Soil and Water Management Plan

SMWSTCTP-AFJ-1NL-PE-PLN-000003 Revision 03

Sydney Metro West – Central Tunnelling Package

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4 November 2021

REF: CSWMP REV3_SWMONP_R2

Dear Stuart

RE: Sydney Metro Central Tunnelling Package: Construction soil and Water Management Plan and the Surface Water Monitoring Program

I refer to Sydney Metro's (SM) submission of the following documents required by the Sydney Metro West Infrastructure Approval (SSI 10038) which was approved by the Department of Planning, Industry and Environment (DPIE) on 11 March 2021:

- Sydney Metro West, Central Tunnelling Package Construction Soil and Water Management Plan (CSWMP) (SMWSTCTP-AFJ-1NL-PE-PLN-000003 Revision 03, 03/11/2021)

- Sydney Metro West, Central Tunnelling Package Construction Surface Water Monitoring Program (SWMonP) (SMWSTCTP-AFJ-1NL-PE-PRG-000001 Revision 02 25/10/2021) which forms Appendix D to the CSWMP.

It is noted that:

- The CSWMP has been prepared by Acciona Ferrovial Joint Venture (AFJV) to address the requirements of Infrastructure Approval conditions C5(d), C6 and C12.
- The SWMonP has been prepared by AFJV to address the requirements of Condition C14(c) of the Infrastructure Approval.
- The consolidated document comprising the CSWMP and the SWMonP has been prepared by AFJV to address the requirements of the Construction Environmental Management Framework (CEMF) required by C1.
- Previous versions of the document have been reviewed and updated following comments from the ER.
- Sydney Metro has reviewed and commented on previous versions of the document.
- Stakeholder consultation has been undertaken in accordance with C5 and C14 respectively. Where stakeholders have responded, comments have been generally addressed and it is noted that there is an ongoing interface with the consulted parties.
- Following the above reviews the documents are considered to contain information required by the Conditions of Approval (SSI 10038).

As the approved Environmental Representative for the Metro West and as required by Conditions A30(d), and C9, on the basis of the above, the abovementioned document(s) are endorsed and considered appropriate for submission to DPIE for their approval.

Yours sincerely

Jo Robertson

Environmental Representative – Sydney Metro West – Central Tunnelling Package
CC: John Ieroklis, Matthew Marrinan, Ben Armstrong, Maria Doumit

DOCUMENT APPROVAL

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	16/08/21			For submission to Sydney Metro
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GLOSSARY / ABBREVIATIONS

Abbreviation	Description / Definition
AFJV	Acciona Ferrovial Joint Venture (the Contractor)
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000)
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)
AS/NZS	Australia/New Zealand Standards
ASSMAC	Acid Sulfate Soil Manual: Acid Sulphate Soil Management Advisory Committee of NSW (1998)
Amendment Report	Sydney Metro West Westmead to The Bays and Sydney CBD Amendment Report Concept and Stage 1 (2020
CEMP	Construction Environmental Management Plan
Construction	Includes all work required to construct Stage 1 of the CSSI as described in the documents listed in Condition A1 of Schedule 3, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work. *Note: As defined in Table 1 of SSI 10038 Infrastructure approval for the Project.*
CoA	Minister's Conditions of Approval (as relevant to Sydney Metro West Concept and Stage 1)
CTP	Central Tunnelling Package
DECC	Former Department of Environment and Climate Change (NSW) now NSW Office of Environment and Heritage.
DPIE	NSW Department of Planning, Infrastructure and Environment
DPI (Water)	NSW Department of Primary Industries (Water) (Former Office of Water)
EIS	Sydney Metro West Concept and Stage 1 Environmental Impact Statement (April 2020)
EMS	Environmental Management System
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 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 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 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
Environment Policy	Statement by an organisation of its intention and principles for environmental performance

Abbreviation	Description / Definition
EPA	NSW Environment Protection Authority
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*
EPL	NSW Environment Protection Licence under the *Protection of the Environment Operations Act 1997*.
ESCP	Erosion and Sediment Control Plan
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).
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.
OCCS	Overarching Community Communication Strategy
Planning Secretary	The Planning Secretary of the Department of Planning, Industry and Environment
PoEO Act	*NSW Protection of the Environment Operations Act 1997*
Project	Sydney Metro West Concept and Stage 1
Relevant Councils	Any or all local government councils as relevant, Inner West, Strathfield, Burwood
REMM	Revised Environmental Management Measure
Submissions Report	Sydney Metro West Westmead to The Bays and Sydney CBD Submissions Report Concept and Stage 1 (2020)

1. INTRODUCTION

1.1 BACKGROUND

Sydney Metro is Australia's biggest public transport program. Services on the North West Metro Line between Rouse Hill and Chatswood started in May 2019. The Sydney Metro network also includes Sydney Metro City & Southwest, Sydney Metro West and Sydney Metro Western Sydney Airport.

Sydney Metro West is a new 24-kilometre metro line between Westmead and the Sydney CBD. This infrastructure investment will double the rail capacity of the Greater Parramatta to Sydney CBD corridor with a travel time target between the two centres of about 20 minutes.

