reference document is Chapter 16 (Geology soils and groundwater), Chapter 17 (Hydrodynamics and Water Quality), Appendix O (Surface water quality and hydrology), Chapter 18 (Flooding), Appendix R (Flooding), of the EIS.

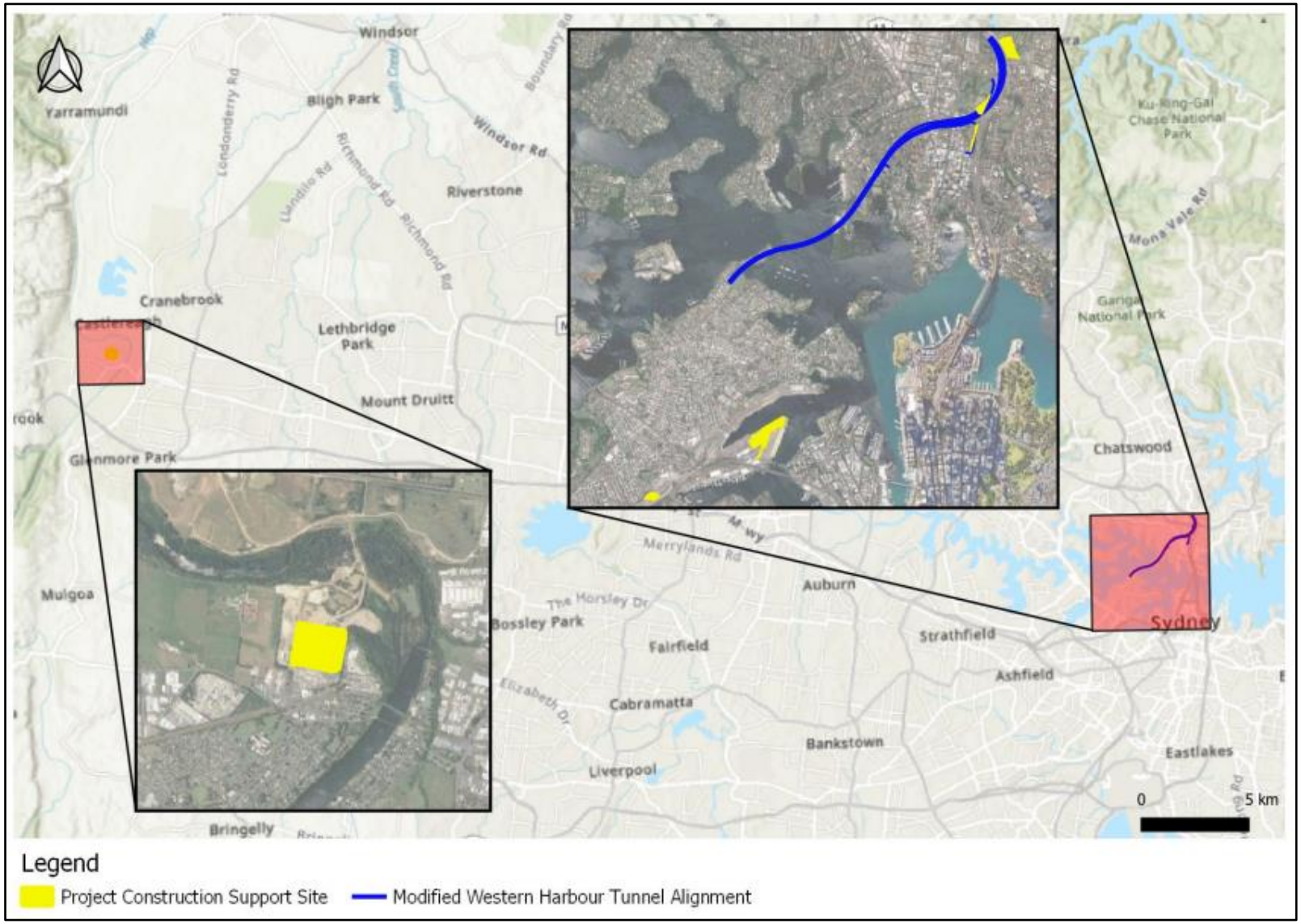


Figure 5-1 Project Footprint

5.1 Topography and soil characteristics

The project area topography has a moderate incline towards North Sydney, reaching an elevation of around 90 metres Australian Height Datum at the Pacific Highway, North Sydney.

Hawkesbury Sandstone (Rh) underlies the majority of the project area, with isolated occurrences of Ashfield Shale (Rwa) in the north-eastern portion of the project area, around North Sydney and Neutral Bay. The solid geology within the study area is crosscut by a number of geological structural features that may impact groundwater flow. These include dykes and geological faults: Mapping of these features is provided in Figure 5-2 below.

The Sydney 1:100,000 Soil Landscape Series Sheet 9130 (NSW Department of Mineral Resources, 1983) indicates that the residual soils within the project area include Blacktown (bt), Disturbed (xx), Hawkesbury (ha), and Gymea (gy) landscape groups. The majority of the project area is underlain by the Gymea landscape group with Hawkesbury landscape group surrounding the shorelines and isolated occurrences of the Blacktown landscape group around North Sydney.

The acid sulfate soil probability between Balls Head to Crows Nest was assessed as C4 (extremely low probability/very low confidence) and B4 (low probability/very low confidence) at Artarmon. Class 1 and Class 2 acid sulfate soil risks have however been mapped in the vicinity of the Rozelle Rail Yards and Birchgrove Park.

Based on the classification scheme presented in the Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soils Management Advisory Committee, 1998a), any works (Class 1) below natural ground surface and/or works by which the water table is likely to be lowered (Class 2) could present a risk.

Naturally occurring soil salinity is not expected to be encountered within the project footprint. Ashfield Shale may contain marine salts which will result in saline groundwater.

The Emu Plains (WHT13) construction ancillary facility currently consists of fill, compacted and graded at various levels. The site is raised in the east and slopes towards a drainage channel in the central east of the site. West of the drainage channel, the site levels increase and become relatively flat. The central and eastern portions of the site is currently utilised as a stockpiling area for gravel and aggregate and resource recovery stockpiling. The western portion is currently used for the storage of various plant and equipment.

The site is considered to be ‘disturbed terrain’ as the original soil has been removed, greatly disturbed or buried. The site consists of extensive excavation of natural quaternary deposits, including sand mining, and anthropogenic deposits. Refer to Figure 5-3 below.

The natural, undisturbed geology of the area consists of alluvial terrace deposits (silty clay, fine to medium grained quartz-lithic sand and polymictic gravel (Clastic Sediment)) and quaternary alluvium consisting of sand, silt and gravels derived from sandstone and shale.

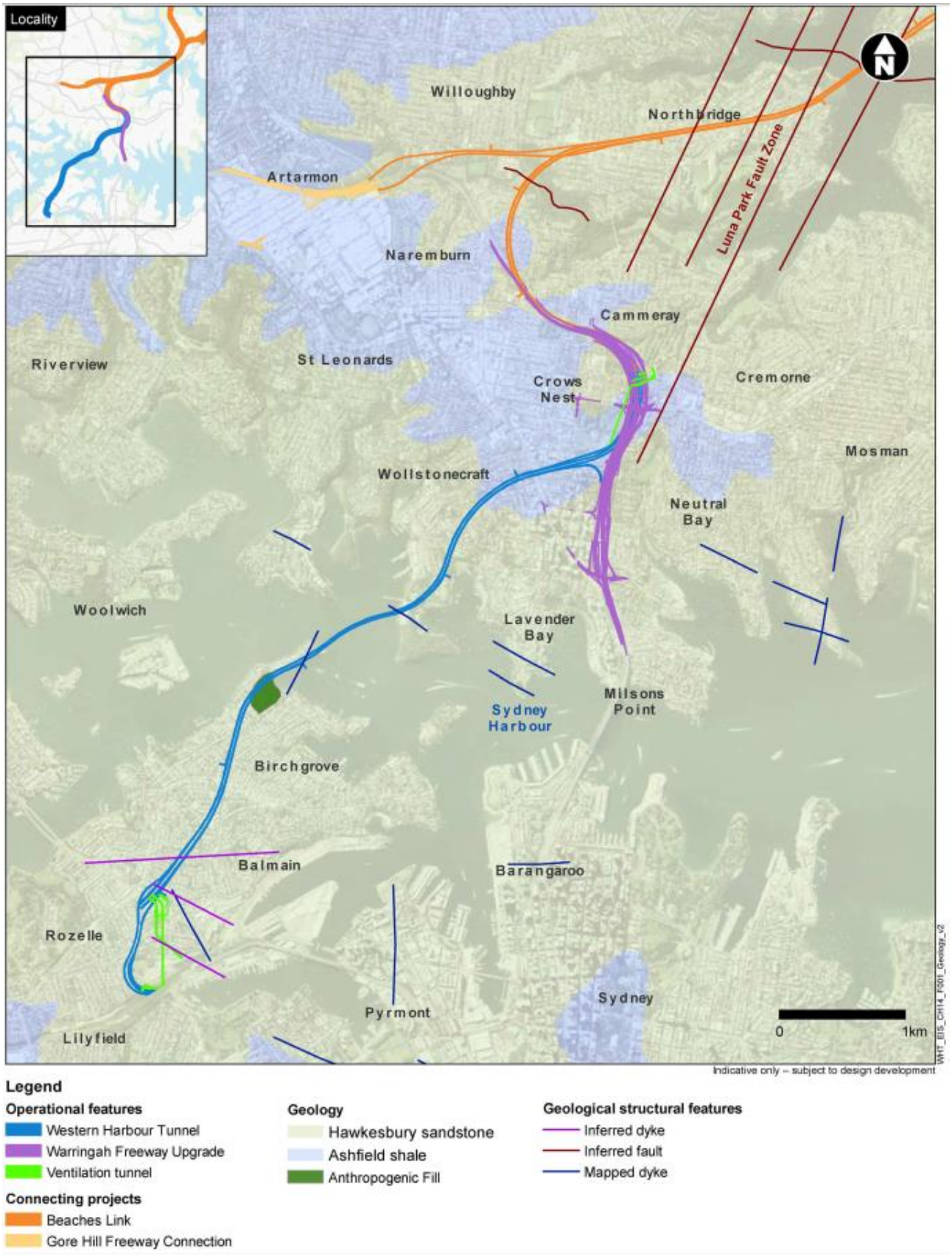


Figure 5-2 Regional geological context of the Project in Inner West and North Sydney area

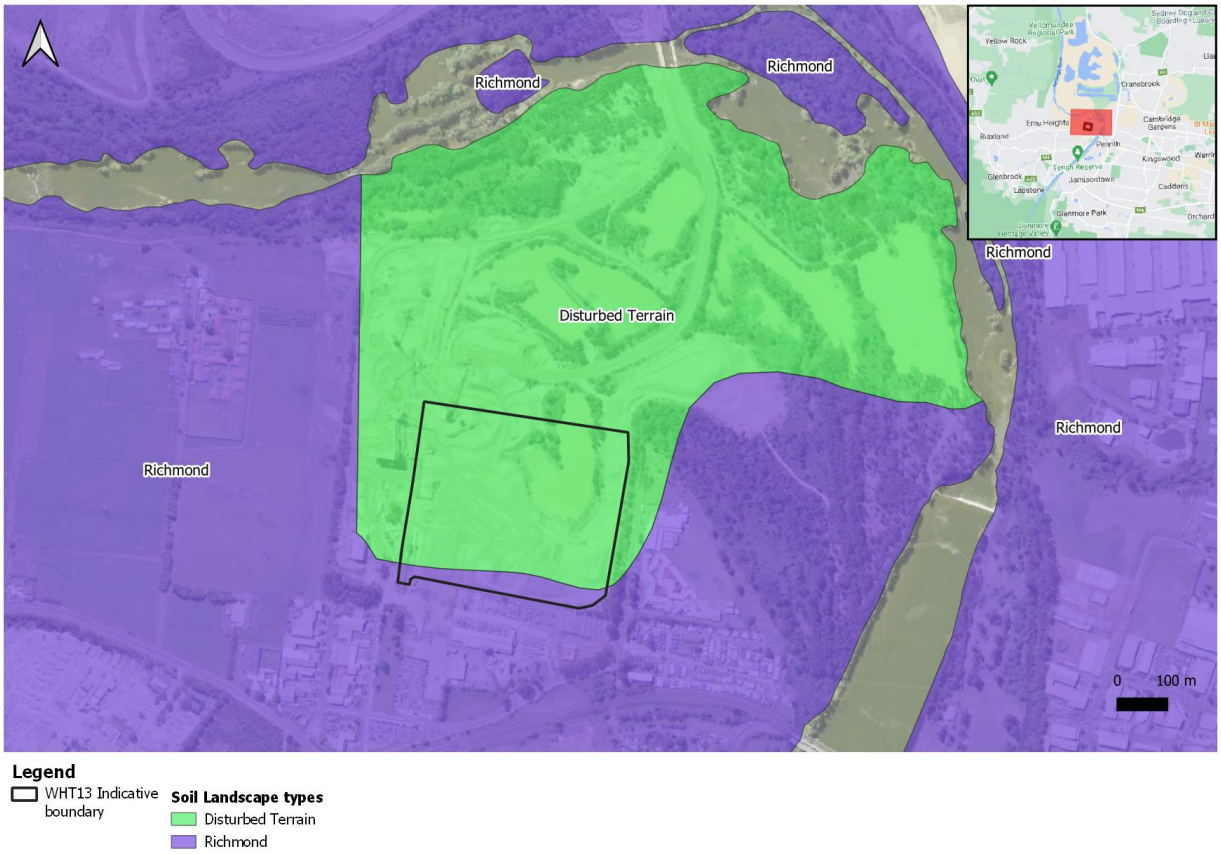


Figure 5-3 Local geological context of Emu Plains construction ancillary facility

5.2 Surface water

Surface water investigations were undertaken as part of the EIS and are presented in Appendix O of the EIS (Technical working paper: Surface water quality and hydrology).

5.2.1 Existing Drainage Regimes

The Project Area intersects the following surface water catchment areas:

- Anderson Park
- White Creek
- Willoughby Creek

The main bodies of water surrounding the project area are Middle Harbour and Sydney Harbour, which are estuaries. The White Creek catchment discharges into Sydney Harbour whilst Willoughby Creek discharges into Middle Harbour. A brief description of these waterways is provided in Table 5-1.

The Emu Plains construction ancillary facility (WHT13) is located approximately 500 metres from the Nepean River. The site generally slopes downwards towards an artificial drainage channel. The site surface is highly modified, consistent with the continued use of the site over several decades.

Currently the existing WHT13 site (operated by Boral) contains several dams, including two tailings management dams, three sedimentation dams and one clean water management dam (Refer to Figure 5-6). These dams exist in a semi-closed system where water is collected from surrounding stormwater and used on site.

Table 5-1 Description of key waterways and catchments relevant to the Project

Waterway/ catchment	Description	Relevant project features
Sydney Harbour (Sydney Harbour and Parramatta River regional catchment)	• Sydney Harbour in the context of the project comprises two main tributaries: Lane Cove River and Parramatta River • The bathymetry near the Harbour Crossing is complex and irregular with defined channels, shallow bays including Balls Head, Snails Bay and Berrys Bay, and deep holes up to 32 metres deep • The hydrodynamic conditions at the proposed Harbour Crossing are primarily influenced by astronomical tides with other influences from barometric effects (environmental air pressure), wind and freshwater flows from local creeks and rivers being comparatively small.	• White Bay construction support site (WHT3) drains into White Bay • Southern portion of the Project drains towards Neutral Bay.
Anderson Park Catchment	• Small concrete lined channel (about 400 metres long) in the densely developed suburbs of Sydney. It drains a catchment dominated by residential areas and roads. • Headwaters are in the suburb of Neutral Bay and flows in a southerly direction discharging to Neutral Harbour which connects to the greater Sydney Harbour.	Ridge Street (WHT9) construction support sites.

Waterway/ catchment	Description	Relevant project features
Whites Creek (Whites Creek catchment) 	• Small creek (about two kilometres long) in the densely developed inner western suburbs of Sydney. It drains a catchment dominated by residential areas and roads • Headwaters are in the suburbs of Stanmore and Leichhardt, and flows in a northerly direction discharging to Rozelle Bay, Sydney Harbour • The complete length of the creek is a stormwater drain with buried pipes in the upper reaches and open concrete channel for the lower one kilometre Sydney Water has begun works on naturalising Whites Creek due to its deteriorated condition. It is likely to incorporate features such as sandstone blocks and vegetated benches to provide ecological benefits to the channel.	Rozelle Rail Yards construction support site (WHT1). – no longer proposed for use. Rozelle Tunnel Portal (WHT12) is nearby, but does not drain directly into this catchment.
Willoughby Creek (Willoughby Creek catchment) 	• Willoughby Creek is a small, modified concrete and rock channel which drains the suburbs of Neutral Bay and Cammeray directly into Willoughby Bay at Cremorne • The development of impervious surfaces within the catchment has increased the volume and rate of runoff, which has in turn necessitated flood mitigation measures • Willoughby Bay and Long Bay are popular boating and swimming areas for local residents.	Cammeray Golf Course (WHT10) construction support sites.

The locations of the waterways and catchments associated with the project are shown in Figure 5-4 and Figure 5-5.

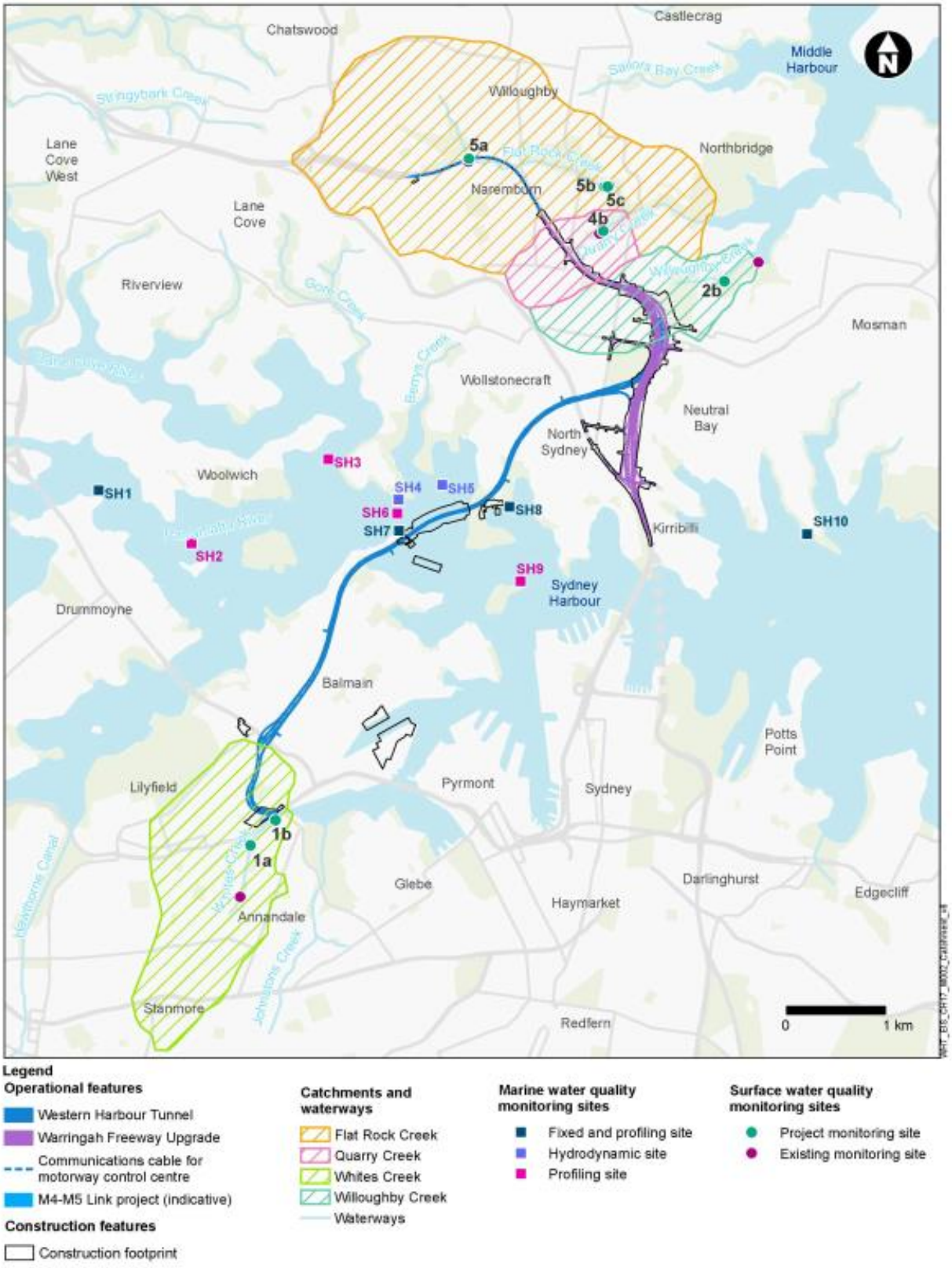


Figure 5-4 Catchments, waterways, and water quality monitoring locations (Sourced: Chapter 17 of the EIS)

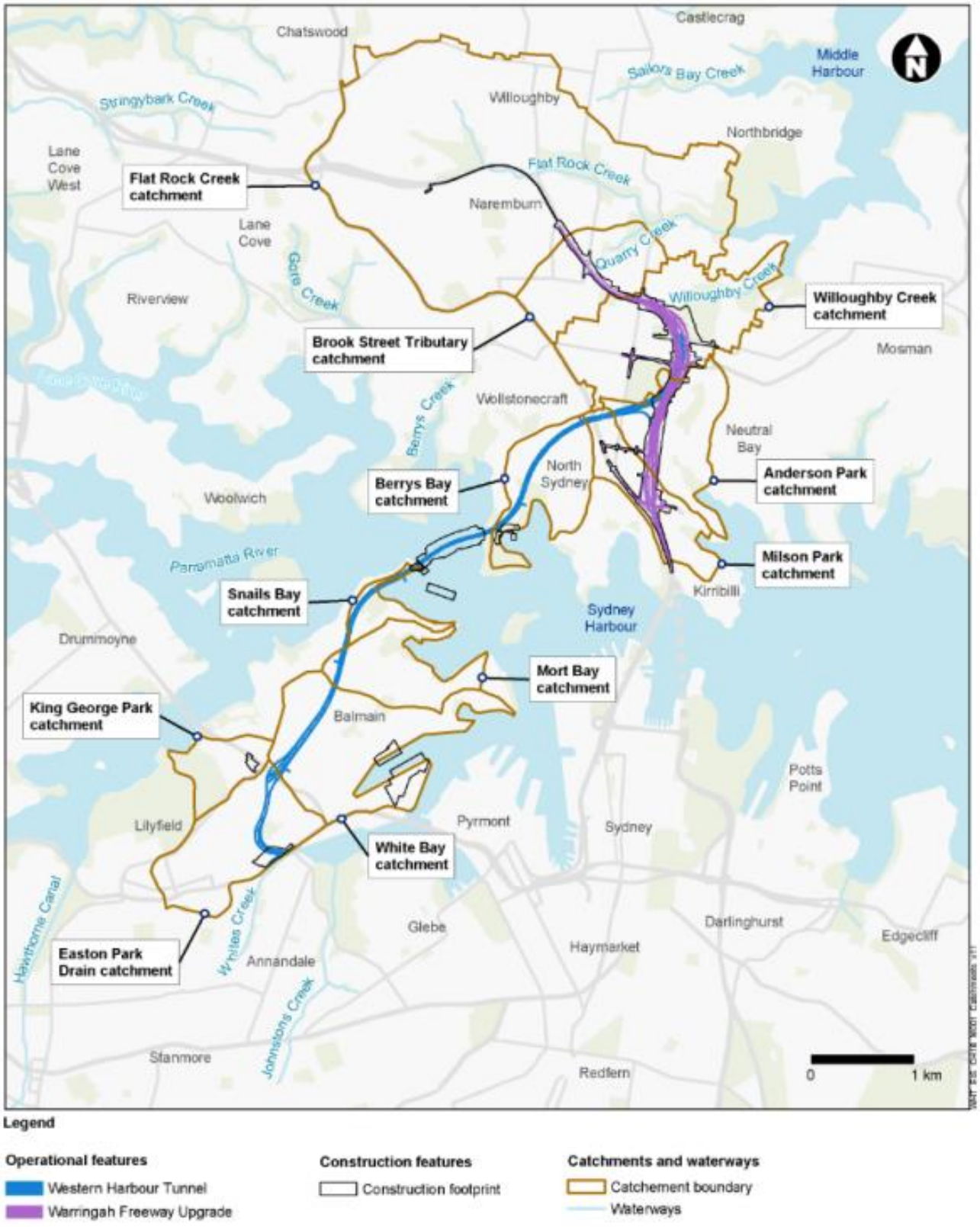


Figure 5-5 Catchment Areas (Sourced: Chapter 18 of the EIS)