The planning approvals and environmental impact assessment for Sydney Metro West has been split into a number of stages recognising the size of the project. This includes:

- Stage 1 – Concept and all major civil construction works including station excavation and tunnelling between Westmead and The Bays. Planning approval for this stage was granted in March 2021.
- Stage 2 – All major civil construction works including station excavation and tunnelling from The Bays to Sydney CBD
- Stage 3 – Tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line

An Environmental Impact Statement (EIS) (Jacobs/Arcadis, 2020) for the Concept and Stage 1 (herein referred to as the Project) assessed the soil and surface water quality impacts in response to the Secretary's Environmental Assessment Requirements issued by the Department of Planning, Industry and Environment (DPIE). The soil and surface water quality impact assessment is included in Chapter 19 of the EIS. The Project was approved on 11 March 2021 (SSI 10038). An administrative modification (Modification 1) was approved on 28 July 2021.

1.2 SCOPE

The Soil and Water Management Plan (SWMP) forms part of the civils Construction Environmental Management Plan (CEMP). This Plan outlines how AFJV will comply with and implement the applicable 'environmental requirements' for the Central Tunnelling Package (CTP) (the Project) and identify how Acciona Ferrovial Joint Venture (AFJV) will manage the construction soil and water quality impacts during construction of the CTP civils construction phase B1 (in accordance with the Sydney Metro Phasing Report).

This SWMP outlines how AFJV will comply with and implement the applicable elements from the following documents, collectively referred to herein as the 'Project requirements':

- NSW Minister for Planning's Conditions of Approval
- Revised Environmental Mitigation Measures (REMMs) and the
- Sydney Metro Construction Environmental Management Plan (CEMF)

2. OBJECTIVES AND TARGETS

In order to assess the environmental performance during construction, environmental objectives and targets have been established. These objectives and targets have been developed with consideration of key performance outcomes for each key issue as specified in the EIS. Refer to Section 3.3 of the CEMP for performance outcomes for soil and water management as identified in the Project EIS. The CEMF has specific objectives in relation to soil and water management that will apply to construction and have been outlined in Table 1.

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TABLE 1 OBJECTIVES AND TARGETS

Objective	Target-	Measurement tool
Minimise pollution of surface water through appropriate erosion and sediment control;	Soil erosion and sediment controls are implemented throughout the site in accordance with the approved ESCP and are to be inspected on the following basis: ▪ Weekly during environmental inspection ▪ Prior to a rainfall of >20mm in a 24 hour period, where forecasted ▪ Following a rainfall event of >20mm in a 24 hour period. Where appropriate, consider the installation of long-term or in-built erosion and sediment controls to minimise cost and resources.	Internal weekly inspections checklist Audit reports Weather monitoring records Wet weather inspection checklist
Minimise leaks and spills from construction activities;	All plant on site to have maintenance records and pre delivery inspection report All plant operators conduct regular Pre-start plant checks. Maintain well-stocked spill kits on site	Pre delivery inspection report Prestart inspection records Internal weekly inspection checklist Audit reports
Maintain existing water quality of surrounding surface watercourses; and	Conduct ambient water quality monitoring program in accordance with the frequencies committed to in Section 6 No pollution incidents resulting in environmental harm or regulatory action.	Monitoring program and associated reporting
Source construction water from non-potable sources, where feasible and reasonable.	Implement water reuse program Produce a water balance study prior to commencement of construction	Sustainability monitoring program Water balance study

The EIS identified specific construction performance outcomes for the Project; those relevant to the management of soil and water are included in Table 2.

TABLE 2. PERFORMANCE OUTCOMES

Performance Outcome Requirement	Sydney Metro West Construction Performance Outcomes	How Stage 1 addresses performance outcomes
Spoil generated during the construction is effectively stored, handled, treated (if necessary), reused, and/or disposed of lawfully and in a manner that protects environmental values.	• 100 per cent of useable spoil is reused in accordance with the spoil reuse hierarchy • The use of potable water for non-potable purposes is avoided if non-potable water is available • The reuse of water is maximised, either on site or off site	Spoil would be classified in accordance with Waste Classification Guidelines (NSW Environment Protection Authority, 2014). Spoil that is classified as virgin excavated natural material, excavated natural material, subject to a resource recovery order/resource recovery exemption under the Protection of the Environment Operations (Waste) Regulation 2014 or is otherwise reusable would be reused (consistent with the 100 per cent beneficial reuse performance outcome). The CTP would minimise water use and use non-potable water where feasible consistent with adopted sustainability initiatives and targets.
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).	• The discharge water quality requirements outlined in applicable environment protection licence(s) are met • Existing water quality of receiving surface watercourses is maintained.	Wastewater would be treated, and standard erosion and sediment control measures would be implemented for all surface works areas to minimise pollutant loading to the downstream waterways during construction. Wastewater would be treated to comply with the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines and runoff from construction works would be designed to meet the standards outlined in the Blue Book. Discharges from construction would be monitored for compliance with the discharge criteria in environmental protection licence(s).

3. ENVIRONMENTAL REQUIREMENTS

3.1 RELEVANT LEGISLATION AND GUIDELINES

The relevant legislation to the CTP is listed in TABLE 3

TABLE 3. RELEVANT LEGISLATION

Legislation	Management
Environmental Planning and Assessment Act 1979	Modifications to the SSI 10038 Infrastructure approval would be assessed under the EP&A Act.
Fisheries Management Act 1994	Permits not required for an approved CSSI.
Protection of the Environment Operations Act 1997	An Environment Protection Licence (EPL) will be sought for scheduled activities. CTP also must comply with Section 120 of the Act, along with any other relevant section of the Act.
Contaminated Land Management Act 1997	Contaminated material will be managed in accordance with this Soil and Water Management Plan, the Remediation Action Plans and the Groundwater Management Plan.
Water Management Act 2000 *Water Management (General) Regulation 2018*	Relevant licencing and permits will be obtained for the extraction of water, the use of water and the carrying out of activities on or near water sources.
Sydney Water Act 1994	Sydney Water Act will be complied with when impacting Sydney Water assets.