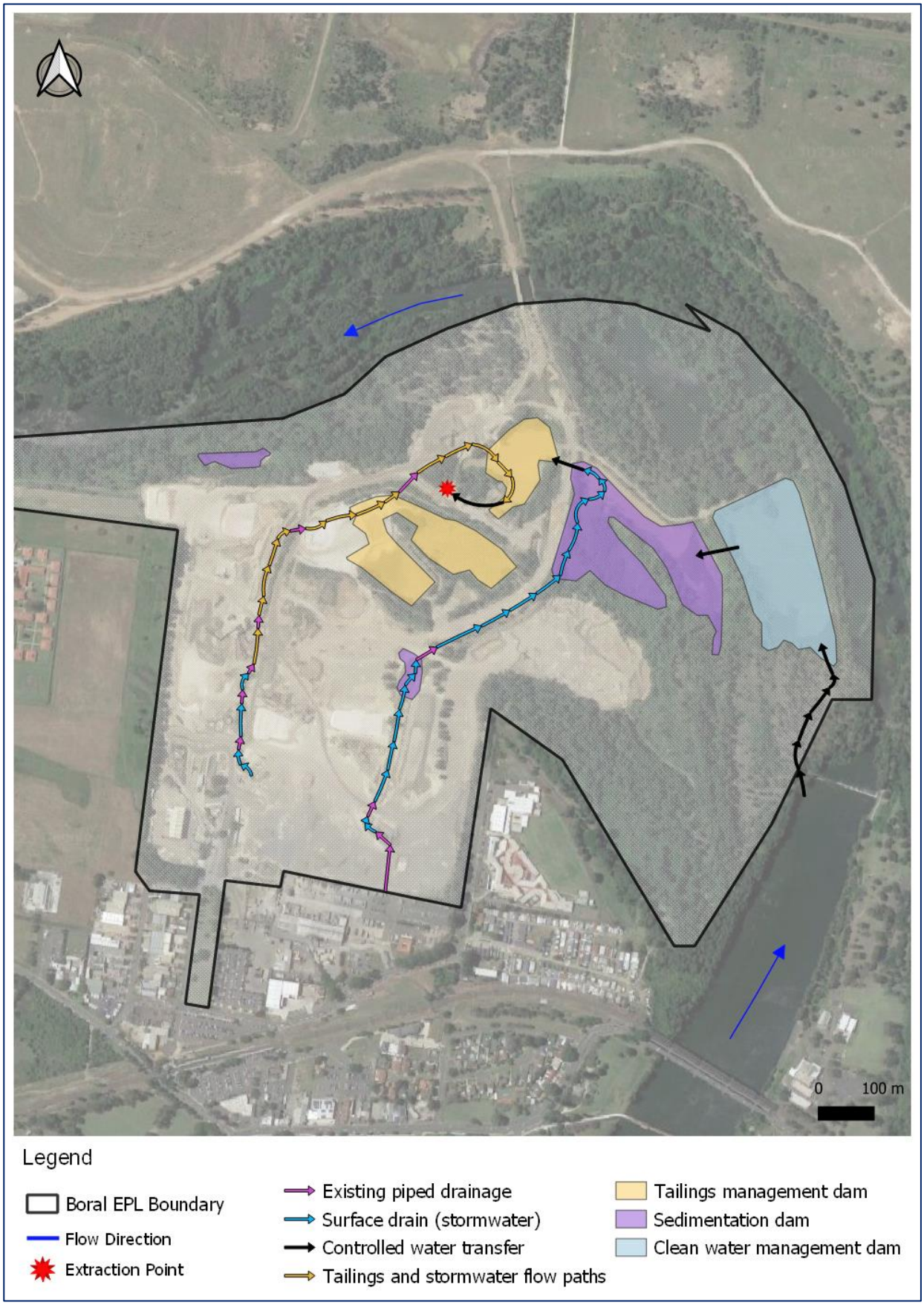


Figure 5-6 Existing site water management measures at Emu Plains construction ancillary facility (WHT13)

5.2.2 Surface Water Quality

The water quality of waterways relevant to the Project is influenced by several factors including:

- Current and former polluting land uses within the catchments
- Stormwater and sewage overflows and leachate from contaminated and/or reclaimed land
- Urbanisation of the catchments and subsequent reduction in permeable area, increasing run-off and pollutant loads entering waterways.

A review of the existing water quality data and site-specific water quality monitoring indicates that the waterways are in very poor condition and are representative of a heavily urbanised system.

The water quality of each assessed waterway is summarised in Table 5-2.

Table 5-2 Existing water quality conditions in the study area[1]

Waterway	Commentary on ANZG (2018) and ANZECC/ARMCANZ (2000) indicators	Monitoring sites/data source (refer Figure 5-4)
Whites Creek	• Median faecal coliforms and ammonia concentrations above the recommended limit for protection of aquatic ecosystems • High levels of heavy metals • High nutrient concentrations • Low dissolved oxygen levels • High pH (i.e. alkaline conditions) • High turbidity.	• Sites1a, 1b • Sydney Water • M4-M5 Link project and Bays Precinct project.
Willoughby Creek	• High levels of heavy metals • High nutrient concentrations • Low dissolved oxygen levels.	• Site 2b.

Penrith City Council regularly monitors water quality in the Nepean River. The Council's water monitoring focuses primarily on weekly bacterial testing with monthly physical and chemical parameters being undertaken at key sites along the Nepean River between October and March each year. The closest monitoring sites to WHT13 are:

- Regatta Park, Emu Plains
- Rowing Club (Nepean River Weir), Penrith

A desktop search of the Penrith City Council Recreational Water Quality Monitoring web page was undertaken as part of the MOD2 report. The search identified that the annual river grade for both monitoring sites are "Poor". As the Project does not propose to discharge directly into the Nepean River, the Project will not be undertaking baseline monitoring for the Nepean River, unless required within the EPL

A Surface Water Monitoring Program is required to meet construction conditions for the Project. Further detail on the Monitoring Program is provided in Section 8.3 of this SSWMP.

5.2.3 Sensitive receiving environment

The Sydney Harbour is classified as a sensitive receiving environment that has a high conservation and community value that supports ecosystems and human uses of its waters. Sydney Harbour is considered as a Type 1 Fish Habitat due to the presence of serval species of seagrass, the

[1] Source: EIS Table 17-9

potential habitat for vulnerable species including the Black Rock Cod and is a primary contact recreation area.

The Nepean River is also a sensitive receiving environment and is classed as a 4th order watercourse and is located approximately 500 metres east and 400 metres north of the site. Several 1st, 2nd and 3rd order watercourses along with their associated riparian buffers, are located within a 500m of the Emu Plains construction ancillary facility.

5.3 Rainfall

Rainfall data has been obtained from the Planning Approval Documents for the closest Bureau of Meteorology (BoM) weather station to the main Project tunnel alignment is located at Observatory Hill (BoM station ID: 66214). Observatory Hill has detailed rainfall records from the year 1858. The average annual rainfall for the period of 1858 to 2020 has ranged from a minimum of 583 millimetres (recorded in year 1888) to a maximum of 2194 millimetres (recorded in year 1950).

Table 5-3 Summary of rainfall records from Observatory Hill Sydney

Observatory Hill Sydney (BoM station ID: 66214)				
Month	**Monthly Rainfall depth (mm)**			**Mean number of rain days**
	Mean	Highest	Lowest	
January	101	387	6	12
February	119	631	3	13
March	132	521	8	14
April	127	622	1	13
May	117	585	3	13
June	133	643	4	13
July	96	336	2	11
August	80	483	0	10
September	68	356	0	11
October	77	285	1	12
November	84	517	1	12
December	77	402	1	12

The closest weather station to the Emu Plains (WHT13) site is located at Penrith Lakes (BoM station ID: 067113). Table 5-4 summarise the rainfall records from Penrith Lakes from the year 1995.

Table 5-4 Summary of rainfall records from Penrith Lakes

Penrith Lakes (BoM station ID: 67113)		
Month	**Monthly Rainfall depth (mm)**	

Penrith Lakes (BoM station ID: 67113)				
	Mean	Highest	Lowest	**Mean number of rain days**
January	94.4	307.8	19.2	8
February	119.7	356.8	1.8	8
March	108.3	592.8	16.8	9
April	50.2	258.8	1.8	6
May	35.2	150.2	3.2	4
June	45.2	226.0	2.0	6
July	37.2	259.2	1.4	4
August	30.0	161.2	0.0	4
September	31.7	93.6	0.2	5
October	57.0	256.2	4.6	6
November	84.0	233.4	13.0	8
December	63.2	164.2	0.0	7

5.4 Rainfall erosivity factor

The rainfall erosivity factor is a measure of the ability of rainfall to cause erosion (referred as “R” in the Revised Universal Soil Loss Equation (RUSLE)). The rainfall erosivity factor is used to determine the soil loss in tonnes per hectare over one year, and is used in calculations when sizing construction sediment basins.

The Project has a Rainfall Erosivity Factor erosion index (EI) of 3,500 EI. Sydney is the closest location with detailed R-factor data and is detailed below in Table 5-5.

Table 5-5 Monthly % and annual rainfall erosivity (R – factor) values

Monthly % and annual rainfall erosivity (R – factor) values													
	Dec	Jan	Feb	Mar	Apr	Mar	Jun	July	Aug	Sep	Oct	Nov	Year
%	6	8	10	11	10	10	11	8	7	6	6	7	100
R – Value[1]	223	292	344	382	367	338	384	277	231	197	223	243	3500
[1] Source: WHTBLWFU-CPBD-NWW-WA-PLN-000006-2_SWMP													

5.5 Flooding

Flood models have been developed as part of the EIS to more accurately define flood behaviour in the vicinity of the operational footprint for the Project, and in particular flooding in the vicinity of the proposed tunnel portals.

The existing Emu Plains construction ancillary facility and the wider site operated by Boral is located at the inner bend area of the Nepean River, and it is very likely to be flooded by backwater from the Nepean River during some flood events.

Flood mapping from the EIS and MOD2 report has been included in the SAMs attached as Appendix A5 of the CEMP, to identify areas where stockpiling and storage of potentially harmful materials should be avoided.

A Flood Evacuation Management Plan will be prepared. Refer to Table 7-6 for further details.

5.6 Contamination

The Project has been investigated for land and marine contamination as part of Project planning approvals. The Project conditions (CoA E115 – E123) require any site within the Project area deemed as 'moderate or high risk' for contamination as identified in the EIS to be further investigated and, where appropriate, managed in accordance with a Remediation Action Plan and validated by a NSW EPA accredited site auditor.

The figure below identifies those areas of moderate to high risk per the approved Project EIS and MOD2 report.

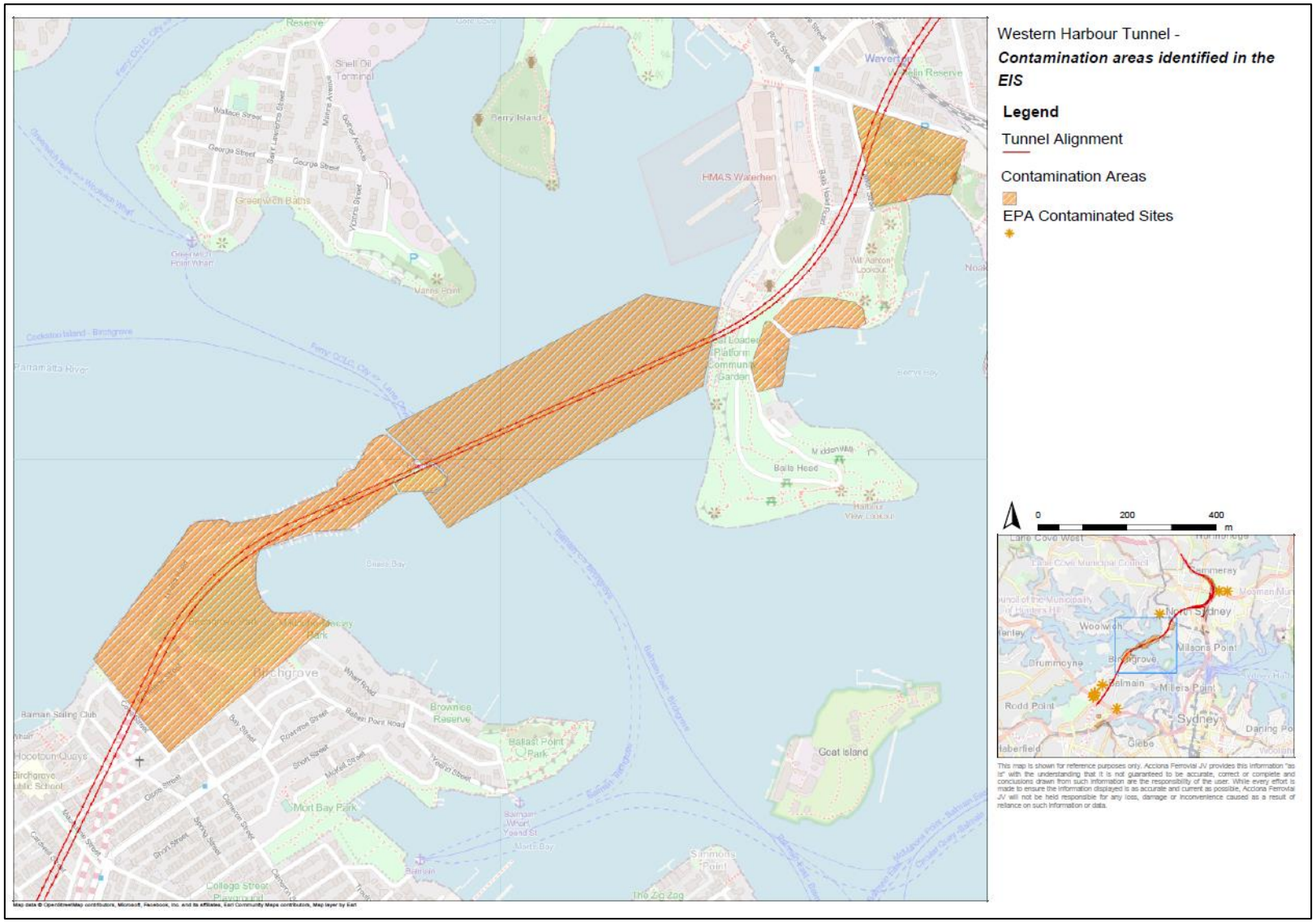


Figure 5-7 Identified moderate to high-risk areas of contamination

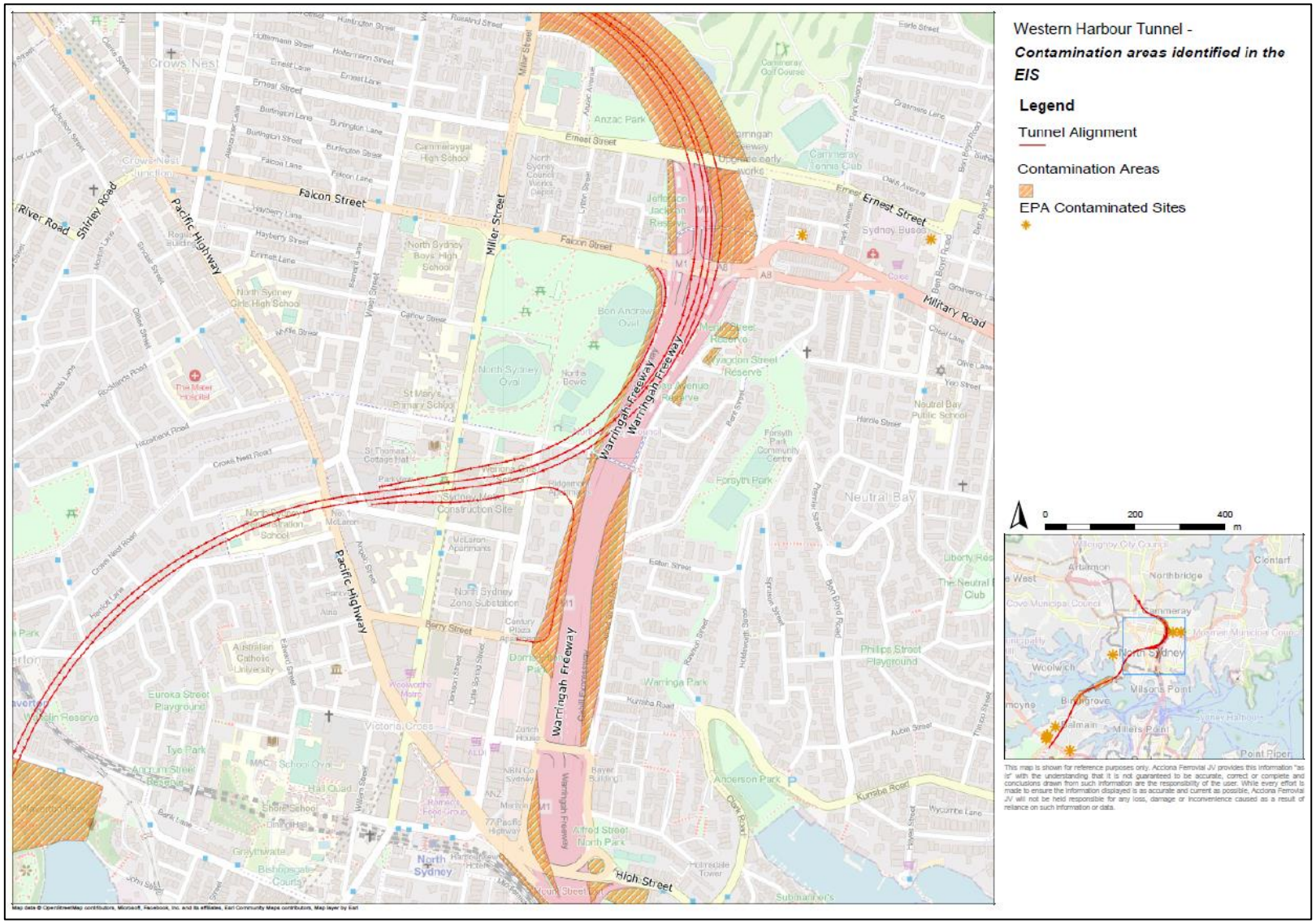


Figure 5-8 Identified moderate to high-risk areas of contamination

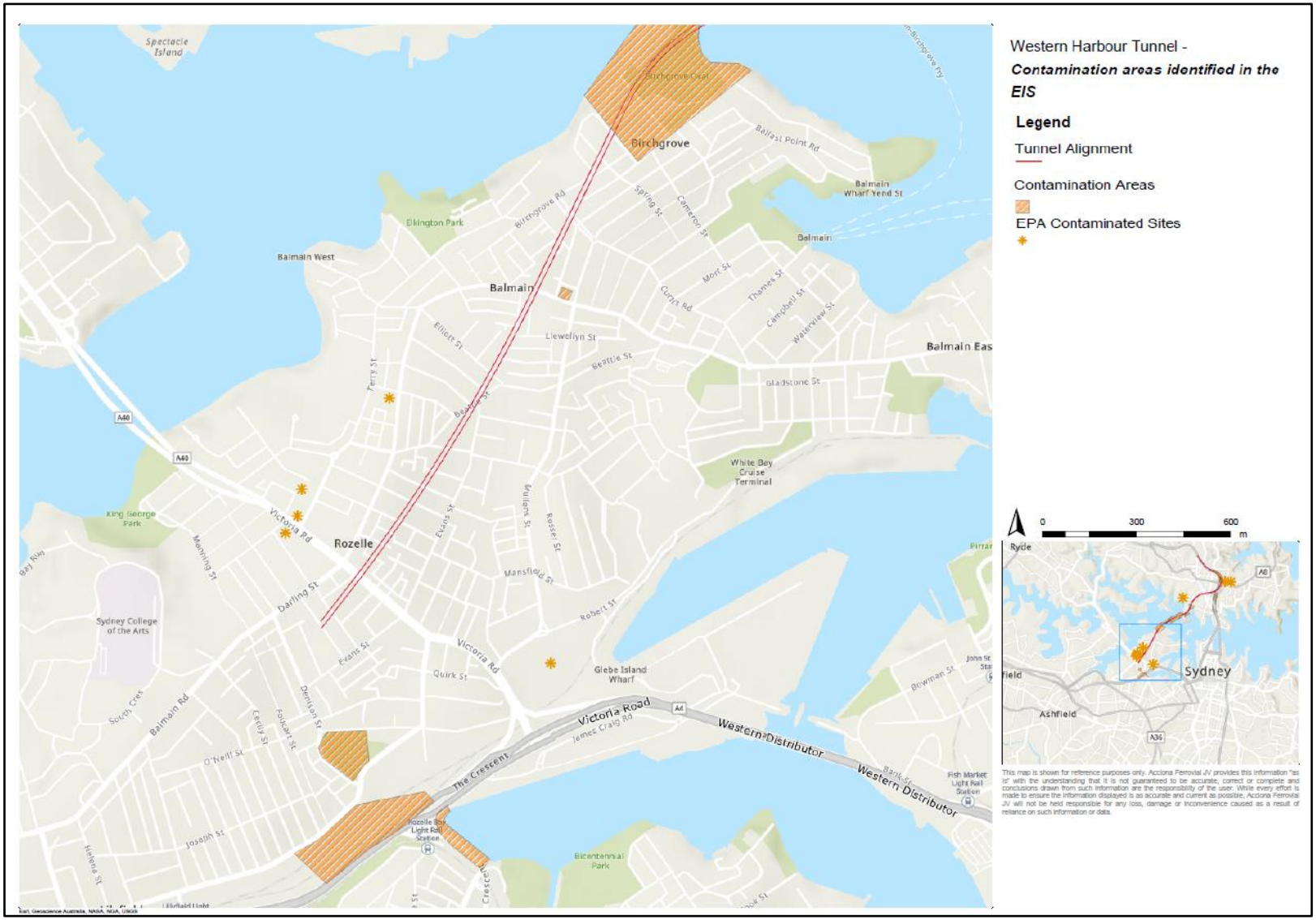


Figure 5-9 Identified moderate to high-risk areas of contamination

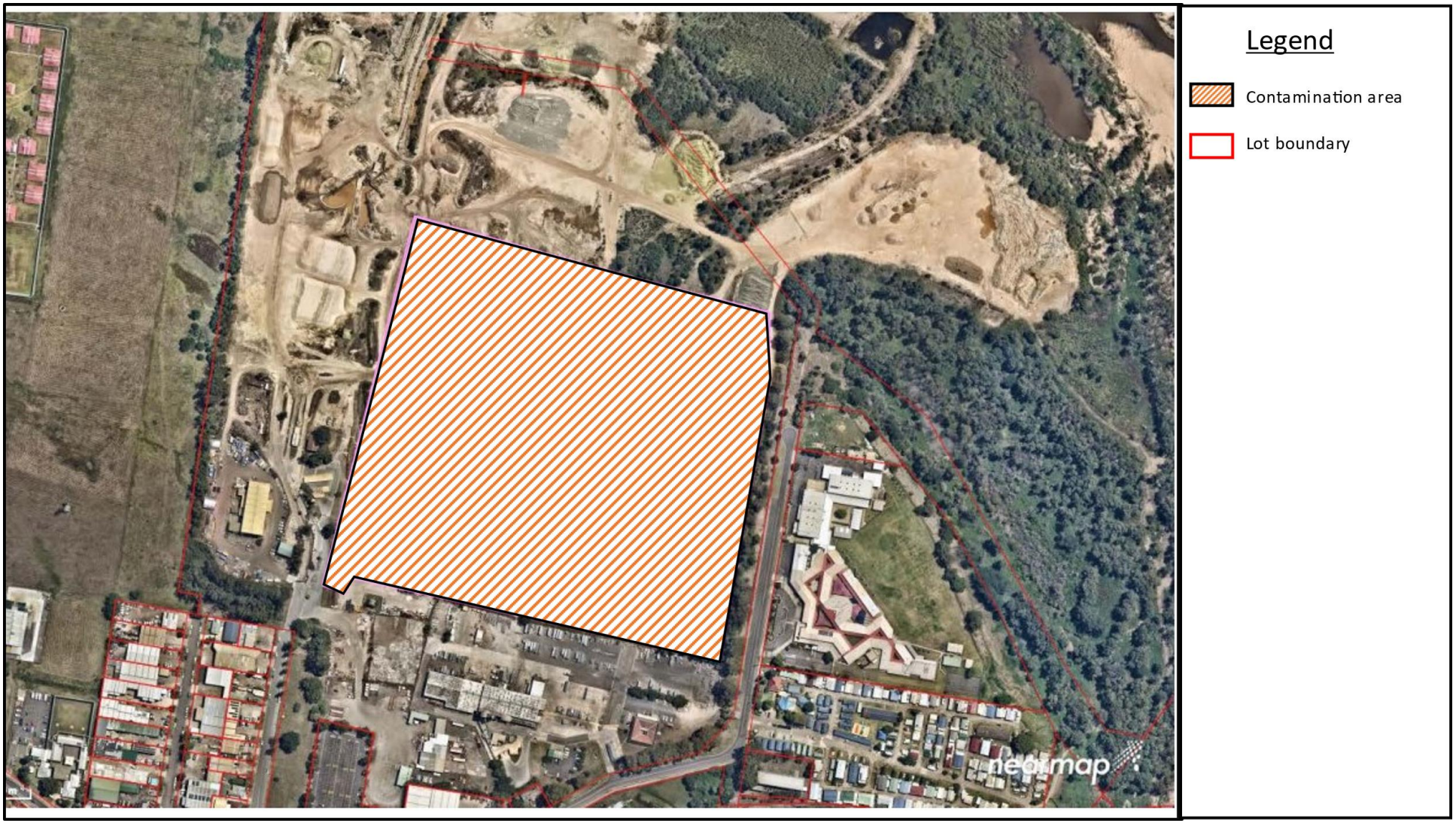


Figure 5-10: Identified moderate to high-risk areas of contamination

6 Environmental aspects and impacts

6.1 Construction activities

Key aspects of the Project that could result in adverse impacts to soils and water include:

- Vegetation clearing and topsoil stripping
- Tunnelling
- Remediation
- Earthworks and retention structures
- Demolition
- Relocation of utilities
- Site access
- Drainage works
- Material stockpiles
- Paving activities
- Water use
- Compounds operation including fuel and chemical storage, refuelling and chemical handling
- Noxious weed treatment including herbicide spraying
- Establishment and use of construction support sites including potential impacts on flood behaviour and vehicle wash down.

Refer also to the Aspects and Impacts Register included in Appendix A2 of the CEMP.

6.2 Impacts arising from construction

The potential for impacts on soil and water will depend on several factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment.

6.2.1 Potential Impacts to Soils

Erosion and Sedimentation

The proposed construction activities associated with the tunnel portal works, construction support site establishment works, and road upgrade works will involve surface excavation and earthmoving. The temporary exposure of soil to water runoff and wind could increase soil erosion potential, particularly where construction is carried out in soil landscapes characterised by a high or extreme erosion hazard. There is the potential for exposed soils and other unconsolidated materials, such as spoil, sand and other aggregates to be transported from the construction support sites into surrounding waterways via stormwater runoff.

The construction support sites used in Stage 3B and 3C are not characterised by significant undulating topography, and the soil erosion hazard is unlikely to be significant.

Acid Sulfate Soils

Acid sulfate soils may be encountered during excavation. Potential impacts may include:

- Damage to aquatic environments due to the release of sulfuric acid generated from oxidised acid sulfate soils during construction

- Mobilisation of aluminium, iron and manganese from soils as a result of increased acidity from disturbance of acid sulfate soils.

Further geotechnical testing of underlying sub soil and rock stratum will be carried out to determine the composition of rock and soil types likely to be present within excavation areas.

Class 1 and Class 2 acid sulfate soil risks have been mapped in the vicinity of the Rozelle Rail Yards and Birchgrove Park. Based on the classification scheme presented in the Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soils Management Advisory Committee, 1998a), any works (Class 1) below natural ground surface and/or works by which the water table is likely to be lowered (Class 2) could present a risk.

If acid sulfate soils are encountered, they will be effectively managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998b). The manual includes procedures for the investigation, handling, treatment and management of such soils.

Soil salinity

Construction of the Project has the potential to contribute to urban salinity through:

- Removal of deep-rooted vegetation or other activities which could raise the groundwater table above normal seasonal levels
- Soil compaction at areas of surface disturbance, such as at the construction support sites, which can restrict groundwater flow and result in a concentrate of salt in one area.

As outlined in Section 16.3 of the EIS, naturally occurring soil salinity is not considered a major concern within the project footprint. Salinity is considered unlikely to represent a risk to surface water and/or groundwater during the construction of the Project.

6.2.2 Surface Water

Surface Water Quality

Potential impacts to surface water quality as a result of surface works include:

- Erosion and mobilisation of exposed soils and open cuts by stormwater runoff and wind leading to sedimentation of waterways
- Potential spills of pollutants (chemicals, fuel) flowing to downstream watercourses
- Transfer of spills and pollutants to adjacent roads
- Discharge of water (note; this will be managed through the preparation of a Water Pollution Impact Assessment as required by MCoA E210, and accepted by the EPA for specific criteria to be included into the Project EPL).
- Mobilisation or activation of acid sulphate soils.

Geomorphology

Construction of the Project has the potential to impact on geomorphology due to:

- Mobilised sediment which could build up in the streams if not appropriately managed
- Impervious surfaces created by the Project, leading to increases in the volume and rate of runoff, which could cause erosion within the instream channel
- Subsidence below watercourses, potentially impacting on channel bed and bank conditions.

6.2.3 Flooding

Construction activities have the potential to increase flooding conditions when compared to both present day and operational conditions. This is because construction activities typically impose a larger footprint on the floodplain due to the need to provide temporary structures outside the operational project footprint which will be removed following the completion of construction activities.

6.2.4 Contamination

The potential for construction works to impact contaminated lands within the Project is possible. Specific to contaminated land the potential impacts from construction include:

Establishment and Early Works

- Site clearing, de-grub and demolition
- Topsoil stripping
- Project security
- Utilities relocation and site access works (including public diversions)
- Heritage and traditional land-owner works
- Site remediation works
- Laydown and work areas
- Any other temporary works requirement.

Surface and Ancillary Works

- Construction of acoustic sheds and other infrastructure
- Retaining and ground piling activities
- Civil earthworks, decline and cut and cover excavations etc.
- Permanent drainage.

Tunnelling Works

- It is unlikely that tunnelling will intersect any contamination or potentially contaminated areas, however will pass underneath the former 'Waverton tip' area. Potential impacts resulting from movement of contaminated groundwater will be managed in the Groundwater Management Plan.

Pavement and Road Construction

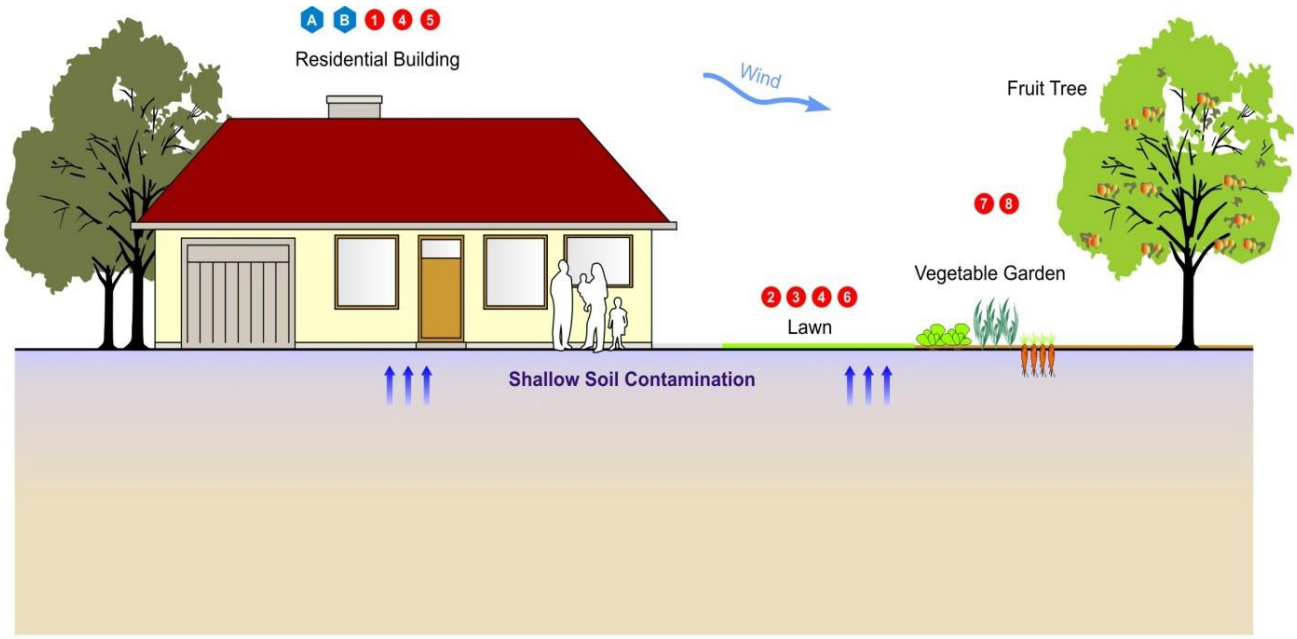
- It is not considered likely that pavement or finishing works will substantially impact any contamination.

Table 6-1 summarises construction activities and potential contamination risks in the identified areas of contamination.

Potential contamination only poses a risk of harm to a sensitive receptor where a pathway for exposure exists between the source and receptor. This includes both human health and the environment. The following pathways have been identified:

- Leachability and escape; water run-off or seepage (as well as groundwater migration/ drawdown) from contaminated material
- Friability or airborne; dust generation from uncontrolled soils, hazardous materials, and waste/ rubble including inhalation of contaminants
- Volatility or vapour phase: release of hazardous ground gases
- Dermal or consumption: direct or indirect contact with contaminated material
- Absorption; phytotoxic impacts to vegetation (from both solid and liquid).

The National Environmental Protection Measures (2013) provides guidance on potential exposure pathways in typical settings, as shown in the example below.



RECEPTORS	EXPOSURE PATHWAYS	
A Adult residents B Child residents (0 - 6 years)	1 Indoor inhalation of vapours derived from shallow soil 2 Outdoor inhalation of vapours derived from shallow soil 3 Incidental ingestion of surface soil and dust particulates 4 Dermal contact with surface soil and dust particulates 5 Indoor inhalation of dust particulates	6 Outdoor inhalation of dust particulates 7 Consumption of home-grown produce 8 Consumption of soil adhering to home-grown produce

Source: NEPM 2013 (Schedule B7, page 15)

Figure 6-1 Potential exposure pathways

Table 6-1 Contamination description and risk ranking along the Project

Location ID	Location	Location relative to alignment	Construction element and anticipated depth	Potential contamination source	Potential contamination distribution	Potential contaminants	Risk Ranking
W4	Birchgrove Peninsula and Park – Louisa Road, Birchgrove	Above tunnel	Tunnel (depth)	Slag and ash fill material (historical furnace waste from harbourside industry)	Surface (potentially 0-0.5m)	Heavy metals, hydrocarbons, asbestos	Low to Negligible • Possible contamination • Potential contamination distribution unlikely to affect tunnelling (based on depth to tunnel). The EIS assigned a risk ranking of Moderate. However, given the change in construction methodology as mentioned in MOD2 report and the depth of potential contamination distribution at Birchgrove Peninsula and Park, the risk ranking is expected to be less than what was characterised in the EIS owing to reduced excavation requirement. The risk rating is reassigned to Low to Negligible.
W5	Sediments within Sydney Harbour	Above tunnel	Tunnel (depth)	Contamination associated with industrial use of Sydney Harbour and catchment inputs	Surface to recent (~150 year) depositional extent	Heavy metals, hydrocarbons (mainly PAH), pesticides, PCB, PFAS, dioxin, organotins	Low • Known contamination The EIS assigned a risk ranking of High. However, given the change in construction methodology as mentioned in MOD2 report and the depth of potential contamination distribution within the sediment of Sydney Harbor, the potential risk of interacting with contaminated material during the construction of the harbour crossing would significantly reduce. The risk rating is reassigned to Low.

Location ID	Location	Location relative to alignment	Construction element and anticipated depth	Potential contamination source	Potential contamination distribution	Potential contaminants	Risk Ranking
W8	Waverton Park – Woolcott Road, Waverton	Above tunnel	Tunnel (depth)	Infill/reclamation next to shore line	Surface and depth potentially 0 m to > 20m). (Depth distribution associated with depth of infilling)	Heavy metals, hydrocarbons, pesticides, PCB, nutrients, cyanide, VOC, asbestos	High • Known contamination (which could impact upon groundwater) • Tunnel below site footprint.
W14	St Leonards Park bordering Warringah Freeway (between Ridge Street and Falcon Street), North Sydney	Within footprint of construction support site and surface works	Ridge Street north construction support site (WHT9) and Warringah Freeway Upgrade surface work (surface)	Deposition of particulate matter and filling	Surface and depth (potentially 0-2m)	Heavy metals, hydrocarbons, pesticides, PCB, nutrients, cyanide, VOC, asbestos, PFAS	Moderate • Possible contamination • Excavation activities within site footprint • Excavation activities within potential contamination distribution range (laterally and vertically – surface work only) • Potential contamination distribution unlikely to impact upon tunnelling (based on depth to tunnel).
W17	Unsealed areas next to Warringah Freeway – eastern side (between Ernest Street and Falcon Street), Cammeray)	Above tunnel and within footprint of surface works and Falcon Street shared user bridge construction site	Warringah Freeway Upgrade surface work (surface) and tunnel (depth	Deposition of particulate matter	Surface (potentially 0-0.1 m)	Heavy metals (mainly lead), hydrocarbons (mainly PAH), asbestos	Moderate • Possible contamination • Excavation activities within site footprint • Excavation activities within potential contamination distribution range (laterally and vertically – surface work only) • Potential contamination distribution unlikely to impact upon tunnelling (based on depth to tunnel).

Location ID	Location	Location relative to alignment	Construction element and anticipated depth	Potential contamination source	Potential contamination distribution	Potential contaminants	Risk Ranking
W18	Unsealed areas next to Warringah Freeway – Ernest to Miller Street), Crows Nest	Within footprint of surface works	Rosalind Street construction support site (WFU9) Warringah Freeway Upgrade surface work (surface)	Deposition of particulate matter	Surface (potentially 0-0.1 m)	Heavy metals (mainly lead), hydrocarbons (mainly PAH), asbestos	High • Known contamination • Excavation activities within site footprint • Excavation activities within potential contamination distribution range (laterally and vertically).
WHT13	Emu Plains construction ancillary facility	Within footprint of construction support site	Emu Plains construction ancillary facility (WHT13)	Historic fill brought onto site from unknown sources. Migration of impacted groundwater to the site from industrial facilities located immediately south of the site.	Unknown	Heavy metals, hydrocarbons, OCP/OPP/ PCBs, VOCs, asbestos	Moderate to high • Possible contamination • Excavation activities within site footprint as part of establishment works However, during the operation of the Emu Plains (WHT13) construction ancillary facility, the site would primarily comprise of hardstand areas and roads which would limit any potential interaction with the underlying soils.

7 Environmental control measures

Construction associated with the Project has the potential to have soil and surface water impacts adjacent to the construction footprint. In order to avoid, mitigate and/or minimise these potential impacts, a range of environmental requirements and control measures are identified in the various environmental documents, including the EIS and other Transport for NSW guidance documents.

These specific measures and requirements, along with additional measures identified as best practice, are outlined below and in Table 7-6.

7.1 Progressive erosion and sediment control plans

This Plan will be complimented during construction by the preparation of a series of detailed Site Specific or Progressive Erosion and Sedimentation Control Plans (PESCP's) for different stages of construction and specific work areas.

PESCP's will be prepared in accordance with the Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volume 2D (NSW Department of Environment and Climate Change, 2008), commonly referred to as the 'Blue Book'. PESCPs will be prepared prior to ground disturbance construction activities and generally using drainage or general arrangement drawings and indicate (where relevant):

- Catchment areas.
- Construction boundaries.
- Runoff capture, treatment and disposal
- Areas of contamination
- Exclusion zones and sensitive areas.
- Contours and drainage paths.
- Access points and tracks (e.g. haulage).
- Compounds and storage areas.
- Stockpile sites.
- Temporary work areas.
- Material processing areas.
- Permanent and temporary controls (including order of implementation).

The principles of erosion and sedimentation management as described in the Blue Book will be incorporated into the PESCPs, including:

- Separation/diversion of:
  - upslope water (aka offsite water) around disturbed areas
  - 'clean' from 'dirty' flows, and
  - runoff from contaminated areas for capture onsite.
- Emphasis on early construction of critical permanent drainage structures (eg catch drains upslope).
- Maximise diversion of onsite dirty water into sediment controls.
- Installation of surface cover as early as practicable, including geotextile linings, vegetation or hardstand.
- Reduction of surface flow length, through the use of check points and diversions.

- Sediment controls will be installed around stormwater inlet pits where appropriate and where they will not cause or exacerbate flooding. Traffic management and safety will need to be considered if installing such devices on or near live traffic.
- Concrete washout will confined to designated concrete washout locations which will be routinely maintained to prevent overflow.
- Minimise the amount of material transported from site to surrounding pavement surfaces (mud-tracking).
- Installation of sediment controls downslope of any disturbed areas. Sediment controls will be removed only after adequate stabilisation of disturbed surfaces is achieved.

The ACCIONA Environment Team responsible for preparing the PESCPs will have completed the Blue Book training and extensive experience in erosion and sediment control.

A Soil Conservationist will be engaged to provide advice regarding erosion and sediment control including review of Progressive Erosion and Sediment Control Plans (PESCPs) until disturbed areas are suitably stabilised.

PESCPs will include input from field personnel to formulate practical documents for field implementation. A PESCPs Register will be utilised to maintain version history and updates.

7.2 Site access management

General measures to be implemented to manage site access to prevent material tracking (mud tracking) offsite include:

- Establish stabilised access points with rumble grids or wheel washes to prevent mud tracking on roads
- Clearly delineate access points
- Use of street sweepers
- Longer term and/or heavily used haul roads would generally be sealed. Sealed haul roads would be regularly cleaned
- Unsealed haul roads would be regularly damped down with fixed or mobile sprinkler systems
- Appropriate site speed limits would be imposed and signed on haul routes
- Exclusion zones would be designated on construction sites to limit disturbance.

7.3 Soil stripping and stockpiling

Spoil will be generated from both surface sites and underground tunnelling activities. The anticipated spoil volumes generated from the Project surface sites for Stage 3B and 3C are outlined in Table 7-1 from initial design estimates.

Table 7-1 Indicative estimated project spoil volumes from surface sites

Site	Estimated spoil volumes (Cubic metres)
Berrys Street (WHT8)	10,880m^3
Falcon St/Ridge St (WHT9)	325,197m^3
Cammeray Golf Course (WHT10)	504,447m^3
City West Link Portals (WHT12)	881,330m^3

Some works may require the stockpiling of material on site if the material cannot be loaded directly into trucks. As part of initial site establishment activities, those stockpiles would be located outside

of acoustic sheds (also known as spoil sheds). Table 7-2 summarises the indicative volumes of spoil stockpiles located outside of acoustic sheds, however this will be highly variable.

Table 7-2 Indicative stockpile locations and volumes outside acoustic sheds

Location	Indicative stockpile volume (Cubic metres)
White Bay (WHT3)	9,000m^3
Berry Street North (WHT8)	300m^3
Cammeray Golf Course (WHT10)	750m^3

General measures to be implemented to manage soil stripping and stockpiling include:

- Stockpile areas are to be established within approved low-hazard areas ideally outside the 1% AEP flood extent, clear of watercourses, stormwater drainage lines/culverts and not within the dripline of any retained trees where feasible and reasonable (REMM F6).
- Spoil stockpiles will be located in areas which are not subject to frequent inundation by floodwater. The exact level of flood risk accepted at stockpile sites will depend on the duration of stockpiling operations, the type of material stored, the nature of the receiving drainage lines and also the extent to which that would impact flooding conditions in adjacent development (REMM F5).
- Diversion drains/bunds are to be installed on the high side of stockpiles if run off from upslope lands could impact on the stockpile.
- As much as is feasible, mulched vegetation, topsoil and subsoil (if applicable) are to be stockpiled separately.
- Any contaminated material stockpiles (i.e. asbestos, contaminated soil) will be covered on-site and short-term material stockpiles (>5 days not in use) with potential to generate dust will be wetted down or covered to prevent fugitive dust emissions or run-off during wet weather.
- Stockpiles situated outside of acoustic, or spoil sheds are to be protected from wind and water erosion, or bunded to prevent sedimentation from water erosion where risk of run off from site exists. Temporary stockpiles outside of acoustic, or spoil sheds are to be stabilised if they are to be in place for more than 10 days.
- Topsoil and mulch stockpiles will be constructed to no more than 2m in height where possible and will be battered down to a maximum slope of 2:1 (H:V) where space permits.