Additional guidelines and standards relating to the management of soils and water include:

- Acid Sulfate Soil Manual: Acid Sulphate Soil Management Advisory Committee of NSW; (ASSMAC 1998),
- National Acid Sulfate Soils Guidance (DAWE 2018)
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines'),
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000),
- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section 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").
- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries,
- NSW Fisheries, November 2003. Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings (Ref: NSWF – 1181),
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (2004),
- Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (RTA 2005),
- Sydney Harbour Water Quality Improvement Plan (Sydney Metropolitan Catchment Management Authority (SMCMA) 2010).
- National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1) 2013; and

- Waste Classification Guidelines – Part 1: Classifying Wastes, NSW EPA (2014).
- PFAS National Environmental Management Plan 2.0 (HEPA, 2020).
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (NSW EPA 2015)
- Guidelines for the NSW Site Auditor Scheme, 3rd edition (NSW EPA, 2017)
- Guidelines for Consultants reporting on contaminated land: Contaminated land guidelines (NSW EPA 2020b)
- Guidelines for the Assessment and Management of Groundwater Contamination (NSW DECC, 2007)
- Managing Asbestos in or on Soil (SafeWork NSW, 2014)
- National Environment Protection Council (1999, Revised 2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 2013)
- Assessment and Management of Hazardous Ground Gases (NSW EPA, 2020)
- Sampling design guidelines (NSW EPA, 1995)
- Australian Standards 4482.1 Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-Volatile and Semi-Volatile Substances 2005

This SWMP has also been developed with due consideration of other relevant guidelines including:

- CRC Care Technical Report No. 10, Health screening levels for petroleum hydrocarbons in soil and groundwater Summary, 2011 (CRC Care, 2011).
- CRC Care Technical Report No. 39, Risk-based management and remediation guidance for benzo(a)pyrene, 2017 (CRC Care, 2017).
- International Programme on Chemical Safety and World Health Organisation - Concise International Chemical Assessment Document 53 – Hydrogen Sulfide: Human Health Aspects (WHO, 2003).

3.2 PROJECT REQUIREMENTS

The Minister's Conditions of Approval (CoA) and Sydney Metro's Construction Environmental Management Framework (CEMF) requirements relevant to the development of this SWMP are listed in Table 4. Requirements of all other relevant Cos's and Revised Environmental Mitigation Measures (REMM's) that relate to soil and water management are listed in Appendix A.

TABLE 4: COMPLIANCE TABLE - REQUIREMENTS FOR PREPARATION OF CEMP

Project Planning Approval Conditions		
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF)	Section 3
C5 (c)	Of the CEMP Sub-plans required under Condition C1 of this schedule, the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. c) Soil and Water to be prepared in consultation with DPIE EES, Relevant Council(s), SOPA (in respect of Sydney Olympic Park) and Sydney Water (if Sydney Water's assets are affected)	Section 3.2 Appendix B
C6	The CEMP Sub-plans must state how: (a) the environmental performance outcomes identified in the documents listed in Condition A1 of this schedule will be achieved;	Section 2

Project Planning Approval Conditions		
	(b) the mitigation measures identified in the documents listed in Condition A1 of this schedule will be implemented; (c) the relevant conditions of this approval will be complied with; and (d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Section 6 Section 3.2and Appendix A Section 5 CEMP Section 3.4.1
C12	In addition to the relevant requirements of the CEMF, the Soil and Water CEMP Sub-plan must include, but not be limited to: (a) details of construction activities and their locations which have the potential to expose areas known to contain, or potentially contain, contaminated soils and / or materials; (b) measures for the handling, treatment and management of hazardous and contaminated soils and materials including measures to manage and / or minimise worker and public health and safety with regards to exposure to contamination; and (c) a description of how the effectiveness of the actions and measures for managing contamination impacts would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, and how the results of the monitoring would be recorded and reported.	Section 4.5 Section 6.8 Section 6.8 Section 6.11 Section 6.8 Section 7.3
C14 (c)	C14 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 Stage 1 of the CSSI against the performance predicted in the documents listed in Condition A1 of this schedule or in the CEMP: c) Surface Water Quality to be prepared in consultation with DPIE Water, Relevant Council(s) and Sydney Water (if any Sydney Water assets are impacted)	Appendix D Appendix B
C15	Each Construction Monitoring Program must provide: (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; (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;	Appendix D Section 7.3

Project Planning Approval Conditions		
	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts; (j) a consideration of SMART principles; and (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Conditions C16 to C17 of this schedule.	
Construction Environmental Management Framework		
12.2 (a)	Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:	This SWMP
i	The surface water and flooding mitigation measures as detailed in the environmental approval documentation	This SWMP Appendix A
ii	details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;	Section 5 Groundwater Management Sub-plan
iii	surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines;	Section 6 Groundwater Management Sub-plan
iv	management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;	Section 6 Groundwater Management Sub-plan
v	a contingency plan, consistent with the Acid Sulfate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulfate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	Appendix F
vi	management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;	Section 6.8