7.4 Ground Stabilisation

General measures to be implemented to manage ground stabilisation include:

- Undertake progressive stabilisation of ground surfaces as quickly as possible as they are completed rather than at the end of the works program.
- Progressively revegetate disturbed areas utilising appropriate species in those areas to be revegetated.
- Temporary ground covers such as hydraulic soil stabilisers or geotextile fabric will be used as much as possible to stabilise batters, stockpiles and large surface areas.
- Scour protection and energy dissipation would be used around discharge points at local points to reduce erosion where necessary.

7.5 Spill Management

The Spill Response Procedure for the Project is included as Appendix E3 of this Plan.

Any environmental events related to spills would be reported in line with the TfNSW "Environmental Incident Procedure" and TfNSW "Environmental Event Report".

7.6 Heavy Rainfall and Flooding Response

There is the potential for construction activities to impact local catchment runoff, which will be managed through appropriate local stormwater management controls to be implemented during construction. Where reasonable and feasible, the operational floor space of construction site facilities (e.g. site offices and kitchens) will be located outside high flood hazard areas based on a 1% AEP flood.

Stormwater that falls onto the roof of the casting shed and acoustic sheds at Emu Plains (WHT13) construction ancillary facility will be redirected into the local stormwater network via downpipes.

A Flood Emergency Management Plan (FEMP) will be prepared for WHT13 in accordance with MCoA E49B and REMM F12. The Flood Emergency Management Plan (FEMP) will be prepared in two general stages – construction and operation. The FEMP will include:

- flood awareness/education for construction site workers;
- flood warden delegation and responsibilities during construction and operation
- temporary evacuation signage including clearly labelled direction of travel in the event of a flooding emergency; and
- actions to be taken before, during and after a flood emergency, and triggers for different actions.

The FEMP will be developed in consultation with the SES and Reconstruction NSW.

Prior to the FEMP being finalised for WHT13 the general process to be followed in the event of heavy rainfall or a flood emergency for contingency planning during the construction of the Project is outlined in Figure 7-1.

Additionally, a basin will be provided at the Emu Plains construction support site (WHT13) to compensate for some of the flood storage loss due to filling of existing low areas and proposed hardstand across the WHT13 site. The basin size would be determined by keeping the flow rate from the Emu Plains construction support site (WHT13) to the adjacent land unchanged in accordance with REMM F11.

To maintain offsite movement of upslope surface water, stormwater from the southern upstream catchment of WHT13 will be redirected to stormwater pipes proposed to be installed under the site.

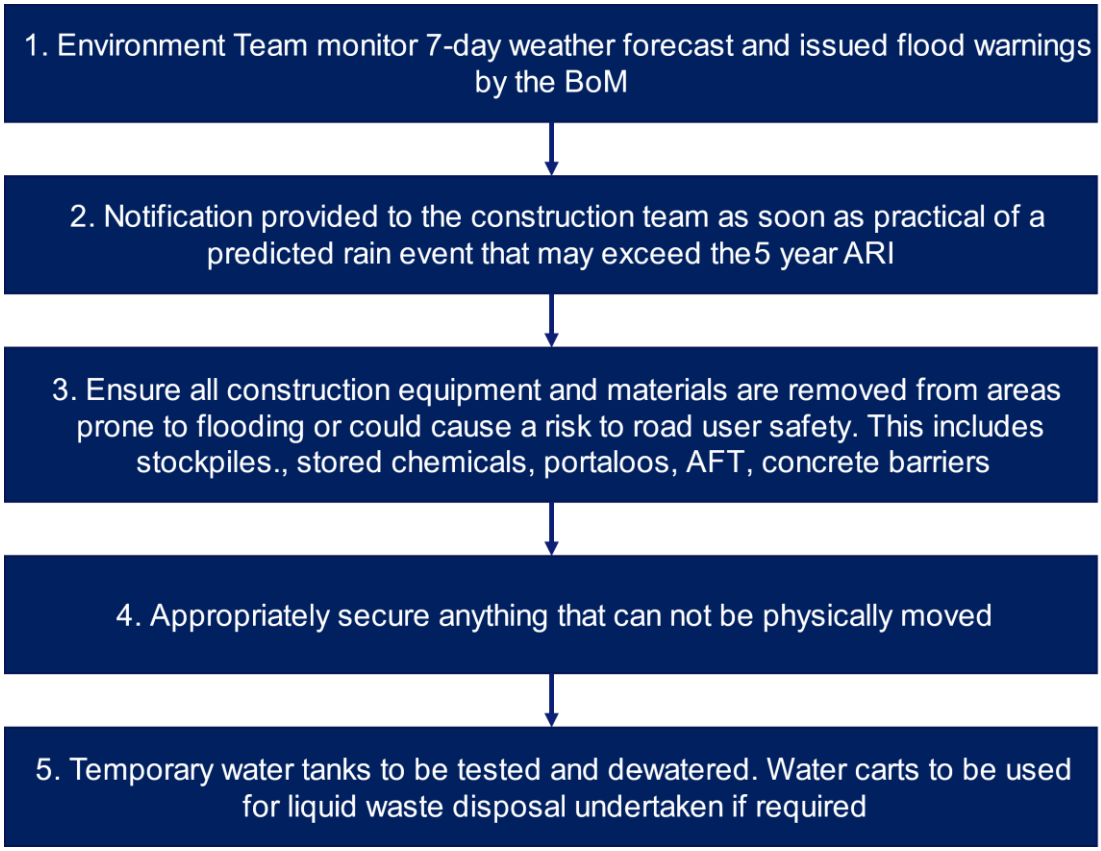


Figure 7-1 Heavy rainfall and flood event contingency planning process

7.7 Sensitive Area Maps

To assist pre-construction planning and on-site construction management SAMs will be prepared prior to the commencement of construction. The SAMs will be prepared in stages as the works progress in each precinct.

SAMs will be reviewed and updated where there is a significant change in work activities. A copy of the initial SAMs are provided in Appendix A5 of the CEMP for activities associated with Stage 3B and 3C. Relevant soil and surface water content to be included on the SAMs include:

- Areas of known or potential contamination
- No go / restricted areas
- Flood sensitive areas

7.8 Water storage, discharge and reuse

7.8.1 Surface water

Surface water may be stored in temporary detention areas / containers on site, prior to being treated, discharged or re-used. Water within excavations that does not meet the criteria for discharge may be pumped into storage tanks or an impermeable bund for treatment, allowing works to recommence in parallel with water treatment.

Where practicable, and in line with the projects Water Reuse Strategy, any water collected in excavations / work sites will be reused within the site (e.g. dust suppression, watering retained vegetation, re-use in wheel washes and/or wheel baths). The following water resource management objectives will apply to construction:

- Minimise use of potable water; and

- Maximise opportunities for the reuse of rainwater, stormwater, wastewater and groundwater.

Construction water management will be designed to maintain or improve the water quality of the receiving ambient environment (MCoA E206). As such, where water discharge is required, testing and where necessary treatment of construction water will be undertaken in accordance with the Project Water Discharge & Reuse Permit (WDRP).

The WDRP regulates both onsite reuse and offsite point source discharge for surface water and groundwater discharge. Prior to any discharge off the premises, or reuse within the premises, the Environment Manager or Coordinator (or delegate authorised by the Environment Manager/Coordinator) is to sign off that the water is suitable for reuse or discharge using this WDRP.

The WDRP will record:

- Results from water quality testing
- Measures installed to minimise potential for water to leave the premise;
- Measures installed to minimise potential surface runoff generated from the reuse (reuse includes dust suppression, watering retained vegetation etc.); and
- Measures installed to minimise potential for uncontrolled water to reach any watercourse.

For surface water runoff water quality testing will be undertaken for the parameters listed in Table 7-3prior to discharge offsite and recorded on the WDRP; water may not be discharged offsite until compliance is achieved.

Table 7-3 Surface water discharge criteria

Parameter	Criterion	Method
Oil and grease	None visible	Visual inspection
pH	6.5 – 8.5	Probe/Meter
Total Suspended Solids (TSS)	<50 mg/L	Meter/grab sample

Exceptions to this testing and criteria are as follows:

- If water is to be re-used for dust suppression this water does not need to be tested or treated providing water does not leave the site (either directly or indirectly via runoff).
- Any discharges from construction Water Treatment Plants (WTP) is managed in accordance with the Groundwater Management Plan and Monitoring Program, and in accordance with MCoA E208.
- Where water has encountering contaminated material this will be managed via the construction WTPs following the preparation of a WPIA and inclusion of relevant discharge criteria into the EPL, in accordance with the Groundwater Management Sub-plan. Where the construction WTPs are not yet operational, this water will be removed from site and disposed in accordance with the Waste Classification Guidelines (EPA, 2014).
- Where an unexpected contamination find is uncovered, any water in contact with that unexpected contamination would also be treated as contaminated and be managed along with the contamination management response, until confirmation from laboratory testing confirms the find is not contamination.
- Should the EPL contain additional discharge criteria for active discharge of surface water, the Project will apply the more sensitive of the criteria applicable.

Opportunity for a TSS/Turbidity ratio will be investigated early into the Project to allow for expedited results, as turbidity can be determined onsite and does not require laboratory analysis. This will be

confirmed every 10th sample, by a concurrent TSS sample. Where ground conditions change, such as the excavation into a new soil profile, the TSS/Turbidity ratio may require confirmation.

The recording of water testing results on the WDRP must be maintained:

- In a legible form, or in a form that can readily be reduced to a legible form;
- For at least 4 years after the monitoring or recording event to which they relate took place, and
- So that they can be produced in a legible form to any authorised officer of the EPA upon request.

7.8.2 Groundwater

Groundwater will be managed in accordance with the Groundwater Management Sub-plan, including the process of treatment, discharge or re-use, and compliance with the discharge criteria required under MCoA E208.

Where groundwater discharge is required, this will be managed via the construction WTPs following the preparation of a WPIA and inclusion of relevant discharge criteria into the EPL, and in accordance with the Groundwater Management Sub-plan. Where the WTPs are not yet operational, this water will be removed from site and disposed in accordance with the Waste Classification Guidelines (EPA, 2014).

7.9 Materials storage

General measures to be implemented to manage material storage include:

- Chemicals will be stored and handled in accordance with relevant Australian standards such as:
  - Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005) and the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, 2011)
  - The Environment Protection Manual for Authorised Officers: Bunding and Spill Management technical bulletin (EPA, 1997)
  - AS 1940-2004 The storage and handling of flammable and combustible liquids
  - AS/NZS 4452:1997 The storage and handling of toxic substances
  - AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods
  - AS/NZS 1547:2012 On-site domestic wastewater management
- Liquid chemicals and fuels will be stored in appropriate containers in bunded areas. Bunded areas will have the capacity to hold 110% of the liquid waste volume for bulk storage or 120% of the volume of the largest container for smaller packaged storage (REMM HR1).
- Where practicable, storage areas will not be located within 50 metres of natural surface drainage areas, storm drainage systems, poorly drained or flood prone areas or any area with a slope steeper than 10%. (REMM HR1)
- All drums and decanted containers must be labelled and stored within bunded areas whenever they are not in use. Whenever practical, all unattended drums/containers must be returned to the bunded storage area.
- Storage of large quantities of fuel for construction plant is not permitted. Appropriately licensed fuel trucks carrying emergency fuel spill kits must be used to service plant and equipment.

7.10 Contaminated Land Management

7.10.1 Investigation and verification

Prior to the commencement of any work that would result in the disturbance of moderate to high risk contaminated sites as outlined in Section 5.6, where this contamination has not been previously removed or remediated (i.e. as part of another Stage of works for WHT or the Warringah Freeway Upgrade Project) as identified in the documented listed in Project's EIS (CoA E115), a detailed site investigation and, if required, remedial process to achieve a Section A Site Audit Statement will be followed. This process will detail the required management and verification processes relevant to the risk posed. Further information on this process is detailed in Table 7-4.

Note, where geotechnical investigations are required in contaminated areas, this will be managed through the preparation and implementation of an Environmental Work Method Statement (EWMS) which will outline the testing and disposal of waste material, and backfill with clean/inert material. This not considered to trigger the contamination investigation and verification process described below.

7.10.1.1 Detailed Site Investigation

Where one is required, the Detailed Site Investigation must be prepared and submitted to the Planning Secretary for information in accordance with MCoA E116. Content of the Detailed Site Investigation must meet the requirements of MCoA E117.

Detailed Site Investigations will be prepared for Ridge Street, Emu Plains (WHT13) precast yard and potentially for Cammeray site (to be determined following preliminary site investigations).

7.10.1.2 Remediation Action Plan

Where one is required to make the land suitable for proposed final land use, a Remediation Action Plan must be prepared in accordance with MCoA 118 and submitted to the Planning Secretary for information prior to undertaking remediation.

7.10.1.3 Site Audit Statement

If required, a Section B Site Audit Statement validating the Remediation Action Plan must be prepared in accordance with MCoA E120 prior to commencing remediation. A Section A Site Audit Statement must be prepared after the completion of remediation, certifying that the Remediation Action Plan was appropriately implemented and the land is appropriate for the nominated future land use. This must be provided to the Planning Secretary and Council prior to commencement of operation, in accordance with MCoA E121 and E122.

Table 7-4 Contamination investigation and verification process

Detailed Site Investigation (MCoA D115-117)	RAP (MCoA 118/119)	Section B Site Audit Statement (MCoA 120)	Site Validation	Section A Site Audit Statement (MCoA E121/122)
In accordance with S.105 of CLM Act 1997 – comprehensively prepared. Prepared by a 'Certified Environmental Practitioner'. Include review of all previous reports and use of data.	In accordance with S.105 of CLM Act 1997, include required Sec. B audit statement Will utilise NEPM remediation hierarchy to maximise outcomes, minimise waste while considering objectives and	Must be prepared by an NSW EPA-accredited Site Auditor that certifies the Remediation Action Plan Changes to the Remediation Action Plan must be re-approved in writing by the NSW EPA accredited Site Auditor.	In accordance with S.105 of CLM Act 1997. Environmental consultant oversight during remediation to accurately validate. Include preparation of long-term environmental	In accordance with S.105 of CLM Act 1997. Declare individual site/ area as suitable for intended land-use and specify any ongoing management requirement including survey/as-built.

Construction team workshop to understand methodologies and sub-surface impacts, focus on areas of high risk. Integration with project GIS, survey, and data management. Overlain with relevant plans (e.g. spoil and water management).	limitations of project. Site controls will include transparent excavation, waste and disposal tracking/ reporting. Will integrate with the unexpected finds protocol and all work health and safety (WHS) requirements.		management plans (if required). Preparation of site validation report including waste documentation.	Fulfil requirements of NSW EPA Site Auditor Scheme 2017.

7.10.2 Unexpected Finds

The discovery of unexpected contamination on the Project will be managed in accordance with the Unexpected Finds Procedure (Appendix E4). An unexpected find is any contaminated material not already managed under existing controls or anticipated under the EIS.

In line with Figure 1 of Appendix E4, if suspected contamination is uncovered during delivery of the Project, the following will occur:

- Works will cease immediately within the vicinity of the find and will be demarcated.
- The situation will be assessed by the Environmental Manager and Site Supervisor with contaminated land specialist consultation occurring if required.
- Further assessment and management will be undertaken to determine if contamination poses a risk to human or ecological receptors.
- Reporting under the 'Reportable Event' category in accordance with the Roads and Maritime Environmental Incident Classification and Reporting Procedure (September 2017)
- Where it is deemed that the contamination has been, or could have been caused, or changed by ACCIONA's operations, the EPA will be notified in accordance with Section 60 of the CLM Act.

Any unexpected finds will be recorded in an Unexpected Finds Register maintained by ACCIONA's environmental team.

Notification and reporting to Authorities such as the EPA will be undertaken in accordance with the Roads and Maritime Guideline for the Management of Contamination (2013), NSW EPA Guidelines on the Duty to Report Contamination (2009) and CLM Act 1997 where relevant.

7.10.3 Remediation

Should contamination be identified, following endorsement of the remediation action plan, the Project will use industry best practices to clean-up, remediate, mitigate, or manage the identified contamination.

Table 7-5 summarises commonly adopted remedial techniques which may be considered during the remediation action plan for the Project:

Table 7-5 Common remediation approaches

Excavation & Validation	Treatment & Encapsulation	Stockpiling/ Classification	Disposal/ Recovery

Known AEC/hotspot quarantine and isolation to prevent cross-contamination All identified contamination managed under GPS/ survey with waste tracking Supervision by project environmental consultant Validation sampling and reporting Any hazardous material (e.g. asbestos) supervised by SafeWork NSW licensed removalist	Reduction of waste classification through on-site processes. Include in-situ sampling, reclassification Stabilisation/ mobilization, bioremediation or chemical fixation as applicable to waste Neutralisation of sulfidic ores (PASS/ ASS) Environmental consultant to perform conformance sampling Creation of on-site encapsulation if suitable in accordance with long-term requirements including marker layer and survey/ reporting	Stockpile identification, covering and demarcation Site erosion and sediment controls and suitable segregation methods On-site re-use and emplacement under project site tracking controls Project waste sampling protocols and decision-making flow chart including leachability Sampling by environmental consultant for re-use/disposal	Opportunity to re-use on-site as priority, followed by opportunity for off-site recovery, followed by landfill List of approved receiving facilities, overseen by Project leadership NSW EPA EPL licenced waste facility or approved development consented sites only – per stockpile classification De-coupling of transporter and receiving facility commercial agreements to dis-incentivise fraudulent activity

7.10.3.1 Waste

All contaminated material waste will be managed in accordance with Waste and Resource Management Plan (CEMP Appendix J). All waste will be tested prior to disposal, in accordance with the EPA Waste Classification Guidelines, and disposed at an appropriately licensed facility. Appropriate records and disposal dockets retained for audit purposes.

7.10.3.2 Asbestos

It is a requirement of the WHS Act (2011) to manage and report asbestos within all workplaces. An asbestos management plan will be prepared and retained on-site. Any non-friable asbestos >10m^2, or friable asbestos that will be disturbed or during demolition or site works will be done so under NSW SafeWork licenced conditions. An appropriately licenced removalist (Class A/B) will be engaged, working under an Asbestos Removal Control Plan and SafeWork NSW notification/removal permit (as required).

Asbestos management will be detailed in project safety documentation.

7.10.3.3 Contamination Register

Any contamination on the Project including known contamination listed above will be managed and recorded on a Project specific register to prevent accidental disturbance or exposure.

The contamination register will include the following minimum contents:

- Location and plan including geo-reference points (if known) of each area within the Project where contamination is previously known
- The proposed future land-use of each area
- Reference to the baseline detailed site investigation of each area within the Project to determine the presence and extent of contamination. Supporting development of any site-specific remediation action plans will also occur.

This register must be always maintained and consulted prior and during development of Project Works.

7.10.3.4 Ground Gas

Condition REMM SG13 identifies that ground gas investigations will be carried out in Easton Park. No surface works proposed beyond investigative drilling and surveys at Waverton Park. As such, guidance will be obtained from suitably qualified contaminated lands consultant as to the requirement for ground gas investigations at Waverton Park to assess for the potential presence of landfill generated gas which could impact on the construction and/or operation of the project.

If required, ground gas investigations will be carried out in accordance (where applicable) with the Guideline for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2012).

7.10.3.5 Environmental Work Method Statements

Prior to undertaking contamination or remediation works, a suitable environmental work method statement (EWMS) must be prepared to manage risks arising from the work activities and preventing further contamination exacerbation. Detail on the process of EWMS is included in the CEMP.

The EMWS must include the following:

- Description of the work activity, including any plant and equipment to be used
- Outline of the sequence of tasks for the activity, including interfaces with other construction activities
- Identification of any environmental and/or socially sensitive areas, sites or places
- Identification of potential environmental risks/impacts due to the work activity
- Mitigation measures to reduce the identified environmental risk, including assigned responsibilities to site management personnel
- Process for assessing the performance of the implemented mitigation measures.
- Any specific management actions identified as part of remediation action plans or otherwise by the Site Auditor.

7.11 Excavated tunnel material

Excavated material will be generated from both surface sites and underground tunnelling activities. Generally, tunnel material will be classified as Virgin Excavated Natural Material and will be appropriate for reuse.

About 1,753,000 Bank Cubic Metres will be excavated in the mined tunnel sections, access ramps, TBM launching chamber and TBM receiving chamber for the Project, the majority of which will be sandstone.

This material will be excavated generally by both roadheaders and tunnel boring machine operating underground. Generated spoil will be transported from the excavated tunnel by dump trucks and stockpiled at the surface within acoustic sheds, to be transferred via loaders or excavators into highway tippers for haulage to the spoil receiving sites, except at City West Link Portal (WHT12), where no surface stockpile will be available, and spoil will be loaded underground into the highway tippers.

It is anticipated that Cammeray Golf Course (WHT10) will have storage capacity for 6,000m^3 of tunnel spoil, while Ridge Street North (WHT9) is estimated at 1,200 m^3. The spoil removal from site will always be able to keep within the stored volume capacity by continuing to load out while the road header is not cutting at the face i.e., during advance, during maintenance and during rock support.

From the acoustic shed, the material will be loaded by excavator into road licensed heavy vehicles for relocation or disposal to an appropriately licensed facility. This process is typical to all major tunnelling Projects within Sydney.

The use of the spoil shed for the management of tunnel spoil will minimise potential dust and visual impacts for surrounding receivers.

The management of tunnel spoil as waste or for the purpose of reuse is detailed in the Waste and Resource Management Sub-plan (CEMP Appendix J).

7.12 Management and mitigation measures

Management and mitigation measures relevant to the Project are outlined in Table 7-6. These will be implemented to minimise soil and surface water impacts and ensure all commitments and requirements of the project approval are met. These specific management and mitigation measures have been developed to address the requirements of applicable legislation, the MCoA and commitments of the REMMs.

Table 7-6 Soil and surface water management and mitigation measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM01	Training will be provided to relevant project personnel, including subcontractors on soil, contamination, surface water and groundwater requirements through inductions, toolboxes or targeted training. All Project personnel will undertake the Project induction, including content as specified in this Plan.	Suitably qualified / trained persons	Prior to construction Construction	Construction Manager HR/Training Manager Environment & Sustainability Manager	MCoA C2	Induction records Toolbox talk record
SWMM02	Site personnel will be trained in the Spill Response and Management Procedure and the protocol to be implemented in the event of a spill or leak.	Safety and environmental coupled with site management protocols	Construction	Construction Manager HR/Training Manager Environment & Sustainability Manager	REMM SG23 REMM WQ2	Induction records Toolbox talk record
SWMM03	Progressive Erosion and Sediment Control Plans will be developed and implemented onsite, in accordance with Section 7.1 of this Plan. Inspections of installed measures will be incorporated into weekly environmental inspections as well as ad hoc / informal daily inspections.	Suitably qualified / trained persons Soil Conservationist	Prior to construction	Construction Manager Site Superintendent / Site supervisors Environment & Sustainability Manager	MCoA E114	PESCP

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM04	Erosion and sedimentation controls will be checked and maintained weekly and following heavy rain, and actions recorded in the Environmental Inspection Checklist, in accordance with Section 8.3 of this Plan.	Soil Conservationist Suitably qualified / trained persons Environmental Inspection Checklist	Construction	Construction Manager Site Superintendent / Site supervisors Environment & Sustainability Manager	McoA E114 REMM WQ1	Site surveillance and inspections reports
SWMM05	Water accumulating within any excavation, trap or low point on site that cannot be re-used in construction or dust suppression will be tested and, if necessary, treated prior to discharge or disposed of to a licenced facility.	Site water analysis equipment	Construction	Environment & Sustainability Manager	REMM WM5	Analytical analysis reports Waste dockets WDRP
SWMM06	Water will not be actively discharged from site until necessary approvals and permits/ licences are obtained, including the Dewatering Permit, as described in Section 7.8 of this Plan. To be valid, the Dewatering Permit must be signed by the Environment Manager or delegate.	EPL Sydney Water (for Trade Waste Agreements, where applicable) WDRP	Prior to construction Construction	Environment & Sustainability Manager	McoA E210	EPL Water Discharge Permit
SWMM07	Stockpile management will occur in accordance with Section 7.3 of this plan. Where reasonable and feasible, the operational floor space of	Environmental Inspection Checklist	Construction	Construction Manager	REMM F5 REMM F6	Site Surveillance and Inspection reports

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	construction site facilities (e.g. site offices and kitchens) will be located outside high flood hazard areas based on a 1% AEP flood.			Site Superintendent / Site supervisors Environment & Sustainability Manager		
SWMM08	Prior to forecast potential heavy rainfall and flood events, sites will be inspected for areas requiring additional management measures. Controls to be implemented in accordance with Section 7.6	PESCPs SAMs	Construction	Environment & Sustainability Manager Site Superintendent / Site supervisors	REMM F7	Site Surveillance and Inspection reports
SWMM09	Entries to tunnel excavations, including cut and cover sections of tunnel, will be protected against frequent flooding through the provision of controls such as localised bunding and flood protection barriers.	PESCPs	Construction	Environment & Sustainability Manager Site Superintendent / Site supervisors	REMM F3	Site Surveillance and Inspection reports
SWMM10	The flood standard at each tunnel entry will consider the duration of construction, the magnitude of inflows and the potential risks to personal safety.	Suitably qualified / trained persons	Construction	Temporary design manager	REMM F4	Design report

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM11	Vehicles and machinery will be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.	ACCIONA plant policy	Construction	Maintenance Manager	Best Practice	Maintenance Records Site surveillance and inspections reports
SWMM12	Spill kits will be maintained at all times on site and in site vehicles.	Spill kits	Construction	Site Superintendent / Site supervisors WHS Manager	REMM SG23	Site surveillance and inspections
SWMM13	All spills will be promptly reported to the Environmental team.	Project Induction	Construction	All personnel Environment & Sustainability Manager	McoA A43 McoA C2	Induction records Toolbox talk record Site surveillance and inspections
SWMM14	Materials storage will be as described in Section 7.9 of this plan. This will be confirmed as part of routine environmental inspections.	ESCPs SAMs Environmental Inspection Checklist	Construction	Site Superintendent / Site supervisors	REMM HR1	Site surveillance and inspections

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM15	Where practicable, designated plant refuelling areas, plant service/maintenance areas and concrete/plant wash down areas will be located at least 5 metres from native vegetation and at least 50 metres from: • a natural surface drainage area, and • a built drainage structure such as a storm water pipe or box culvert.	PESCP SAMs	Construction	Design Manager Construction Manager Environment & Sustainability Manager	REMM HR1	Design Drawings Site surveillance and inspections PESCP
SWMM16	If acid sulfate soils or potential acid sulfate soils are encountered, they will be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998).	Environmental and construction teams to manage in accordance with procedure	Prior to construction	Environment & Sustainability Manager	E117 REMM SG12	Appendix E1 Acid Sulfate Soil Procedure
SWMM17	Guidance will be obtained from suitably qualified contaminated lands consultant as to the requirement for further testing to be conducted prior to ground disturbance in high risk acid sulfate areas at Birchgrove Park, Berrys Bay and Whites Creek.	Environmental and construction teams to manage in accordance with procedure	Prior to ground disturbance in high-risk ASS areas	Environment & Sustainability Manager	REMM SG12	Appendix E1 Acid Sulfate Soil Procedure

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM18	Guidance will be obtained from suitably qualified contaminated lands consultant as to the requirement for ground gas investigations at Waverton Park to assess for the potential presence of landfill generated gas which could impact on the construction and/or operation of the project. If an investigation is required, it will be undertaken in accordance with *Guideline for the Assessment and Management of Sites Impacted by Hazardous Ground Gases* (NSW EPA, 2012	Suitably qualified / trained persons	Prior to disturbance to the existing landfill under Waverton Park	Environment & Sustainability Manager	REMM SG13	Investigation report.
SWMM19	Stormwater pipe to be installed under the Emu Plains (WHT13) ancillary facility to capture stormwater from southern upstream area and discharge into the existing open drainage line.	PESCP	Construction	Construction Manager Environment & Sustainability Manager	REMM F10	Design Drawings PESCP
SWMM20	Diversion drains will be implemented at the Emu Plains (WHT13) ancillary facility to divert overland flow around the site buildings and sensitive facilities.	PESCP	Construction	Construction Manager Environment & Sustainability Manager	REMM F10	PESCP

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
SWMM21	An appropriate size basin is to be established at the Emu Plains (WHT13) ancillary facility to compensate for the flood storage loss due to filling of existing basin(s) and the additional paved area	PESCP	Construction	Construction Manager Environment & Sustainability Manager	REMM F11	PESCP
SWMM22	A flood evacuation plan will be developed for the Emu Plains (WHT13) construction ancillary facility prior to commencement of bulk earthworks activities for the Emu Plains site.	Flood evacuation plan	Prior to flood emergency	Safety Manager	REMM F12	Flood evacuation plan

8 Compliance management

Compliance with this Plan will be measured against the targets outlined in Section 2.3 of this plan through ongoing monitoring throughout the construction of the Project.

8.1 Roles and responsibilities

The ACCIONA Project Team's organisational structure and overall roles and responsibilities as well as the Environmental Representative and required specialists are outlined in Section 5.7 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 7 of this Plan.

8.2 Training

All employees, contractors and utility staff working on site will undergo site induction training relating to soil and water management issues. The induction training will address elements related to soil and water management including:

- Existence and requirements of this SSWMP
- Relevant legislation
- Roles and responsibilities for soil and water management
- Procedures to be implemented in the event of an unexpected discovery of contaminated land
- Water quality management and protection measures
- Emergency spill procedures
- Unexpected Finds
- Location and type of known potential contaminants and management of them

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. This may include:

- Spill kit training
- Blue Book training
- Emergency incident / response training
- Water quality monitoring training.

Further details regarding staff induction and training are outlined in Section 5.9 of the CEMP.

8.3 Monitoring and inspection

Monitoring requirements are outlined in the Surface Water Monitoring Programs detailed in Appendix E2.

Weather conditions and forecasts (including rainfall prediction maps) will be monitored approximately daily and the relevant information passed on to site personnel to allow for adequate planning for significant rain events and/or flooding.

Inspection requirements are outlined in Table 8-1. Additional requirements and responsibilities in relation to inspections are documented in Section 5.12 of the CEMP.

Table 8-1 Monitoring and inspection requirements

Monitoring details	Record	Responsibility	Frequency
Inspection of erosion and sedimentation controls	Environmental Inspection Checklist	Site Supervisor Environmental Manager	Weekly[1] After heavy rainfall events[2] Before a site shutdown of > 3 days
Meteorological data including daily rainfall, hourly temperature, relative humidity, wind (direction and speed) and barometric pressure	Daily rainfall records from closest BOM or DPE station	Environmental Manager	Approximately daily
Any additional monitoring as defined by EPL	TBC	Environmental Manager	TBC
Any additional inspections as requested by the independent certifier	Independent Certifier Records	Environmental Manager	TBC

[1] Daily checks will be conducted as part of ad-hoc/informal site inspections.
[2] A heavy rainfall event is rainfall exceeding 25 mm in 24 hours and before a site closure of two days or more.

Maintenance identified on the Environmental Inspection Checklist will be implemented within the time periods nominated. Site supervisors will undertake daily informal erosion and sediment control checks and record any issues within site diaries. Site supervisors will ensure controls are maintained and in working order between inspections.

Additional inspection may also be undertaken by:

- EPA
- Site Auditor (regarding contamination management)
- TfNSW
- DPE
- Environmental Representative

8.4 Licences and permits

An Environment Protection Licence has been obtained for the Project.

As per MCoA E206, the Project will be designed and constructed so as to maintain the NSW Water Quality Objectives (where they are being achieved as at the date of Project approval) or otherwise contribute towards achievement them, unless the EPL contains different requirements, in which case those requirements must be complied with.

Further, discharges from construction water treatment plants to surface waters must not exceed the criteria defined in MCoA E208, unless the EPL specifies alternate criteria. This is addressed within the Groundwater Management Sub-plan.

In line with MCoA E210 if construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment (WPIA) will be required to inform licensing consistent with section 45 of the POEO Act. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk.

As per REMM WQ13 if sediment basins are required, a WPIA, commensurate with the potential risk and consistent with the National Water Quality Guidelines (ANZG (2018)) and Managing Urban

Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) will be prepared to inform the discharge criteria which will be incorporated into the EPL.

8.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, MCoA and other relevant approvals, licences, and guidelines.

Auditing is to comply with Conditions of Approval A37 to A42 inclusive. Audit requirements are detailed in Section 5.13 of the CEMP.

8.6 Reporting

Reporting requirements and responsibilities are documented in the CEMP. Additional reporting will also be generated as required in the Surface Water, and Groundwater Monitoring Programs.

The Duty to Report Contamination will be considered per the CLM Act 1997. ACCIONA will work with the certified environmental practitioner consulted with the notification triggers including unsuitable lands, prescribed contaminant levels or off-site (including foreseeable) migration of contaminants from site by any means.

The 2015 Guideline prepared by the NSW EPA (2015) within the CLM Act (1997) specifies if the following triggers occur, a requirement to report of land contamination is required:

- The level of the contaminant in, or on, soil is equal to or above a level of contamination set out in Schedule B1 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) or other approved guideline value with respect to a current or approved use of the land, and people have been, or foreseeably will be, exposed to the contaminant, OR
- The contamination meets a criterion prescribed by the regulations, OR
- The contaminant or a by-product has entered, or will foreseeably enter, neighbouring land, the atmosphere, groundwater, or surface water, and is above, or will foreseeably be above, a level of contamination set out in National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) or other approved guidelines and will foreseeably continue to remain equal to or above that level.

9 Review and improvement

9.1 Continuous improvement

As outlined in Section 5.17 of the CEMP, management reviews will be undertaken as part of the continual improvement process. The reviews will be initiated by the Environmental Manager and include relevant project team members and stakeholders. Continuous improvement of this plan and of monitoring requirements detailed in Section 8.3 of this Plan will be achieved by the ongoing evaluation of environmental management performance against planning approval requirements, environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets outlined in this Plan.

9.2 SWMP update and amendment

The auditing and review processes described in Section 5.13 to Section 5.17 of the CEMP may result in the need to update or revise this Plan. This will occur whenever there is a change to the construction scope or methodology that may increase the potential impacts upon Soil and Surface Water or to address relevant updates to a related Sub-Plan or monitoring program (as identified in Table 1-1).

Only the Environment Manager can amend this Plan. Any update of this Plan will require endorsement by the Environmental Representative and depending on the change, process outlined in Section 6 of the CEMP must be followed where approval from the Planning Secretary prior to implementation of the update is required.

Appendix E1 – Acid Sulfate Soil Procedure

Acid Sulfate Soil Procedure

Western Harbour Tunnel

June 2023

THIS PAGE LEFT INTENTIONALLY BLANK

Contents

Figures

Tables

Document control

Approval and authorisation

Approved on behalf of ACCIONA by	Andrew Marsonet
Signed	
Dated	16 December 2022

Document status

Revision	Date	Description	Approval
Rev A	14/12/2022	Final	E.Woodward
Rev B	14/06/2023	Updated document template.	M.Lee / E.Woodward

Glossary/ Abbreviations

Abbreviations	Expanded text
ACCIONA	Acciona Construction Australia (the Contractor)
AS/NZS	Australia/New Zealand Standards
ASS/PASS	Acid Sulfate Soils/ Potential Acid Sulfate Soils
ASSMP	Acid Sulfate Soil Management Procedure
CEMP	Construction Environmental Management Plan
DPE	NSW Department of Planning and Environment
DPI (Water)	NSW Department of Primary Industries (Water) (Former Office of Water)
DSI	Detailed Site Investigations
EIS	Prepared by Jacobs (2020) for Western Harbour Tunnel and WFU projects
EMS	Environmental Management System
Environment Policy	Statement by an organisation of its intention and principles for environmental performance
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organisation's environmental aspects
Environmental incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance with the conditions of this approval. Note "material harm" is defined in this document.
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*

Abbreviations	Expanded text
EPL	NSW Environment Protection Licence under the *Protection of the Environment Operations Act 1997*.
EWMS	Environmental Work Method Statements
Hold point	Is a verification point that prevents work from commencing prior to release.
Material harm	This is harm that: (a) involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial or (b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment).
MCoA	Minister's Conditions of Approval (as relevant to Western Harbour Tunnel/ Warringah Freeway Upgrade)
Minister, the	NSW Minister for Planning and Public Spaces
Non-compliance	An occurrence, set of circumstances or development that is a breach of this approval but is not an incident
Planning Secretary	The Planning Secretary of the Department of Planning , Industry and Environment
PoEO Act	*NSW Protection of the Environment Operations Act 1997*
Project, the	Western Harbour Tunnel project
Relevant Councils	Any or all local government councils as relevant
REMM	Revised Environmental Management Measure
SSWMP	Soil and Surface Water Management Sub-plan
WHT	Western Harbour Tunnel

1 Introduction

1.1 Context

This Acid Sulfate Soil (ASS) Management Procedure (ASSMP or Procedure) has been prepared for the construction delivery stage of the Western Harbour Tunnel (WHT) project (the Project). The Procedure forms an Appendix to the Contaminated Lands Management Plan (CLMP) which is an Appendix to the Soil and Surface Water Management Sub-plan (SSWMP) within the Construction Environmental Management Plan (CEMP) for the Project.

1.2 Scope

The scope of this ASSMP is to describe how ACCIONA proposes to manage potential impacts of mishandling of ASS or Potential Acid Sulfate Soil (PASS) during construction of the Project.

This procedure is applicable to all activities undertaken for the project that have the potential to disturb expected and unexpected areas of ASS or PASS on the Project.

2 Purpose and objectives

2.1 Purpose

The purpose of this ASSMP is to describe how the ACCIONA proposes to manage the potential discovery and disturbance of potential or actual ASS during the construction of the Project.

2.2 Objectives

The key objective of this Procedure is to provide instruction on of potential or actual ASS during design and construction to protect the environment. To achieve this objective, ACCIONA will undertake the following:

- Ensure all activities which may potentially expose, impact on, or handle ASS have access to this procedure.
- Ensure all Project personnel involved in activities which may potentially expose, impact on, or handle ASS are aware of the requirements for ASS management.
- Maximise the reuse of on-site materials generated on site where practical.

3 Legal and other requirements

3.1 Relevant legislation and guidelines

The legislation relevant to the SSWMP and this program is listed in Section 3 of the SSWMP.

Guidelines and standards specifically relating to this monitoring program include:

- Acid Sulfate Soil Manual: Acid Sulphate Soil Management Advisory Committee of NSW; (ASSMAC 1998)

- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu" November 1997
- Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) Volume 1, and NSW Department of Environment, Climate Change and Water, 2008. Volume 2D, (commonly referred to as the “Blue Book”)
- Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (RTA 2005).

4 Aspects and Impacts

4.1 Description of ASS

Acid sulfate soils are generally distributed in estuaries and coastal floodplains, back swamps, and coastal areas in elevations <5m AHD. Monosulfidic Black Ooze potentially exists in drains and waterways in acid sulfate areas and saline areas. Acid sulfate soil risk maps were reviewed, and ASS / PASS is likely to be intersected in the project area and during the works.

Based on the EIS, PASS are likely to be present within the Project boundary. During the project the following relevant construction activities have been identified for cautionary measures:

- Excavations
- Piling and tunnelling activities
- Dewatering (various below ground sources)

Potential actions during construction activities that can result in harmful ASS impacts include:

- Uncontrolled surface runoff in areas of stockpiled ASS, causing the release of acid into the environment
- Leaking of acid into the environment at ASS treatment sites
- Exposure of potential ASS to the air, in excavations, thus causing increased oxidisation and increased probability of release of acid and offensive odours into the environment
- Inadequate treatment of ASS reused for construction material
- Potential ASS effects on concrete structures, road surfaces and potential destabilisation of fill.

To mitigate the effects of ASS, measures will be implemented into management plans and Environmental Work Method Statements in accordance with this Procedure. ASS treatment areas will be located, designed, constructed, and operated in accordance with the requirements of this Procedure, or taken offsite for offsite treatment.

4.2 Procedures for Managing and Treating ASS

Material source will be assessed on the basis of data obtained prior to excavation, enabling classification of material prior to excavation, improving predictability of material handling. Sampling will be undertaken by the drilling of air track holes to create rock dust for sampling purposes.

4.3 ASS Avoidance and Mitigation

In accordance with Project mitigation measures, prior to ground disturbance in areas of possible ASS/PASS occurrence, testing would be carried out to determine the presence of these materials. This testing would be done as part of the Detailed Site Investigations (DSI) and the in-situ waste

classification process. If encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998).

The following steps must be considered in design and construction planning:

- Avoid the disturbance of ASS where practical to do so by locating temporary facilities, temporary inground services etc away from identified potential areas, wherever possible.
- Risk of disturbance to potential ASS should be reduced to as low as reasonably practicable taking into account engineering and economic constraints.
- Avoid or minimise excavation and lowering of the water table in areas known to potentially contain ASS.
- Acid resistant construction materials to be applied in areas known to contain high risk ASS.

Where impacts to areas containing ASS is unavoidable, the excavation, stockpiling and containment, treatment and reuse or disposal of ASS will be pre-planned in accordance with the requirements of this Procedure to minimise environmental impacts to acceptable levels.

4.4 Unexpected Discovery of ASS

The following flow chart should be used to assist in the initial identification process of soils which have not already been assessed as being ASS or PASS. Detailed ASS identification protocol and collection methodologies can be found in Appendix A Field pH Testing Procedure.

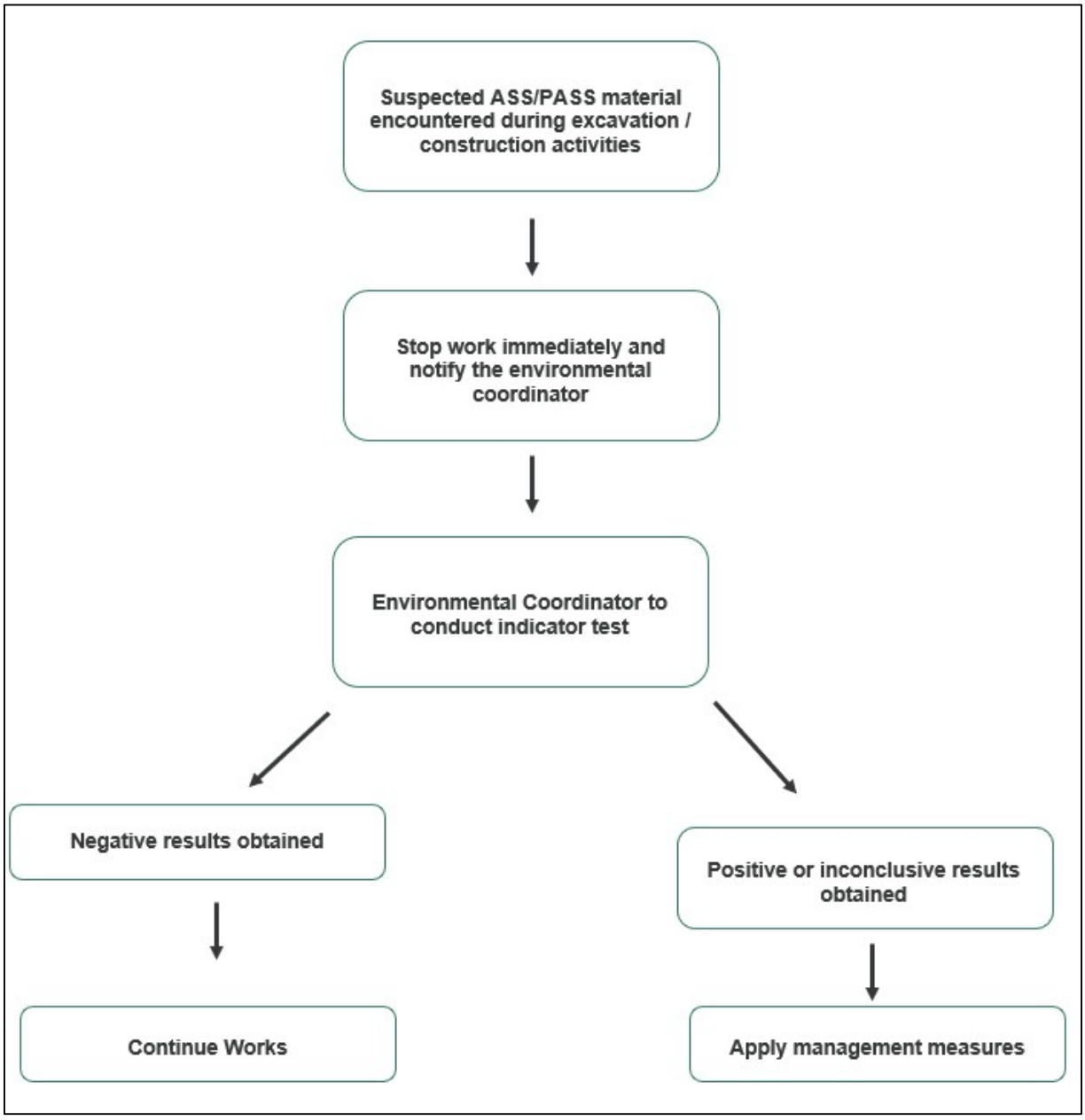


Figure 1 Unexpected discovery of ASS / PASS

5 ASS management and Treatment

5.1 Immediate reuse

In the case of immediate reuse on site (e.g. trenching and backfilling within a day), there is a reduced likelihood that PASS will be exposed long enough to oxidise and become ASS. Immediate reuse (same day) may be appropriate if PASS is of low to moderate strength. It is recommended that lime application occur prior to backfilling as a precautionary measure.