Project Planning Approval Conditions		
vii	A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locationswhere monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified.	Section 7.3 CEMP
viii	The requirements of any applicable licence conditions.	Section 3.4
ix	The responsibilities of key project personnel with respect to the implementation of the plan	Section 7.1
x	Procedures for the development and implementation of Progressive Erosion and Sediment ControlPlans	Section 6.1 Section 6.2 Appendix C
xi	Identification of locations where site specific Stormwater and Flooding Management Plans are required.	Section 6.9
xii	Compliance record generation and management.	Section 7.4
12.2 (b)	Principal Contractors will develop and implement Progressive Erosion and Sediment Control Plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”).	Section 6.2 Appendix C
	▪ The ESCPs will be approved by the Contractor’s Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman.	Section 6.2
12.2 (c)	ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor’s Environmental Manager (or delegate).	Section 6.2
12.2 (d)	Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to	Section 6.9

Project Planning Approval Conditions		
	ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.	
12.2 (e)	Principal Contractors will undertake the following soil and water monitoring as a minimum: i. Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable; ii. Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours); and iii. All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the appropriate approvals and licencing. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT.	Section 7.3 Section 3.4 Section 6.5
12.2 (f)	The following compliance records will be kept by the Principal Contractors: ▪ Copies of current ESCPs for all active construction sites; ▪ Records of soil and water inspections undertaken; ▪ Records of testing of any water prior to discharge; and Records of the release of the hold point to discharge water from the construction site to the receiving environment.	Section 7.4
12.2 (g)	The following water resources management objectives will apply to the construction of the project: ▪ Minimise demand for, and use of potable water; ▪ Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater; ▪ Examples of measures to minimise potable water consumption include: ▪ Water efficient controls, fixtures and fittings in temporary facilities; ▪ Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes; ▪ Using recycled water or treated water from onsite sources in the formulation of concrete; ▪ Harvesting and reusing rainwater from roofs of temporary facilities; ▪ Using water from recycled water networks; ▪ Collecting, treating and reusing groundwater and stormwater; ▪ Using water efficient construction methods and equipment; and ▪ Providing designated sealed areas for equipment wash down.	Section 2 Groundwater Management Sub-plan Water Reuse Plan Sustainability Management Plan
12.3 (a)	The Soil and Water Management Plan will include the following surface water and flooding mitigation measures as well as any	Section 6.1

Project Planning Approval Conditions	

	additional mitigation measures identified in the planning approval documents.:
	▪ Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas;
	▪ Control measures will be installed downstream of works, stockpiles and other disturbed areas;
	▪ Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction;
	▪ Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume;
	▪ Chemicals will be stored and handled in accordance with relevant Australian standards such as:
	  ▪ 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
	▪ Spill kits will be provided at the batch plants, storage areas and main work sites;
	▪ A protocol will be developed and implemented to respond to and remedy leaks or spills.
	▪ A remedial action plan and unexpected finds protocol would be established to facilitate the quarantining, isolation and remediation of contamination identified throughout the construction programme. Any asbestos identified on site would be managed in accordance with applicable regulatory requirements.

Other Project requirements relevant to the management of soil and water during the CTP can be found in **Appendix A**.

3.3 REVISED ENVIRONMENTAL MITIGATION MEASURES

Refer to **Appendix A** for all relevant Revised Environmental Mitigation Measures (REMMs).

3.4 LICENCES AND PERMITS

An Environment Protection Licence (EPL) for *Railway activities – railway infrastructure construction* and *Concrete works* under Schedule 1 of the POEO Act will be obtained for the CTP. Once obtained, a review of this plan will be undertaken and updated where required.

Soil and water management pre-construction and construction hold points are included within Table 5.

TABLE 5: SWMP HOLD POINTS

Item	Process Held	Acceptance Criteria	Approval Authority
Reuse or Discharge of water	Dewatering activities (During construction)	Implementation of requirements within Section 6.5 of this plan, prior to any discharge off the premises or reuse within the premises.	Environmental Manager or delegate
Erosion and Sediment Control Plan	Prior to ground disturbance that could cause erosion.	ESCPs are developed with site specific environmental controls/mitigation measures with site supervisor/engineers for work activities and are to be implemented prior to works commencing (or a new work stage as appropriate)	Environmental Manager or delegate

3.5 CONSULTATION

CoA C5(c) requires that the SWMP be prepared in consultation with DPIE EES, Relevant Council(s), SOPA (in respect of Sydney Olympic Park) and Sydney Water (if Sydney Water's assets are affected)

CoA C14(c) requires that the Water Quality Monitoring Program, included in this SWMP, is prepared in consultation with DPIE Water, Relevant Council(s) and Sydney Water (if any Sydney Water assets are impacted). REMM SSWQ6 also requires the details of the Water Quality Monitoring Program to be developed in consultation with NSW Environment Protection Authority (EPA) and the relevant Councils.

As such the following stakeholders have been consulted in developing this SWMP:

- DPIE EES and DPIE Water;
- NSW EPA;
- Sydney Olympic Park Authority (SOPA) (in respect of Sydney Olympic Park)
- Burwood Council
- City of Parramatta Council
- Strathfield Municipal Council
- City of Canada Bay Council
- Inner West Council (IWC)
- Sydney Water (if any Sydney Water assets are impacted).

Prior to submission to the DPIE for approval, external consultation during the preparation of the SWMP will be undertaken with stakeholders, as described above. Details of issues raised by stakeholders during consultation will be provided in **Appendix B** including copies of correspondence in accordance with Condition A6.

Ongoing consultation with stakeholders, including Sydney Water in relation to their assets or land, will be undertaken during project development and execution. This will be coordinated through the Utilities Coordination Manager, Interface Manager or Environment Manager as appropriate.

Community feedback and complaints management will be dealt with in accordance with the Community Communication Strategy and Complaints Management System.

Refer to CEMP and the Community Communications Strategy for more information regarding ongoing consultation during delivery of the CTP.

4. EXISTING ENVIRONMENT

Known soil and water constraints within and adjacent to the CTP have been identified and documented in the following environmental assessment reports:

- EIS Sydney Metro West Stage 1 Chapter 19 Soils and surface water quality
- Technical Paper 9: Hydrology and Flooding
- Technical Paper 10: Biodiversity

Additional information has also been gathered since the EIS, which includes the following reports:

- Golder/Douglas Partners, October 2018, Groundwater Level Monitoring Report, 1791865-003-R-GWMR3-RevA
- Golder/Douglas Partners, October 2020. Groundwater Monitoring Report - Stage 2 Locations, 1791865-023-RGWMR Rev A
- Senversa, May 2021, Factual Contamination Investigation Report- The Bays, 000013/11868 White Bay Site Investigations
- Jacobs, dated 18 December 2020,Tender Advice Notice Hydrogeology- Site Wide Central Tunnelling Package, Groundwater Quality Assessment, CENT-JTJV-PW-HG-TAN-0040.3,Rev A,
- ERM, January 2021, Metro West-Contamination-Groundwater, 0577577, Rev 1.

The following summarises the existing environment with respect to Soil and Water and the CTP's likely impacts. Detailed desk top studies and field investigations were undertaken as part of the environmental assessments undertaken for the Environmental Impact Statement process.

4.1 TOPOGRAPHY

The CTP falls within the catchment of the Parramatta River and Sydney Harbour. The catchment lies to the west of the Sydney CBD within the relatively flat region of the Cumberland Plain. Elevations range from 140 metres Australian Height Datum (AHD) in the north-west of the catchment to sea level in the east. Most of the waterways are within urbanised coastal areas.

4.2 SOILS

The geology of the CTP is dominated by Hawkesbury sandstone, Wianamatta Group Ashfield Shale, and Quaternary sediments.

The station box sites for the CTP are located within the Blacktown soil landscape (refer to Figure 1 below), which contains the following characteristics:

- Landscape: found on gently undulating rises on Wianamatta Group shales, with slopes of less than five per cent and local reliefs of up to 30 metres
- Soils: strongly acidic and hard setting soils
- Limitations: low fertility, high aluminium toxicity, localised salinity and sodicity, low wet strength, low permeability, and low available water holding capacity (Reference Soil Landscapes of Sydney, Tille et al, 2009)