Further, the soil material will require backfilling in the reverse order of excavation (i.e. last out first in).

Note: the majority of situations are not conducive for immediate reuse and as such the decision for immediate reuse can ONLY be made by the Environment Manager.

5.2 Treatment of ASS onsite

An ASS treatment area can be established prior to works that are likely to encounter ASS or PASS. The ASS treatment area is to be located:

- As close as possible to the source of the material
- Located at a suitable elevation to be unlikely impacted by flooding
- Away from identified sensitive receivers.
- Where possible, prior to soil disturbance, add required amounts of lime over the area to be disturbed to ensure mixing occurs as early as possible
- Transfer soil to treatment area
- Soil shall be laid in 150mm to 300mm layers on a treatment pad, see Appendix C for typical treatment pad design.
- An estimation on treatment levels and aglime required to treat the total weight of disturbed Acid Sulfate Soil is provided in Appendix B.
- If sufficient mixing did not occur during excavation and initial in situ lime addition, the soil shall be turned over/ mixed in a manner such that lime will be distributed throughout the soil matrix.
- The material is then left on the treatment pad for approximately 1-3 days to allow neutralisation to occur (or less if neutralisation can be achieved sooner), turning the soils when the surface dries out, and so increasing the rate of oxidation. Effective drying and mixing of lime with clay is often very difficult. The drying rate is dependent on the temperature and in cooler climates the methods may be too slow to be practicable.
- Water contained within the collection sumps will need to be sampled to assess requirements for treatment prior to discharge.
- This material shall remain bunded until validation results are available and return concentrations less than the respective criteria (detailed in Appendix B). Should the stockpile validation results exceed the criteria, additional lime will be added as required and further validation samples collected.

5.3 Treatment of ASR onsite

A simple indicator for determining liming rates for acid sulfate rock (ASR) is provided in Appendix B to this Procedure. The pH testing procedure for ASR will be undertaken in accordance with the Field pH and Peroxide test applied to powdered rock material as conventionally applied to soils (refer to Appendix A). Sampling and testing protocols need to be implemented in a manner that accounts for mixing of 'hot spots', in order to provide an averaged basis for managing potential acid forming rock.

5.4 Validation of treated material

Final validation sampling of treated soils will be conducted at the completion of treatment to determine if the neutralisation process has been successful.

Soils that have been mixed with aglime will be analysed (by laboratory analysis eg SPOCAS or Chromium Suite testing method) at a rate of one sample per 250m^3.

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

- The neutralising capacity of the treated soil must exceed the existing plus potential acidity of the soil
- Soil pH > 5.5

- Soil has no further capacity to generate acidity.

Samples of the treated soil should be taken and laboratory tested to demonstrate compliance with the performance criteria. All validation samples are to be recorded by the Environmental Coordinator.

5.5 Reuse of ASS onsite

Once stockpile validation results confirm the criteria described above has been complied with, reuse of the material on site is permitted.

If material cannot be reused onsite and off-site disposal is required, procedures outlined within the document *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* shall be implemented, as detailed in the following sections.

5.6 Disposal of actual acid sulfate soils

If off-site disposal is required, procedures outlined within the document Waste Classification Guidelines, Part 4: Acid Sulfate Soils (NSW EPA 2014) shall be implemented.

ASS must be treated before the material can be considered for disposal at a development site. Treatment should be in accordance with the neutralising techniques outlined in this procedure.

Alternatively, ASS may be taken to an offsite treatment facility, provided that facility is licensed to take ASS materials.

Following neutralisation, the waste must be chemically assessed in accordance with Step 5 of the Waste Classification Guidelines: Part 1 – Classifying waste. This will determine whether there are any other contaminants that may affect how the waste is classified for disposal.

Once classified, the waste must be managed appropriately for that class of waste. (Refer to the Environmental Coordinator to confirm ACCIONA approved location for offsite landfill for disposal).

Prior arrangements should be made with the manager of the landfill to ensure that it is licensed to accept the waste. The landfill must be informed that the actual ASS has been treated in accordance with the neutralising techniques and classified in accordance with the Waste Classification Guidelines.

Further details on the Waste Classification guidelines and disposal requirements is detailed in the Waste and Resource Management Sub plan.

5.7 Monitoring

Where surface water and/or leachate collects within the bunded treatment area, the water shall be tested for pH, turbidity and TSS values prior to discharge or pumped directly to a sedimentation basin or construction water treatment plant.

- Any runoff or fines collected in the settlement pond/sump will require assessment prior to decommissioning of the stockpile area.
- Regular visual monitoring of ASS areas and surrounds shall be undertaken to identify signs of ASS oxidation. This monitoring should include detecting:
    - Unexplained scalding, degradation or death of surrounding vegetation
    - Unexplained death or disease in aquatic organisms
    - Formation of the mineral jarosite and other acidic salts in exposed or excavated soils
    - Areas of green-blue water or extremely clear water indicating high concentrations of aluminium

- Rust coloured deposits on plants and on the banks of drains, water bodies and watercourses indicating iron precipitates
- Black to very coloured waters indicating de-oxygenation.

5.8 Induction and training

Prior to commencing works that has the possibility of impacting potential or actual ASS, the Site Supervisor and/or Project Engineer must advise the Project's Environment Manager.

The environmental manager will work closely with the construction teams to ensure ASS and PASS is well mapped, high-risk areas and reduced levels (RLs) are well known to all persons involved in the construction activity.

Personnel involved in acid sulfate soil management will be trained in the requirements of this Procedure. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

6 Contingency Measures

The following contingency measures will be undertaken in the event of failure of proposed ASS management and treatment. The project soil conservationist may be involved in advisory support to implementing any contingency measures as required.

Table 1 Contingencies for potential failures in ASS management and treatment

Potential failure	Potential impact	Contingency measures
Unexpected find of ASS	Lack of preparedness in managing excavated ASS. Release of acidity into immediate surrounds including waterways.	• Apply Unexpected Finds Procedure • Provisioning of neutralising agent (aglime) when working in high risk ASS areas. • Prepare for temporary stockpile area when working in high risk ASS areas. • Monitoring by Environmental Coordinator • Follow treatment procedure
Failure of batch treatment (neutralisation)	Constrain on stockpile treatment area capacity. Potential release of acidic material to environment.	• Verification of stockpile prior to reuse • Creation of additional temporary stockpile site to be organised under coordination with Environmental Coordinator and soil conservationist for re-treatment.
Local flooding of stockpile treatment area or temporary stockpile area, causing overflow of sump collection.	Release of acidic 'leachate' water to land and waterways	• Treating stockpiles within 24 hours. Location of temporary stockpiles away from waterways and provide sufficient stormwater diversion around stockpiles (monitor short term weather information). • Liming of drainage lines. • Collect washed out sediments, test area and neutralise area if required.

Inflow of groundwater into soil and rock excavations subject to acidic conditions	Impact on groundwater quality and consequential impacts to aquatic environment.	• Provisioning of neutralising agent (aglime) when working in high risk ASS areas. • Pump out acid drainage into temporary storage tanks or basins for treatment • Install lime curtain in work area where appropriate • Monitoring of groundwater conditions
Spillage of ASS during transport	Release of acidity into immediate surrounds including waterways.	• Collect material, neutralise area if required. Provisioning of neutralising agent (aglime) when working in high risk ASS areas.
Unexpected find of ASS	Lack of preparedness in managing excavated ASS. Release of acidity into immediate surrounds including waterways.	• Apply Unexpected Finds Procedure • Provisioning of neutralising agent (aglime) when working in high risk ASS areas. • Prepare for temporary stockpile area when working in high risk ASS areas. • Monitoring by Environmental Coordinator • Follow treatment procedure

Appendix A – Field pH Testing Procedure

A.1 VISUAL ASSESSMENT

If working in an area of ASS and PASS, it is important to be able to recognise indicators of actual acid sulfate soils to prevent further acidification of land and waterways. These indicators include:

- cloudy green-blue water
- excessively clear water
- iron stains
- poor pasture
- scalded soil
- yellow jarosite
- 'rotten egg' smell
- waterlogged soil
- corrosion of concrete and/or steel structures
- oily-looking surface iron bacterial scum
- dark grey soils

Should these conditions be encountered the Environmental Coordinator and the site foreman should immediately be alerted to the material and area of concern.

A.2 FIELD TESTING – FIELD PH AND THE 30% PEROXIDE TEST

Field testing provides rapid in situ techniques for assessing the likelihood of ASS. The test involves measuring soil pH before and after oxidation using the following parameters:

- pHF — measure of soil pH of a soil:water paste
- pHFOX — measure of soil pH after rapid oxidation with hydrogen peroxide (H2O2)

Field testing cannot be used as a substitute for laboratory analysis in the identification of acid sulfate soils for assessment purposes. The techniques for field pH (pHF) and field peroxide pH (pHFOX) are detailed as follows:

A.2.1 FIELD PH TEST (PH_F)

The pHF readings should be taken at regular intervals down the soil profile. It is recommended this test be done every 0.25m down the profile but at least every 0.5m interval or horizon whichever is the lesser.

Notes on pH equipment and use
• A battery powered, field pH meter with a robust, spear point, double reference pH electrode should be used • Calibrate the field pH meter in accordance with the manufacturer's instructions • The probe can be inserted directly into soft wet soils or soil mixed up into a paste with deionised water. (Care must be exercised not to scratch the electrode on sandy or gravely soils) • Use of the meter and testing should be only undertaken by trained personnel

A.2.2 FIELD PEROXIDE PH TEST (PHFOX)

To test for the presence of unoxidised sulfides and therefore PASS, the oxidation of the soil with 30% (100 volume) hydrogen peroxide can be performed in the field. The most common method is:

- A small sample of soil (approx. 5 g) is placed in a small glass container (e.g. short clear centrifuge tubes, clear tissue culture clusters or sample jar) and a small volume (20 mL) of peroxide is dropped onto the soil. (Note: Allow the digested solution to cool after the reaction. A pH probe will only measure to 60□C.)
- The reaction should be observed and rated. In some cases, the reaction may be instantaneous; in others, it may take 10 minutes or more. Heating over hot water or in the sun may be necessary to start the reaction on cool days, particularly if the peroxide is cold.
- Potentially positive reactions for ASS include one or more of the following:
    - change in colour of the soil from grey tones to brown tones;
    - effervescence;
    - the release of sulfurous odours;
    - final pH of <3.5 and preferably < 3;
    - lowering of soil pH by at least one pH unit

The strength of the reaction is a useful indicator. Effervescence (or reaction rate) — a visual measure of the vigorousness of the oxidation reaction where: 1 = slight; 2 = moderate; 3 = high; and 4 = extreme.

When effervescence (sometimes violent) has ceased, a few additional mL of peroxide should be added until the reaction appears complete. If the reaction is violent, it is recommended that deionised water be added to cool and dilute the reaction. The test may have to be repeated with a small amount of water added to the soil prior to peroxide addition. The pHFOX of the resultant mixture is then measured. The peroxide test is most useful and reliable with clays and loams containing low levels of organic matter. It is least useful on coffee rock, sands or gravels, particularly dredged sands with low levels of sulfuric material (e.g. <0.05 % S).

With soils containing high organic matter (such as surface soils, peats, mangrove / estuarine muds, and marine clays), care must be exercised when interpreting the reaction as high levels of organic matter and other soil constituents particularly manganese oxides can also cause a reaction.

Note of caution with the use of peroxide
• 30 % hydrogen peroxide is a strong oxidising agent and should be handled carefully with appropriate eye and skin protection. This test should be only undertaken by trained personnel. • The pH of analytical grade peroxide may be as low as 3 as manufacturers stabilise technical grade peroxide with acid. The peroxide pH should be checked on every new container and regularly before taking to the field and adjusted to 4.5 - 5.5 with a few drops of 0.1M NaOH if necessary. False field pH_{FOX} readings could result if this step is not undertaken.

A.2.3 PH AFTER OXIDATION

The measurement of the change in the pHFOX following oxidation can give a useful indication of the presence of sulfuric material and can give an early indication of the distribution of sulfide down a core/ profile or across the site. The following table provides an interpretation of the change in pH.

If one positive result is obtained, the required action should be followed. The ‘pH after oxidation’ test is not a substitute for analytical test results.

pH_F	pH_{FOX}	ΔpH	Reaction Rate	Action Required
≥ 5.0	≤ 5.0	≤ 2	1—2	If no other field indicators or acid sulfate soil risk indicators are present, no further action is required
> 4.0 and < 5.0	> 3.0 and < 5.0	> 2	≥ 2	PASS may be present, further assessment is required (laboratory analysis)
≤ 4.0	≤ 3.0	> 2	≥ 2	AASS or PASS are likely to be present, further assessment is required (laboratory analysis)

Care is needed with interpretation of the result on highly reactive soils. Some soil minerals other than pyrite react vigorously with peroxide, particularly manganese but may only show small pH changes.

Note of caution with testing of soil with high organic content

- When selecting soil for testing it is advisable to avoid material high in organic matter as the oxidation of organic matter can lead to the generation of acid. However pH of soils containing organic matter and no pyrite do not generally stay below 4 on extended oxidation. In general positive tests on 'apparently well drained' surface soils should always be treated with caution and followed up with laboratory confirmation.

The field peroxide tests can be made more consistent if a fixed volume of soil (using a small scoop) is used, a consistent volume of peroxide is added and left to react for an hour, and the sample is made up to a fixed volume with deionised water before reading. However, such procedures take time in the field and are more suited to a 'field shed' situation.

Appendix B - Estimating ASS Treatment Levels and Aglime rates

The following extract is taken from “Guidelines for the Management of Acid Sulfate Material Acid Sulfate soils, Acid Sulfate Rock and Monosulfidic Black Ooze, RTA 2005” (refer to ASS Procedure No.4 – Attachment 2 of RTA Guidelines).

Estimating treatment levels and aglime required to treat the total weight of disturbed Acid Sulfate Soil – based on soil analysis (after Ahern et al 1998, *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines*)

The tonnes (t) of pure fine aglime, $CaCO_3$ required to fully treat the total weight/volume of Acid Sulfate Soils (ASS) can be read from the table at the intersection of the weight of disturbed soil [row] with the existing plus potential acidity [column]. Where the exact weight or soil analysis figure does not appear in the heading of the row or column, use the next highest value.

Disturbed ASS (tonnes) (~ m^3 x BD) ‡	Soil Analysis# - Existing Acidity plus Potential Acidity (converted to equivalent S% units)													
	0.03	0.06	0.1	0.2	0.4	0.6	0.8	1	1.5	2	2.5	3	4	5
1	0	0	0	0	0	0.03	0.04	0.05	0.1	0.1	0.1	0.1	0.2	0.2
5	0	0	0	0.05	0.1	0.1	0.2	0.2	0.4	0.5	0.6	0.7	0.9	1.2
10	0	0.03	0.05	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.4	1.9	2.3
50	0.1	0.1	0.2	0.5	0.9	1.4	1.9	2.3	3.5	4.7	5.9	7.0	9.4	12
100	0.1	0.3	0.5	0.9	1.9	2.8	3.7	4.7	7.0	9.4	12	14	19	23
200	0.3	0.6	0.9	1.9	3.7	5.6	7.5	9.4	14	19	23	28	37	47
250	0.4	0.7	1.2	2.3	4.7	7.0	9.4	12	18	23	29	35	47	59
350	0.5	1.0	1.6	3.3	6.6	10	13	16	25	33	41	49	66	82
500	0.7	1.4	2.3	4.7	9.4	14	19	23	35	47	59	70	94	117
600	0.8	1.7	2.8	5.6	11	17	22	28	42	56	70	84	112	140
750	1.1	2.1	3.5	7.0	14	21	28	35	53	70	88	105	140	176
900	1.3	2.5	4.2	8.4	17	25	34	42	63	84	105	126	168	211
1000	1.4	2.8	4.7	9.4	19	28	37	47	70	94	117	140	187	234
2000	2.8	5.6	9.4	19	37	56	75	94	140	187	234	281	374	468
5000	7.0	14	23	47	94	140	187	234	351	468	585	702	936	1170
10000	14	28	47	94	187	281	374	468	702	936	1170	1404	1872	2340

L	**Low treatment:** (≤0.1 tonnes lime)	M	**Medium treatment:** (>0.1 to 1 tonne lime)	H	**High treatment:** (>1 to 5 tonnes lime)	VH	**Very High treatment:** (>5 to 25 tonnes lime)	XH	**Extra High treatment:** (>25 tonnes lime)

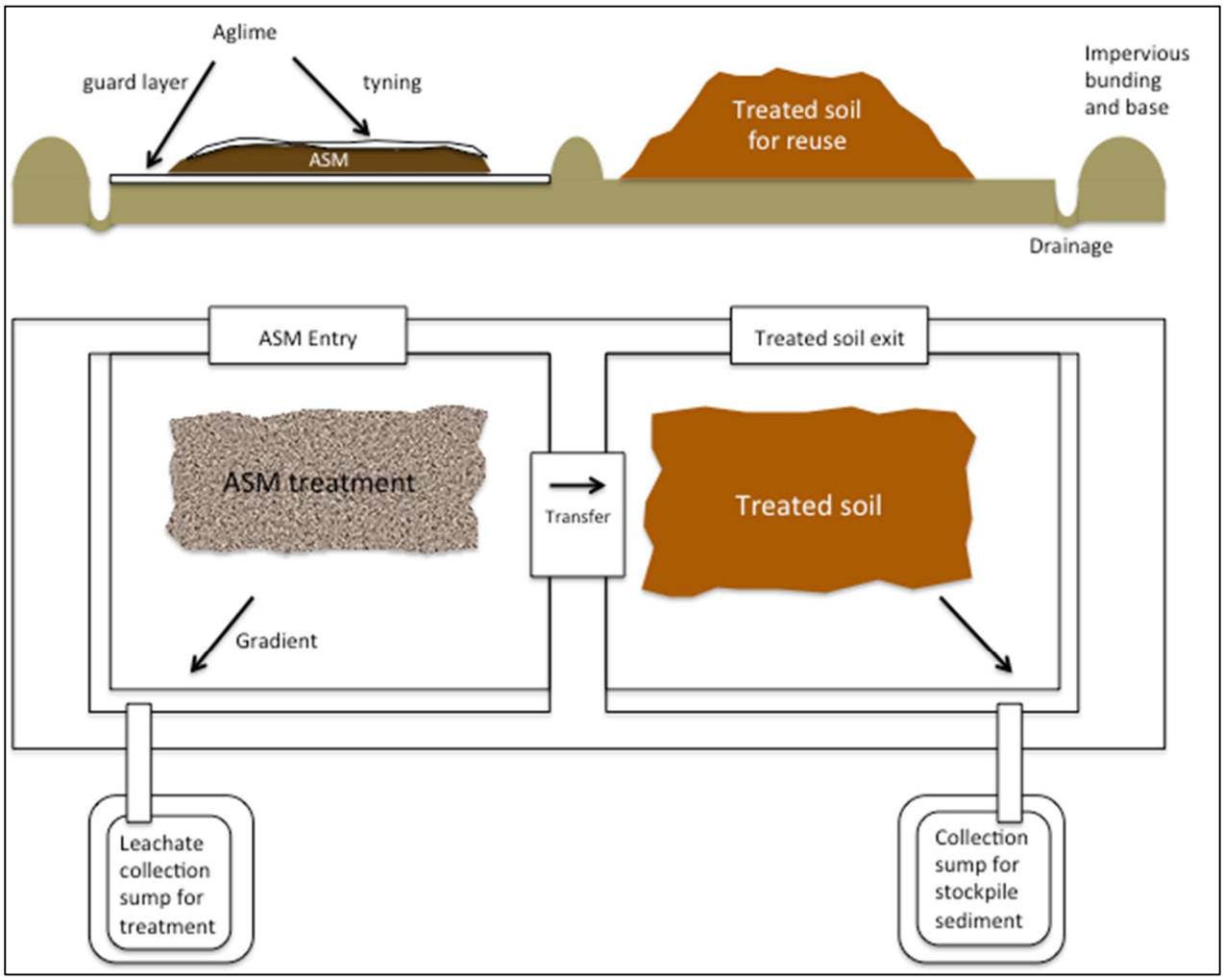
Note: Lime rates are for pure fine aglime, $CaCO_3$ assuming an NV of 100% and using a safety factor of 1.5. A factor that accounts for Effective Neutralising Value is needed for commercial grade lime. (See the *Information Sheets on Neutralising Agents – Neutralising Considerations*).

‡ An approximate soil weight (tonnes) can be obtained from the calculated volume by multiplying volume (cubic m) by bulk density (t/m^3). (Use 1.7 if BD is not known). Dense fine sandy soils may have a BD up to 1.7, and hence $100m^3$ of such soil may weigh up to 170t. In these calculations, it is necessary to convert to dry soil masses, since analyses are reported on a dry weight basis.

Potential acidity can be determined by Chromium Reducible Sulfur (S_{CR}), Peroxide Oxidisable Sulfur (S_{POS}) and Total Oxidisable Sulfur (S_{TOS}). For samples with pH <5.5, the existing acidity must also be determined by appropriate laboratory analysis eg. Titratable Actual Acidity (TAA). Soils with retained acidy eg. jarosite or other similar insoluble compounds have a less available acidity and will require more detailed analysis. The amount of treatment required may be reduced if the self-neutralising capacity of the soil is appropriately measured. Consult the ***Queensland Acid Sulfate Soils Technical Manual, Laboratory Methods Guidelines***.

Appendix C - ASS Treatment Area Layout

Estimate the potential amount of ASS that may be disturbed and determine a treatment area large enough to contain all, or the progressive treatment loads, of excavated ASS. The Environmental Coordinator and Project soil conservationist should be involved to advise on the establishment of a treatment area. Example set up shown below.



Treatment areas shall meet the following requirements:

- Be located at least 50m from waterways;
- Be located above the 1 in 20 year ARI flood levels;
- Be constructed with impervious material (eg clay) bunds to prevent leachate runoff;
- Be lined with agricultural lime on the floor of the treatment area at a rate capable of neutralising all acid waters that might infiltrate through ASS, prior to placing ASS in the treatment areas;
- Be clearly signposted.