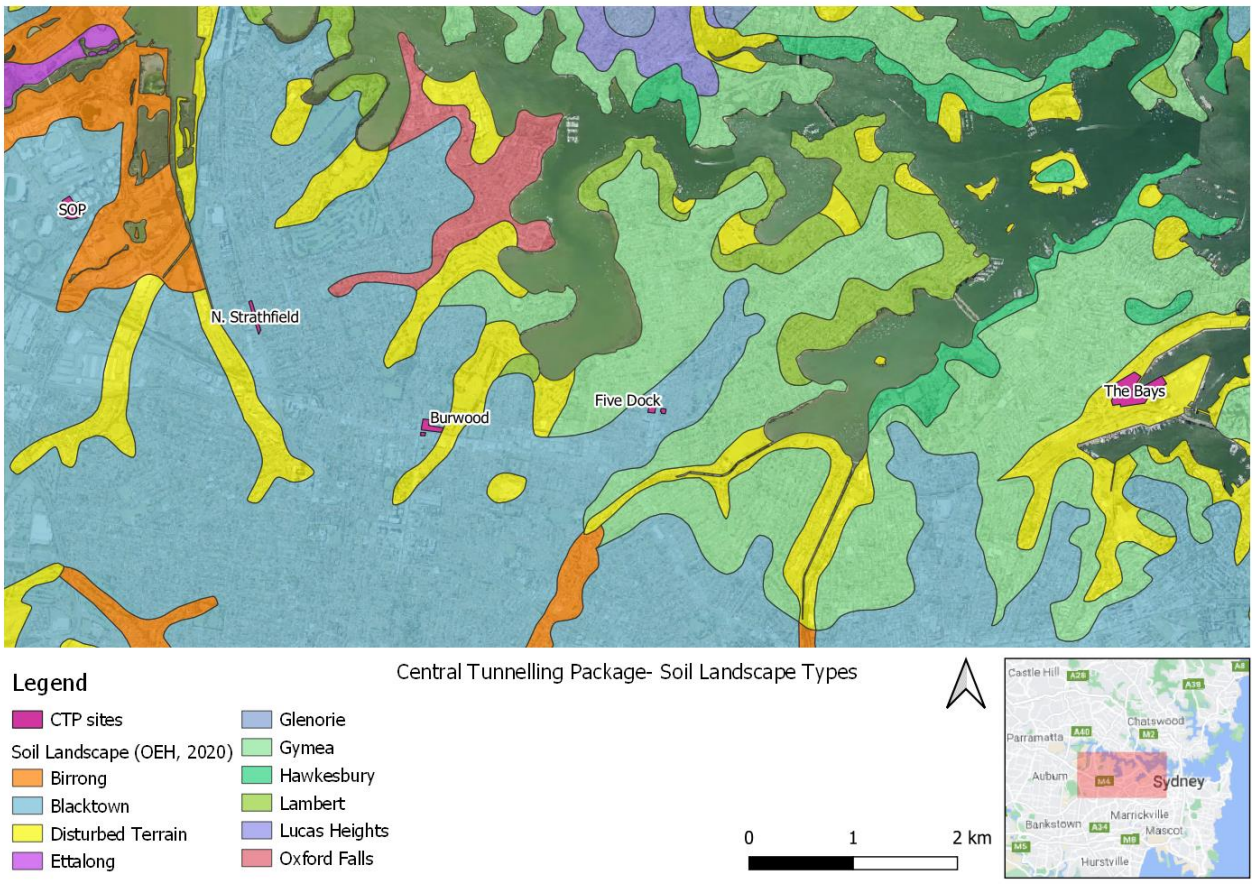

FIGURE 1: SOIL LANDSCAPE MAPPING

4.3 SOIL SALINITY

Soil salinity refers to the movement and concentration of salt in soils as a result of weathering rock materials, historic inland seas and deposition of salt from the ocean onto land by wind or rain.

The probability of saline soils to be present:

- Sydney Olympic Park: Very high.
- Burwood North stations: Very high.
- Burwood North: High to very high in elevated areas/ Very low in low elevated areas
- Five Dock: High to very high in elevated areas/ Very low in low elevated areas
- The Bays station: High to very high in elevated areas/ Very low in low elevated areas

4.4 ACID SULFATE SOILS

Acid sulfate soils (ASS) are the common name given to naturally occurring sediments and soils containing iron sulphide (principally iron sulfide or iron disulfide or their precursors). Exposure of the sulfide in these soils to oxygen as a result of drainage, groundwater drawdown or excavation leads to the generation of sulfuric acid. Areas of ASS are typically found in low-lying and flat locations that are often swampy or prone to flooding.

According to the acid sulfate soils risk maps from the former Office of Environment and Heritage, most of the CTP is located in areas having “no known occurrence” of acid sulfate soils, (refer to Figure 2 below)

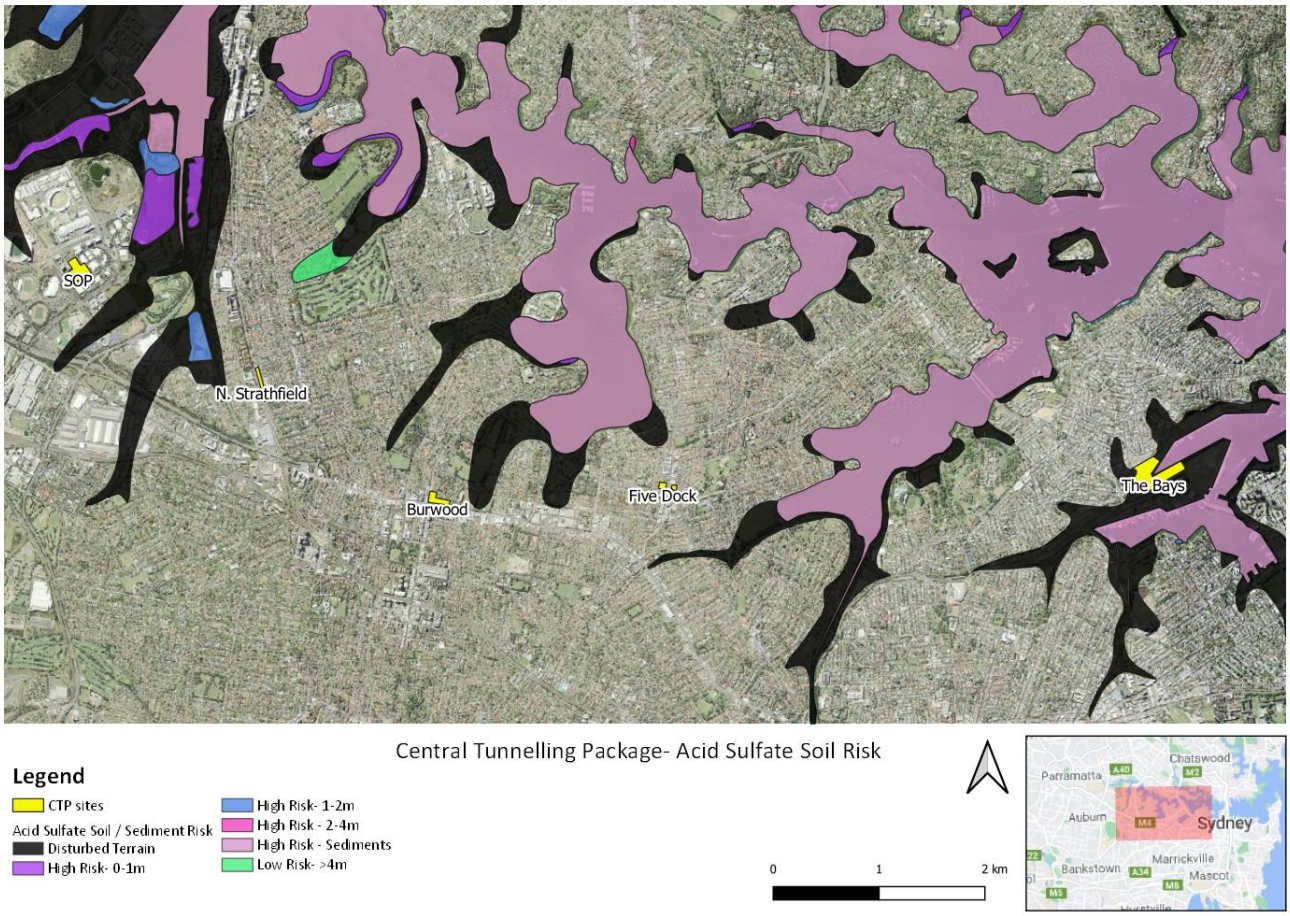

FIGURE 2: ACID SULFATE SOIL MAPPING

Areas around the Parramatta River and White Bay are identified as “disturbed terrain” and based on this information there is potential to encounter acid sulfate soils at The Bays Station.

4.5 CONTAMINATION

Construction activities for the CTP construction footprint has the potential to uncover contamination at several locations during excavation and other ground disturbing activities.

Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk due to current and historical activities. Activities that may have impacts contamination on the CTP area include:

- Leaks and spills from fuel storage infrastructure (hydrocarbons and heavy metals)
- Processing of heavy end hydrocarbons, heavy metals and metalloids
- Land reclamation and other uncontrolled fill material (metals, hydrocarbons, pesticides, polychlorinated biphenyls and asbestos)
- Demolition of buildings that may contain hazardous materials such as asbestos
- Former and current industrial land uses (that may contain contaminants such as hydrocarbons, heavy metals and metalloids, solvents, phenolics, pesticides, heavy metals and metalloids and asbestos in soil)
- Existing railways and associated activities (that may contain contaminants such as metals, hydrocarbons, pesticides, nutrients, phenols, carbamates, pesticides, herbicides and asbestos in soils).

Contaminants of concern for the CTP relevant to soil and water quality include:

- Heavy metals
- Hydrocarbons (TRH, BTEX, PAH)

- Pesticides
- Herbicides
- Asbestos
- PCB and
- PFAS

A summary of potential contamination risk for the CTP construction sites is presented in Table 6 below (as taken from EIS Chapter 20). Detail on contamination management is described in Section 6.8.

TABLE 6: CONTAMINATION RISK RELEVANT TO THE CTP

Construction Site*	Potential contamination risk			Overall potential contamination risk
	Soil	Groundwater	Vapour / Gas	
SOPMS		✓	✓	High
NSMS	✓			Moderate
BNS	✓	✓		Moderate
FDS	✓			Moderate
TBS	✓	✓		Moderate

*SOPMS – Sydney Olympic Park Metro Station, NSMS – North Strathfield Metro Station, BNS – Burwood North Station, FDS – Five Dock Station, TBS – The Bays Station

4.6 GROUNDWATER

The geology within the CTP construction footprint is crossed by several volcanic structural features such as dykes and faults that may impact groundwater flow. Dykes are bodies of rock that cut across other geological units. Faults are a fracture within rock where displacement may have occurred. Dykes and faults may provide a conduit or hydraulic barrier for groundwater inflows.

The groundwater level across most of the Stage 1 construction footprint is generally shallow and typically between one metre and five metres below ground surface at most locations.

A full description of groundwater including aspects, impacts mitigation and monitoring is included in the Groundwater Management Plan for the CTP and not addressed in this Plan.

4.7 SURFACE WATER

Except for The Bays station, the CTP is located within the upper estuary of the Parramatta River catchment, one of the main tributaries of Sydney Harbour. The Bays Station drains to White Bay in the lower estuary of Sydney Harbour. The catchment is highly urbanised and altered from its natural state, with pockets of open spaces and parkland. These land uses influence the water quality and quantity and speed of flows within the catchment. Most of the catchment is estuarine, up to the tidal limit at Charles Street weir in Parramatta, with freshwater watercourses in the upper catchments of the tributaries of Parramatta River. The catchment lies over the Cumberland Plain and is relatively flat, with elevation ranging from 140 metres Australian Height Datum in the north-west of the catchment to sea level in the east.

Specific Water Quality Objectives have been derived for the catchment in line with the NSW Water Quality Objectives. Catchment mapping classifies the CTP site as a waterway that is *"affected by urban development"*. The water quality objectives for the catchment include the protection of:

- Aquatic ecosystems - Maintaining or improving the ecological condition of waterbodies and their riparian zones over the long term
- Visual amenity – Aesthetic qualities of waters
- Secondary contact recreation - Maintaining or improving water quality for activities such as boating and wading, where there is a low probability of water being swallowed.

Stage 1 would drain to a number of watercourses which are sub-catchments of Parramatta River. Many of the watercourses are greatly modified with creek systems extensively channelised or hard-edged with concrete. Relevant watercourses are shown in Figure 3 and Table 7 below.