The treatment area will require a settlement pond or sump to collect any runoff. The pond or sump must be designed to capture the ASS treatment area runoff a 1 in 10 year (1 hour) storm event

Appendix E2 – Surface Water Monitoring Program

Surface Water Monitoring Program

Soil and Surface Water Management Sub-plan

Western Harbour Tunnel

March 2024

THIS PAGE LEFT INTENTIONALLY BLANK

Contents

Figures

Tables

Document control

Approval and authorisation

Approved on behalf of ACCIONA by	Andrew Marsonet
Signed	
Dated	16 December 2022

Document status

Revision	Date	Description	Approval
Rev A	14/12/2022	For TfNSW review	E. Woodward
Rev B	24/01/2023	For external review	E. Woodward
Rev 00	3/03/2023	For DPE review	E. Woodward
Rev 01	3/04/2023	For DPE review / approval	E. Woodward
Rev 1.1	14/08/2023	Updated to include Stage 3C. For external consultation	E. Woodward
Rev 1.2	22/02/2024	Updated following external consultation. For ER review	C. Weller
Rev 2.0	19/03/2024	For Stage 3C ER endorsement & DPHI review.	C. Weller

Glossary/ Abbreviations

Abbreviations	Expanded text
BOM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPL	Environment Protection Licence
MCoA	Minister's Conditions of Approval
MOD2	Western Harbour Tunnel and Warringah Freeway Upgrade TBM solution of crossing Sydney Harbour – Modification 2
NATA	National Association of Testing Authorities
REMM	Revised Environmental Management Measures
SPIR	Submissions and Preferred Infrastructure Report
SSWMP	Soil and Surface Water Management Sub-plan
SWMP	Surface Water Monitoring Program
TfNSW	Transport for New South Wales
the Project	Western Harbour Tunnel project
WHT	Western Harbour Tunnel

1 Introduction

1.1 Context

This Surface Water Monitoring Program (SWMP) has been prepared for the construction delivery stage of the Western Harbour Tunnel (WHT) project (the Project). The Program forms an appendix to the Soil and Surface Water Management Sub-plan (SSWMP). \

The SWMP addresses the requirements of the Minister's Conditions of Approval (MCoA), the WHT and Warringah Freeway Upgrade Environmental Impact Statement (EIS), the revised environmental management measures (REMM) listed in the Western Harbour Tunnel and Warringah Freeway Upgrade TBM solution of crossing Sydney Harbour – Modification 2 (MOD2) and all applicable guidance and legislation.

1.2 Scope of the surface water monitoring program

The scope of this SWMP is to describe how ACCIONA proposes to monitor potential impacts to surface water during construction of the Project. Operational monitoring and operation measures do not fall within the scope of the construction phase and therefore are not included within the processes contained within the SWMP.

2 Purpose and objectives

2.1 Purpose

The purpose of the SWMP is to describe how ACCIONA proposes to monitor surface water quality during construction of the Project. ACCIONA will monitor the extent and nature of potential impacts to surface water quality during construction of the Project. The SWMP will be implemented to monitor the effectiveness of mitigation measures applied during the construction phase of the Project.

Monitoring of surface water will be undertaken to identify potential impacts and ensure a comprehensive management regime can be implemented to address those impacts and manage local surface water quality. This Program provides details of the surface water monitoring network, frequency of monitoring, and test parameters. This SWMP supplements the SSWMP required under MCoA C11, which itself is an appendix of the Construction Environmental Management Plan (CEMP) required under MCoA C1. Compliance with MCoA C12 is described in the table below.

This SWMP is based on baseline studies developed for the project EIS (Jacobs 2020).

Table 1 MCoA requirements for monitoring programs

Ref	Requirement	Where addressed
C12	Each Construction Monitoring Program must provide:	-
a.	details of baseline data available	Section 3.1 Section 3.2
b.	details of baseline data to be obtained and when	No additional baseline data is required.
c.	details of all monitoring of the project to be undertaken	Section 4

Ref	Requirement	Where addressed
d.	the parameters of the project to be monitored	Section 4.3
e.	the frequency of monitoring to be undertaken	Section 4.2
f.	the location of monitoring	Section 4.2
g.	the reporting of monitoring results and analysis results against relevant criteria	Section 5.4
h.	details of the methods that will be used to analyse the monitoring data	Section 5.2
i.	procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts	Section 5
j.	a consideration of SMART principles	Section 4.4 Section 5.2
k.	any consultation to be undertaken in relation to the monitoring programs	Section 2.3
l.	any specific requirements as required by Conditions C13 to C14	Not applicable
C17	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C11. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	Section 2.3
C18	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one month before the commencement of construction.	Section 2 of the CEMP
C19	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	Section 2 of the CEMP
C21	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 5.4

2.2 Objectives

The key objective of the SWMP is to ensure all MCoA, REMMs, and licence/permit requirements relevant to surface water monitoring are described, scheduled, and assigned responsibility as outlined in:

- The EIS prepared for WHT and Warringah Freeway Upgrade
- The SPIR prepared for WHT and Warringah Freeway Upgrade
- Conditions of Approval granted to the project on 21 January 2021
- Roads and Maritime specifications G36, and G38
- The Project's Environment Protection Licence (EPL)
- All relevant legislation and other requirements described in Section 3 of the SSWMP.

2.3 Consultation

This program will be provided to the Department of Planning and Environment (DPE) Water, Sydney Water, and EPA in accordance with MCoA C11(c). Refer to Section 2 of the CEMP for consultation requirements relating to the CEMP and all sub-plans. Ongoing consultation with Council and other stakeholders, including any unique local receivers, may be undertaken for particular issues pertaining to the Project's impact on surface water quality. Community feedback and complaints relating to surface water quality will be dealt with in accordance with the Community Communication Strategy and Complaints Management System.

3 Baseline surface water quality monitoring

3.1 EIS

3.1.1 Overview

A baseline surface water monitoring program was prepared in the technical working paper*: Surface water quality and hydrology* (EIS Appendix O) (Jacobs, January 2020) to inform the project EIS (Jacobs 2020). The program developed following a desktop assessment of data relevant to the existing surface water conditions in the study area from sources including the North Sydney Council, Willoughby Council, and NSW Government agencies including Sydney Water and Transport for New South Wales (TfNSW).

The baseline surface water monitoring program was implemented to:

- Evaluate the existing surface water quality at key locations in the project area
- Identify potential pathways of pollutants to surface water receivers
- Monitor and assess the surface water quality in the project area to form a baseline of environmental conditions, to measure the environmental performance of the project during the construction and operation of the Project.

3.1.2 Monitoring network

Baseline water quality monitoring locations were located along the Project alignment as shown in Figure 1 and listed in the Table below.

Monitoring locations were chosen to provide general characterisation of the waterways and include water quality monitoring locations established for the Project.

Table 2 Baseline monitoring locations

Sample ID	Sample location	Waterway
1a	Brennan Street, Annandale	Whites Creek upstream
1b	Railway Parade, Annandale	Whites Creek downstream
2b	Primrose Park, Cremorne	Willoughby Creek

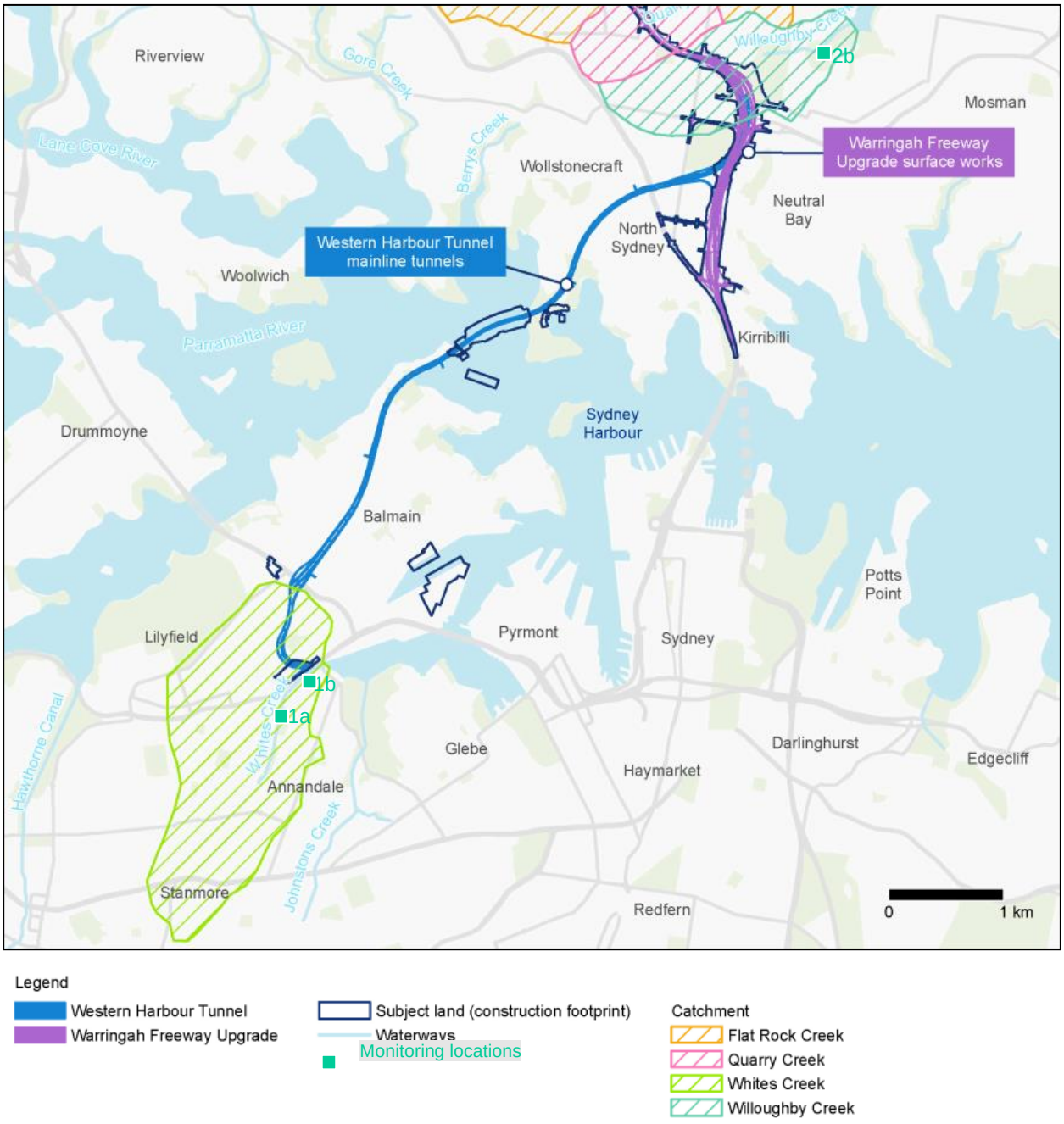


Figure 1 Baseline water quality monitoring locations

3.1.3 Water quality outcomes

The baseline surface water quality sampling program was implemented and included the following analytes:

- Physico-chemical (field) parameters:
  - pH
  - temperature
  - electrical conductivity (EC)
  - salinity
  - dissolved oxygen
  - turbidity (NTU)
- Laboratory parameters:
  - Chlorophyll-a
  - Total suspended solids
  - Total metals (arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc)
  - Nutrients (total nitrogen and total phosphorus)
  - Organic compounds (BTEX and TRH).

Table 3 Baseline surface water quality sampling program

Sample ID	Start of baseline monitoring	End of baseline monitoring	Minimum frequency
1a	October 2017	2 February 2018	Monthly
1b	October 2017	2 February 2018	Monthly
2b	October 2017	1 February 2018	Monthly

Interpretation of the baseline surface water monitoring data was included in the EIS (Appendix O, Table-A (Appendix A)) and is summarised in Table 3 with comparison against the ANZECC (2000) and ANZG (2018) water quality guidelines, which provide default trigger values for physical and chemical stressors for protection of south-east Australian slightly disturbed lowland rivers and estuarine aquatic ecosystems (EIS Appendix O, Section 2.2). ANZG (2018) recommend marine toxicant trigger values be applied to estuarine ecosystems

Table 4 Baseline water quality conditions in the area

Waterway	Baseline data obtained	Description of water quality
Whites Creek	Samples collected at 1a and 1b	• The pH, turbidity, DO, oxidised nitrogen, total nitrogen, and total phosphorus exceeded the guideline[1] levels on some occasions. • Dissolved oxygen (DO) recorded lower than the guideline[1] on some occasions. • Elevated levels of chromium, cooper, lead, zinc, iron and chlorophyll a.
Willoughby Creek	Samples collected at 2b	• Dissolved oxygen (DO) recorded lower than the guideline[1] on most occasions

Waterway	Baseline data obtained	Description of water quality
		• The pH, oxidised nitrogen, total phosphorus, and total nitrogen exceeded the guideline[1] levels on some occasions. • Elevated concentrations of chromium, copper, lead, nickel, zinc and iron

3.2 Pre-construction

3.2.1 Overview

TfNSW engaged Environmental Resources Management Pty Ltd (ERM) to complete preconstruction surface water monitoring for the Project. Sampling locations were developed following a desktop assessment of the projects EIS and selected to monitor waterways that have the potential to be impacted by construction activities, including discharge locations as well as sediment and water basins.

The baseline surface water monitoring was implemented to establish the existing quality of watercourses adjacent to construction prior to project commencement, for comparison to future monitoring results whilst works are in progress.

This monitoring will be continued until the commencement of construction, at which point the construction surface water quality monitoring program will be implanted as described in Section 4.

3.2.2 Monitoring network

Baseline water quality monitoring locations were located along the Project alignment as shown in Figure 1 and listed in the Table below.

Table 5 Monitoring locations

Sample ID	Sample location	Waterway
WC DS	Willoughby Creek Downstream	Willoughby Creek
WHC US	Whites Creek Upstream	Whites creek
WHC DS	Whites Creek Downstream	
WHN1	Western Harbour North 1	Western Harbour
WHN2	Western Harbour North 2	
WHS	Western Harbour South	
WHR	Western Harbour Reference	
AP1 [1]	Warringa Park, Neutral Bay (upstream)	Anderson Park Catchment
AP2 [1]	Anderson Park, Neutral Bay (downstream)	

Notes: [1] monitoring undertaken by ACCIONA

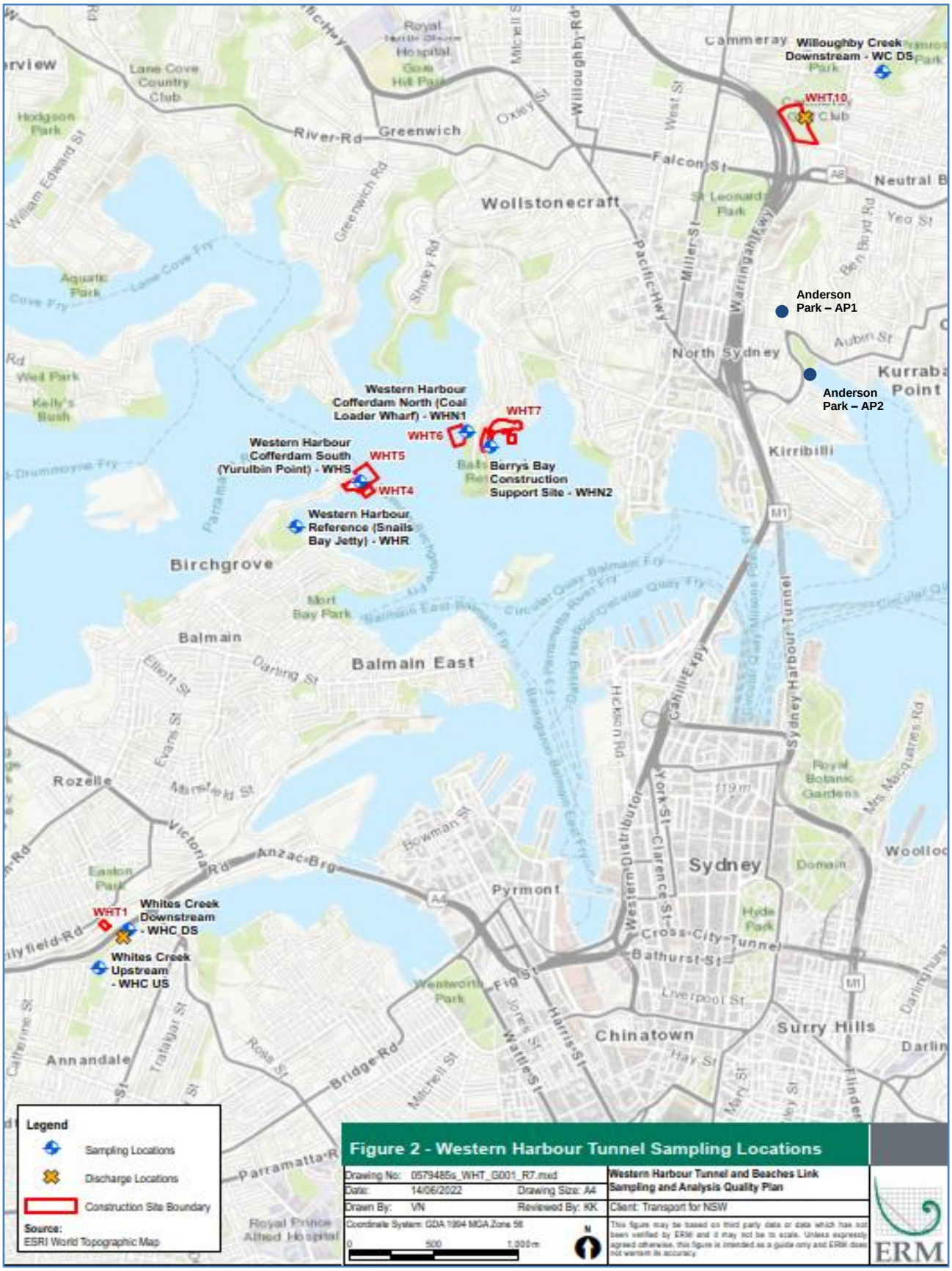


Figure 2 Baseline water quality monitoring locations

3.2.3 Water quality outcomes

The baseline surface water quality sampling included the analysis of:

- Physio-chemical (field) parameters:
  - pH
  - temperature
  - electrical conductivity (EC)
  - salinity
  - dissolved oxygen
  - turbidity (NTU)
- Laboratory parameters:
  - Chlorophyll-a
  - Total metals (arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc)
  - Nutrients (total nitrogen and total phosphorus)
  - BTEXN (Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene)
  - Total Recoverable Hydrocarbons with silica gel clean up (vTRH C6-C9, TRH C10-C36 with silica gel clean-up)
  - Chemical Oxygen Demand
  - Biological Oxygen Demand
  - Per & Polyfluoroalkyl Substances (PFAS) – Harbour Sampling Only
  - Dioxins & Furans

Monthly monitoring was completed from December 2020 to January 2023, with the production of monthly monitoring reports and annual summary reports, including:

- 0579845_WHT Summary Report FINAL_TfNSW_R06.
- 0579845_WHT Summary Report FINAL_TfNSW_R07.

Analytical results were compared against the ANZG (2018) default water quality guideline values for disturbed systems 90 percentile species protection levels, except for parameters that ANZG recommend a high species protection. Where this was the case, freshwater & marine criteria were applied for creek and harbour results respectively. ANZG 2018 exceedances are summarised in Table 6.

Table 6 Baseline water quality conditions in the area

Waterway	Baseline data obtained	Description of water quality
Willoughby Creek	Willoughby Creek Downstream	• Elevated concentrations of cadmium, copper, lead, zinc
Whites Creek	Whites Creek Upstream	• Elevated concentrations of copper, lead, zinc
	Whites Creek Downstream	• Elevated concentrations of cadmium, chromium, copper, lead, zinc
Western Harbour	Western Harbour North 1	• Elevated concentrations of copper
	Western Harbour North 2	• Elevated concentrations of copper, lead
	Western Harbour South	• Elevated concentrations of copper

Waterway	Baseline data obtained	Description of water quality
	Western Harbour Reference	• Elevated concentrations of copper
Anderson Park Catchment	Warringa Park, Neutral Bay (upstream)	• Elevated concentrations of copper and zinc

4 Construction surface water quality monitoring

4.1 Overview

The EIS identifies that the waterways identified for monitoring are located within urbanised and highly disturbed catchments, however the construction has the potential to impact on surface water quality through multiple mechanisms, including:

- increased turbidity from soil and sediment disturbance
- increased pH from the use of concrete products
- discharge of inadequately treated water
- mobilisation of pollutants and contamination

Potential impacts will be assessed during the construction stage by routinely monitoring parameters across the monitoring network and analysing results to determine construction impacts. This monitoring program will continue for the duration of construction (or otherwise directed by DPIE).

4.2 Sampling location and frequency

Surface water quality monitoring will be continued at the baseline monitoring location 2B as shown in Figure 1 (also shown as Willoughby Creek Downstream sample location in Figure 2) and at location AP1 and AP2 as shown in Figure 2 (Anderson Park Catchment) .

The locations at Whites Creek (1A and 1B) are not proposed to be continued, as the proposed works in this catchment do not require any exposed surfaces. The only potentially impacting site would be the City West Link Portal (WHT12) which has been previously established (for the purpose of WestConnex Stage 3B, and now for use for WHT Project Stage 3A) and now exists as full hardstand with existing mud tracking controls deep within the portal tunnel, minimising material transfer and staining onto the adjacent public road. Further, the site has been configured to be fully captured and reticulated into an existing Construction Water Treatment Plant (C-WTP). Discharge of this C-WTP is automatically monitored by an in-line logger, and routinely tested at NATA accredited laboratory to confirm compliance with discharge criteria.

The monitoring program will commence prior to starting construction. This allows for the assessment of trends in water quality, including natural variations, and will allow sufficient data to enable assessment of any potential impacts measured during construction.

Water quality sampling will be undertaken at a monthly frequency during the construction phase using a multiprobe water quality meter.

Where safe to do so, wet weather monitoring will be conducted at a frequency of at least once a quarter (once every 3 months) when a continuous rainfall event of more than 25 mm is received in the local catchment during a 24-hour period as recorded via the BOM weather station. Sampling will be completed when flows are reasonably constant and safe.

4.3 Sampling parameters

Table 7 details the analytes that will be monitored during the construction phase surface water monitoring. The parameters are suitable to indicate if the Project has potentially caused impact to surface water quality as a result of construction activities.

Table 7 Surface water quality parameters

Category	Parameters
Physio-chemical parameters (field)*	• pH • Dissolved oxygen • Conductivity • Salinity [1] • Turbidity • Temperature
Laboratory Analysis	• Chlorophyll-a • Total suspended solids • Total metals (aluminium[2], arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc) • Dissolved Aluminium[2] • TKN (total Kjeldahl nitrogen)[2] • Nutrients (total nitrogen and total phosphorus) • Nitrogen – NOx (oxidised nitrogen) [2] • Organic compounds (BTEX, naphthalene[2], and TRH). • Total Recoverable Hydrocarbons (vTRH C6-C9, TRH C10-C36)[2] • Chemical Oxygen Demand[2] • Biochemical Oxygen Demand[2] • PFAS[2]

Notes: [1] Analytes was not tested for Anderson Park Catchment monitoring points

[2] Additional analytes tested for Anderson Park Catchment monitoring points

Other observations including odour and colour will also be recorded where obvious inconsistencies or unexpected observations are identified.

4.4 Performance criteria

Baseline monitoring shows that some surface water quality parameters exceed the default ANZG (2018) /ANZECC (2000) water quality trigger values for slightly to moderately disturbed ecosystems. This is not unexpected given the highly urbanised and disturbed Project area and receiving waterways.

As such, EIS Appendix O, Section 4.6 confirmed the default trigger values are not suitable for comparison with ambient water quality, with a more suitable approach being to determine site specific trigger values (SSTVs) from a local reference data set for physical and chemical stressors.

This approach involved calculating the 80th percentile of baseline pre-construction data and is provided in Table 8 below as described in Section 4.6 of the EIS Appendix O. ANZECC (2000a) values were utilised as the SSTV for parameters where the 80th percentile of baseline data fell below their applicable guideline criteria.

Noting that surface water quality monitoring described in this section relates to the monitoring of water quality in the receiving environment and should not be confused with the monitoring of discharges from wastewater treatment plant.

Table 8 Site Specific Trigger Values – Willoughby Creek

Category	Parameters		Units	80th Percentile	ANZECC[1]
Physio-chemical parameters (field)	pH		-	8.53	7.0 - 8.5
	Dissolved oxygen (field)		mg/L	9.86	-
	Conductivity		µS/cm	450.12	125 - 2200
	Salinity		-	-	-
	Turbidity (Field)		NTU	145.32	6 - 50
	Temperature		-	-	-
Laboratory Analysis	Chlorophyll-a		mg/L	0.002	3
	Total suspended solids		mg/L	21.4 mg/L	-
	Total metals	Arsenic	mg/L	0.002	0.013
		Cadmium	mg/L	0.00036	0.0002
		Chromium	mg/L	0.0012	0.001
		Copper	mg/L	0.0126	0.0014
		Iron	mg/L	0.684	0.3
		Lead	mg/L	0.0072	0.0034
		Manganese	mg/L	0.0252	1.9
		Mercury	mg/L	-	0.00006
		Nickel	mg/L	0.002	0.011
		Zinc	mg/L	0.0644	0.008
	Total Nitrogen		mg/L	3.34	0.35
	Total phosphorus		mg/L	0.1	0.025
	BTEX		mg/L	*< LOR*[2]	-
	TRH		mg/L	*< LOR*[2]	-

Notes: [1] ANZECC guideline criteria for freshwater slightly to moderately disturbed ecosystems used.
[2] Baseline data did not exceed laboratory limits of reporting for selected analytes.

4.5 Sample collection and field measurements

Grab samples will be collected manually of a volume sufficient for the required physico-chemical (field) parameters and specific chemical analysis using pre-prepared vessels provided by the appointed laboratory.

The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.

A grab sample will be collected at each site and sent to the laboratory for analysis using the relevant vessels provided by the laboratory.

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) including:

- site identification
- sample date, and
- sampler details.

4.6 Decontamination

Sampling equipment will be rinsed with deionised water a minimum of three times between each sample.

Where a sample site shows evidence of contamination (i.e. there is an algal bloom, or the site smells strongly of hydrocarbons, sewage, etc), as well as periodically to prevent a build-up of dirt, equipment will need to be decontaminated as follows:

- Rinse the equipment in tap water
- Clean with De-Con 90 (a phosphate free detergent), or equivalent
- Rinse again with tap water
- Rinse three times with de-ionised water, and finally
- Allow to dry.

4.7 Quality Assurance and documentation

Quality assurance and control protocols during sampling and recording of physio-chemical (field) parameters will be undertaken monthly (each sampling event) in accordance with ANZECC/ARMCANZ (2000b) to ensure the integrity of the dataset.

As part of sampling, quality assurance and control samples during sampling will be undertaken to ensure the integrity of the dataset. These are to include:

- Rinsate blanks (one per sampling event only)
- Blind duplicates (at a rate not less than 20% of total samples)
- Split duplicates (at a rate not less than 20% of total samples).

Samples are to be transported to a NATA-accredited laboratory under documented chain-of custody protocols.

Field results will be checked for accuracy before leaving the site and errors or discrepancies will be cross-checked and further investigation initiated if required.

Monitoring and calibration records will be maintained.

5 Compliance management

5.1 Training

Water quality monitoring will be undertaken by a suitably qualified person, who will be tool-boxed on the content of this Program.

5.2 Data analysis and management response

Results from the construction monitoring program will be analysed as follows:

1. Where a +/- of greater than 30% occurs against the SSTVs described in Section 4.4, an investigation will be undertaken to identify potential cause. This investigation will consider:
    - recent rainfall,
    - other activities or incidents recently or currently occurring within the catchment
    - current site activities
    - available surface water data,
    - baseline data for the relevant waterway, and
    - ANZG (2018) and ANZECC (2000) guideline criteria.
2. Where the investigation confirms a decrease in water quality has occurred as a result of construction activities, the event may be treated as an environmental incident and managed in accordance with the requirements of the CEMP. Determination as to whether an incident has occurred will be made in consultation with the ER and TfNSW.

The SSTVs are intended to provide specific and measurable indicators of appropriate environmental management. Where compliance with these criteria is not achieved as a result of construction, the mitigation measures described in the SSWMP will be reviewed to confirm they have been appropriately implemented or can be improved.

Water quality issues requiring management during construction of the Project have been identified through the EIS, RtS and Environmental Risk Assessment Workshop. These issues, including cumulative impacts, have been outlined in Appendix A2 of the CEMP. SMART principles (Specific, Measurable, Achievable, Realistic and Timely) have been considered and applied within this monitoring program to define scope, locations, procedures, testing and reporting.

Environmental risk analysis will be ongoing and regularly reviewed in accordance with Section 5.1 of the CEMP.

5.3 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Program, MCoA, and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in the CEMP.

5.4 Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions and performance criteria.

In line with CoA C21 surface water quality monitoring results would be provided to DPIE Water every six months and form part of the bi-annual CEMP compliance reporting.

Additional reporting requirements may be included in the Project EPL, which must be adhered as they apply to the Project. This is additional to reporting requirements mandated by the Protection of the Environment Operations Act (Clause 66) for publication of EPL monitoring data within 14 days.

6 Review and improvement

6.1 Continuous improvement

Monitoring data will be reviewed throughout the construction period to identify potential benefits to increase, or decrease, or relocate sampling locations and/or the analytical suites. This may occur as the result of:

- Major changes in catchment use (not associated with the Project)
- Changes in access or safety implications for identified monitoring locations
- Improvements to better localise construction runoff and avoid confounding inputs from other sources

In the case a review identifies the need for the monitoring program to be adjusted, the identification of revised/new sites or analytes will be undertaken in consultation with TfNSW and the Environment Representative.

This document will be subject to the review processes described in the CEMP.

6.2 SWMP update and amendment

The processes described in the CEMP may result in the need to update or revise this Plan. This will occur as needed. In such cases, updates will occur as described in the CEMP.

Appendix A Default Guidelines for Protection of Aquatic Ecosystems (ANZG, 2018 and ANZECC, 2000)

Indicator Freshwater Estuarine

Indicator	Freshwater	Estuarine[1]
Conductivity (µs/cm)	125-1200	No guideline
pH	6.5-8.5	7-8.5
Dissolved oxygen (% saturation)	85-110	80-110
Turbidity (NTU)	6-50	0.5-10
Total Suspended Solids (mg/L)	50	50
Ammonia (µg/L)	20	15
Oxidised nitrogen (µg/L)	40	15
Total nitrogen (µg/L)	350	300
Total Phosphorus (µg/L)	25	30
Chlorophyll-a (µg/L)	3	4
Benzene (µg/L)	950	500
Toluene (µg/L)	180	180
Ethylbenzene (µg/L)	80	80
o – xylene (µg/L)	350	No guideline
m – xylene (µg/L)	75	75
p – xylene (µg/L)	200	No guideline
m+p – xylene (µg/L)	No guideline	No guideline
Bromofluorobenzene	No guideline	No guideline
Dichloroethane	No guideline	No guideline
Manganese mg/L	1.9	No guideline
Naphthalene (µg/L)	16	50
Iron (mg/L)	0.3	No guideline
Arsenic (mg/L)	0.013	No guideline
Cadmium (mg/L)	0.0002	0.0007
Chromium (mg/L)	0.001	0.0044
Copper (mg/L)	0.0014	0.0013
Nickel (mg/L)	0.011	0.007
Lead (mg/L)	0.0034	0.0044
Zinc (mg/L)	0.008	0.015
Mercury (mg/L)	0.00006	0.0001

Note 1: ANZG (2018) recommend marine toxicant trigger values be applied to estuarine ecosystems

Appendix E3 – Spill Response and Management Procedure

Spill Response Plan

Soil & Surface Water Management Sub-plan

Appendix E3

Western Harbour Tunnel Package 2 Project

SSI 8863

December 2022

Spill Response Procedure

RESPONSIBILITY	ACTIONS
Operator	Initial assessment of the spill: determine the **type of spill kit** to be used based on the substance spilled. Refer to Safety Data Sheet for details.
	Containable spill?
	No → Contact the HAZMAT (NSW Fire Brigade: Ph. 000) if the spill is of a hazardous nature or not manageable with the resources available on site. — Site Supervisor
	Notify site warden, evacuate the area and cordon off. Refer to Site Emergency Response Plan. — Site Supervisor
	Activate PIRMP (if required under EPL). — Site Supervisor
	Yes
Operator	**Locate closest spill kit.** Spill kits are available in the following locations: • Site Supervisor's utes and site trucks • Site locations as shown in Site Evacuation Plans
All attending the spill	Wear adequate **PPE for the type of spill**. As a minimum the following must be worn (refer to spill kit instructions and SDS): • Gloves • Protective footwear • Face mask where required
	Stop the source of the spill/leak if safe to do so.
	Contain the spill and protect any drains/waterways channels near the spill.
	Notify site supervisor as soon as practicable.
	Clean up the spill using absorbent materials from the spill kit.
	Place used spill kit materials and any spill generated waste in the waste bag found within the spill kit. Dispose in designated bin. Spilled liquid waste to be placed into a labelled sealed container. The container is to comply with Australian/ New Zealand Standards.
Site Supervisor	Transport and disposal by EPA approved licensed contractor (if required) to a licenced facility. Refer to the CEMP Waste and Resource Management Sub-Plan
Site Supervisor	Replace spill kit equipment used immediately after the event.

NOTES

Spill Kit Materials:

Booms

Deploy booms first to contain spill. Floating booms to be used for spills in waterways to prevent spreading. If there is a possibility of contamination of a waterway floating booms are to be installed before starting work.

Granules / Particulate

If the booms alone cannot absorb the spill/ leak, then use absorbent granules to soak up spilled liquid. Absorbent granules are best for small spills/ leaks.

Pillows

Cushion shaped products containing absorbent fibres, used directly under a leak or drip.

Pads

Thin absorbent mats place over spill and used like blotting paper.

Appendix E4 – Unexpected Finds of Contaminated Land Procedure

Unexpected Contamination Finds Procedure

Western Harbour Tunnel

August 2023

Document control

Approval and authorisation

Approved on behalf of ACCIONA by	Andrew Marsonet
Signed	
Dated	17 December 2022

Document status

Revision	Date	Description	Approval
Rev 00	16/12/2022	Included for TfNSW review, external consultation, ER review, DPE review and DPE approval as part of SSWMP	E. Woodward
Rev 0.1	14/08/2023	Updated for Stage 3C	M.Lee / E. Woodward

Terms and definitions

Term/Acronym	Definition
ACM	Asbestos containing materials
AMP	Asbestos Management Plan
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CLMP	Contaminated Lands Management Plan
MCoA	Minister's Conditions of Approval
EPA	Environment Protection Agency
EWMS	Environmental Work Method Statement
PPE	Personal protective equipment
RAP	Remediation Action Plan
SDS	Safety Data Sheet
SWMP	Soil and Water Management Sub-plan
SWMS	Safe Work Method Statement
TfNSW	Transport for New South Wales
the Project	Western Harbour Tunnel Project
UCFP	Unexpected Contamination Finds Procedure
WHT	Western Harbour Tunnel
WRMP	Waste and Resource Management Sub-plan

1 Introduction

1.1 Context

This Unexpected Contaminated Finds Procedure (UCFP) has been prepared for the construction delivery stage of the Western Harbour Tunnel (WHT) project (the Project). The Procedure forms an Appendix to the Soil and Surface Water Management Sub-plan (SSWMP).

1.2 Scope

The scope of this UCFP is to describe how ACCIONA proposes to identify, contain and dispose of unexpected finds of contamination during construction of the Project.

This procedure is applicable to all activities undertaken for the project that have the potential to unexpected contamination on the Project.

2 Purpose and Objectives

2.1 Purpose

This Procedure describes the actions to be taken in the event that potentially contaminated soil or material is unexpectedly encountered during excavation or construction activities. Should ACCIONA activities result in potential contamination of soils or watercourses, this Procedure also applies.

This Procedure has been developed to meet the requirements of the Minister's Conditions of Approval (CoA) E123 and E124 which states:

'*An Unexpected Finds Procedure for Contamination must be prepared before the commencement of work and must be followed should unexpected contamination or asbestos (or suspected contamination) be excavated or otherwise discovered. The procedure must include details of who will be responsible for implementing the unexpected finds procedure and the roles and responsibilities of all parties involved the procedure must be submitted to the Secretary for information.*'

2.2 Objectives

The key objective of this Procedure is to provide instruction on potential unexpected finds of contamination during design and construction to protect the environment. To achieve this objective, ACCIONA will undertake the following:

- Ensure all activities which may potentially expose, impact on, or handle contamination have access to this procedure.
- Ensure all the management of unexpected finds is appropriately communicated to all personnel.

3 Unexpected Finds

3.1 Identification

In the event of any uncharacteristic material (e.g. soil, sediment, slurry, water or other foreign material) is discovered, this should be treated as a potential unexpected find, and works in the vicinity of the discovery should cease.

Unexpected finds can include but not limited to as being:

- Distinctively different to other soils on-site – both in texture, colour, smell and moisture content
- Underground tanks and structures (e.g. former fuel tanks)

- Appear to be concentrated to a localised area (i.e.. waste burial pits)
- Stained, oil soaked or containing a petroleum sheen.
- Includes other products such as batteries etc.
- May contain offensive odours, including sulphur-based leachate impacts or sewerage, including acid sulfate soils
- Buried building products and debris/waste or other anthropogenic materials
- May contain potential asbestos containing materials
- May contain buried animal carcasses or evidence of decomposition including potential remains.

In the event of an Unexpected Find, following the immediate cessation of works in the vicinity, the steps in this Procedure should be followed to ensure effective management of the find.

3.2 Personal Protective Equipment

Prior to any contamination investigation or management, appropriate personal protective equipment (PPE) must be worn. This may include but not limited to:

- Eye goggles
- Face mask
- Rubber boots
- Rubber gloves
- Work clothes.

Safety management requirements are detailed in Project safety documents and other documents such as Safety Data Sheets (SDS).

3.3 Unexpected Contaminated Finds Procedure

The Environmental Manager will evaluate the situation and, if considered necessary, commission a suitably qualified contamination specialist to undertake a contamination investigation in the area of the find. A report of the investigation will be prepared to determine the nature, extent and degree of any contamination, assess the requirement to notify the NSW Environmental Protection Agency (EPA), and advise on the need for remediation or other action in consultation with TfNSW.

The level of reporting must be appropriate for the identified contamination in accordance with relevant EPA guidelines, including Guidelines for Consultants Reporting on Contaminated Sites (NSW Office of Environment and Heritage (OEH), 2020).

The Environmental Manager (in consultation with a contamination specialist and TfNSW) will determine the appropriate management measures to be implemented and/or the requirement for an EPA-accredited contamination site auditor. This may include treatment or offsite disposal. If the material is to be disposed of off-site, the waste facility must be appropriately licensed (refer to the Project Waste and Resource Management Plan).

If the material is determined to contain asbestos or asbestos containing materials (ACM), an Asbestos Management Plan produced by the Project-appointed appropriately licenced asbestos removalist will be followed.

Material will be classified in accordance with the Waste Classification Guidelines (EPA 2014) for offsite disposal or an assessment of contaminants of concern against the adopted soil assessment criteria. If necessary, in consultation with TfNSW, the Environmental Manager will liaise with the relevant Authorities to determine appropriate management options.

If required, contaminated soils will be treated and validated in accordance with an approved Remediation Action Plan (RAP) to be developed in consultation with TfNSW and the qualified contamination specialist with consideration for the remediation hierarchy. The RAP must be prepared in accordance with EPA guidelines on contaminated land management, and include the following:

- Testing requirements for any contaminated material prior to its disposal off site

- Validation Plan, which must include the area in the immediate vicinity of (both below and adjacent to) the known contamination
- Implications of the validation results on the waste classification for material that may be excavated in the vicinity of the known contamination.

ACCIONA will undertake remediation of the contaminated material, or its removal and disposal, in accordance with the Project RAP. Any changes to the RAP must be agreed by TfNSW. Remedial actions will be incorporated into specific safe work method statements (SWMS) and environmental work method statements (EWMS) and communicated to the Project team and subcontractors through toolbox meetings.

Recommencement of works will occur once remedial works have been implemented to the satisfaction of the Environment Manager or the Site Auditor (if applicable).

Procedure

All unexpected finds of potential contamination will be generally managed in accordance with the flow chart shown on Figure 1.

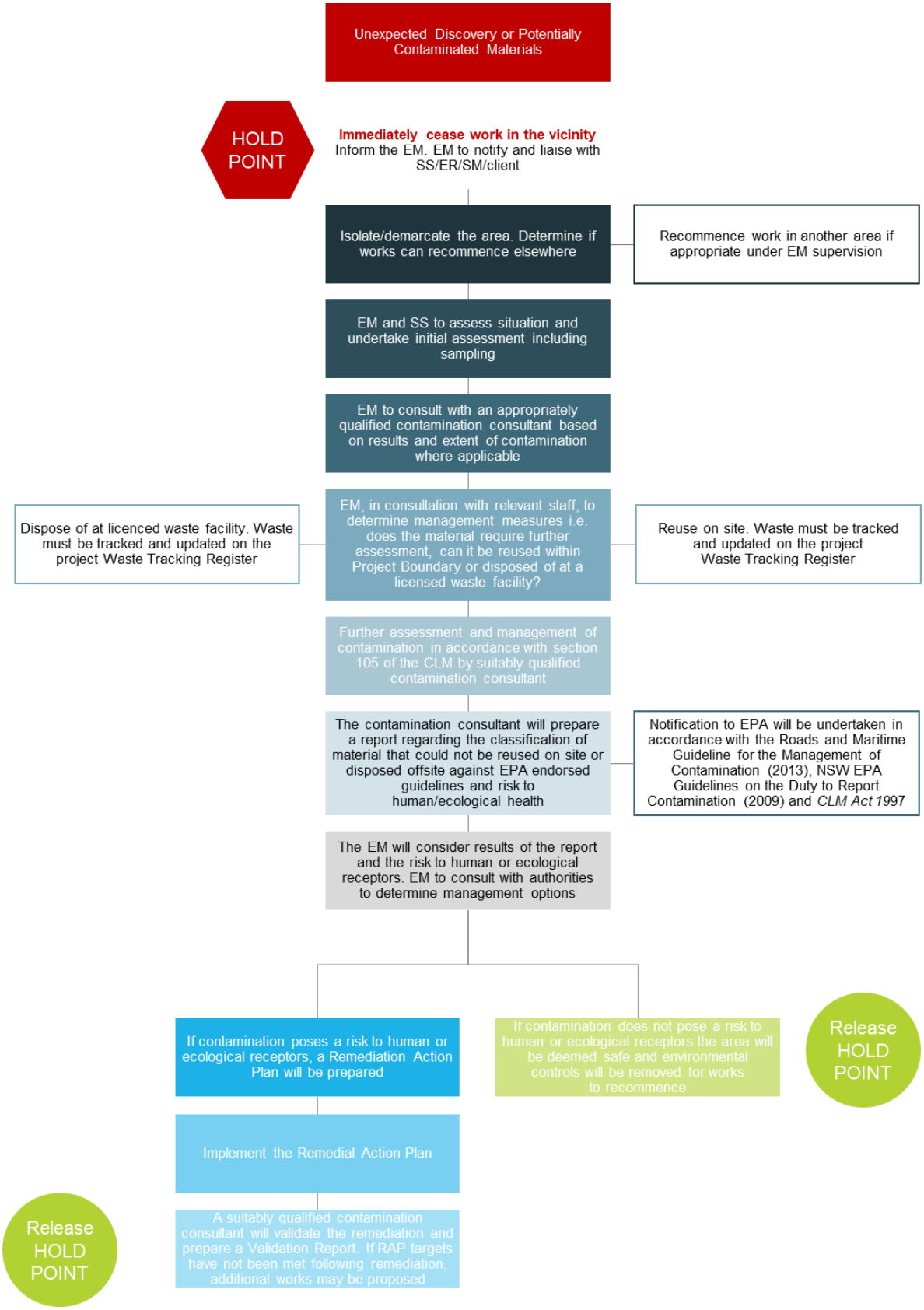


Figure 1 - Unexpected finds of potential contamination procedure flow chart

4 Roles and Responsibilities

4.1 Site supervisor

- Ensure this Unexpected Finds Procedure is implemented throughout construction
- Enforce and stop work immediately upon becoming aware of a suspected unexpected contamination find
- Inform the Environment Manager of unexpected find
- Assist the Environment Manager in recording details of unexpected finds
- Work with the Environment Manager to develop a plan for managing and/or remediating the unexpected find
- Ensure asbestos removalist (if required) are appropriately licenced
- Recommence work only following approval from the Environment Manager

4.2 Environment Manager

- Ensure this Unexpected Finds Procedure is implemented throughout construction
- Record details of unexpected find and consult with TfNSW and environmental regulators as required.
- Engage a suitably qualified contaminated land consultant
- Assist the suitably qualified contaminated land consultant in the investigation and assessment of unexpected find
- Work with Site Supervisor to develop a plan for managing and/or remediating the unexpected find
- In coordination with the Site Supervisor, implement the plan for the management and/or remediation of the unexpected find
- Following successful management of the unexpected finds, issue the Site Supervisor with approval to recommence work.

4.3 Suitably Qualified Contaminated Land Consultant

- Identify the potential hazard to human health and/or the environment in accordance with applicable legislative requirements
- Undertake sampling of unexpected finds for laboratory analysis
- Undertake waste classification of any waste to be removed from site in accordance with the NSW EPA Waste Classification requirements
- Issue asbestos clearance certification (if required).

5 Reporting and Notification

In the event that suspected contamination is uncovered during delivery of the Project, the following will occur:

- Reporting under the 'Reportable Event' category in accordance with the Roads and Maritime Environmental Incident Classification and Reporting Procedure (September 2017)
- Where it is deemed that the contamination has been, or could have been caused, or changed by ACCIONA's operations, the EPA will be notified in accordance with Section 60 of the *Contaminated Land Management Act 1997* (CLM Act).

Any unexpected finds will be recorded in an Unexpected Finds Register maintained by ACCIONA's environmental team.

If material is to be disposed off site, material tracking will be undertaken in accordance with the *Protection of the Environment Operations Act 1997* and the Waste and Resource Management Plan.

Notification and reporting to Authorities such as the EPA will be undertaken in accordance with the Roads and Maritime Guideline for the Management of Contamination (2013), NSW EPA Guidelines on the Duty to Report Contamination (2009) and *CLM Act 1997* where relevant.