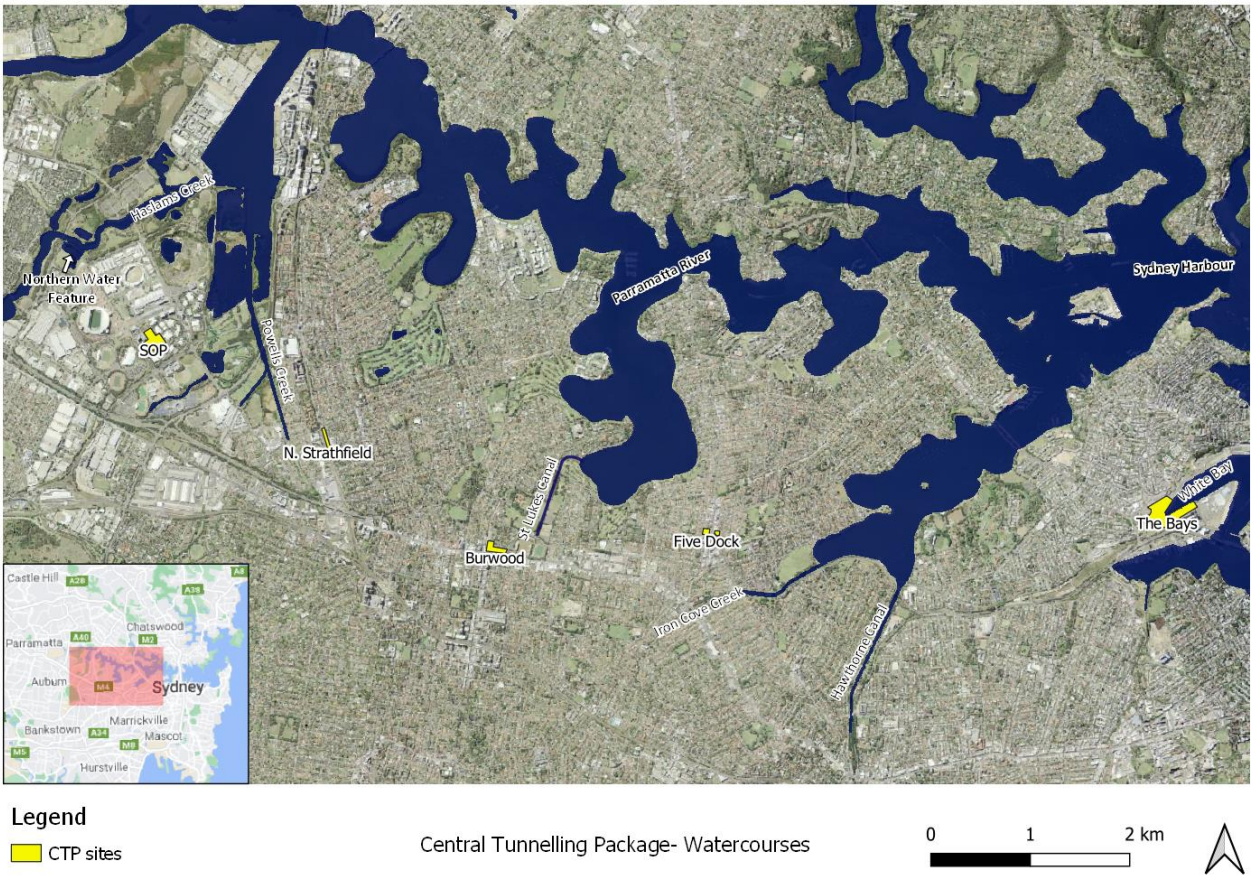

FIGURE 3: WATERCOURSES ALONG THE STAGE 1 ALIGNMENT

TABLE 7: WATERCOURSES RELEVANT TO THE CTP

Site	Watercourse	Receiving waters
Sydney Olympic Park	Haslams Creek (900m)	Homebush Bay
North Strathfield Metro Station	Saleyards Creek (400m) Powells Creek (600m)	Homebush Bay
Burwood North Station	St Lukes Park Canal (500m) Barnwell Park Canal (500m)	Canada Bay Hen and Chicken Bay
Five Dock Station	Dobroyd Canal / Iron Cove Creek (600m)	Iron Cove
The Bays Station	White Bay (50m)	Sydney Harbour

4.8 WATER QUALITY

The NSW Water Quality and River Flow Objectives (NSW Department of Environment, Climate Change and Water, 2006) provide a number of environmental values for the Sydney Harbour and Parramatta River regional catchment.

Table 8 below shows the relevant environmental values that are considered applicable to the watercourses in the CTP as defined in Section 19.5.2 of the EIS.

TABLE 8: WATERCOURSE ENVIRONMENTAL VALUES

Site	Aquatic Ecosystem	Visual amenity	Primary contact recreation	Secondary contact recreation	Aquatic foods (cooked)	Water quality characteristics*
Parramatta River and Sydney Harbour	✓	✓	✓	✓	✓	▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
Haslams Creek	✓	✓	-	✓	-	▪ Elevated nutrient concentrations ▪ Elevated concentrations of faecal coliforms
Powells Creek	✓	✓	-	-	-	▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
Saleyards Creek	-	✓		✓		▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
St Lukes Park Canal	✓	✓	-	-	-	▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
Barnwell Park Canal	✓	✓	-	-	-	▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
Dobroyd Canal	✓	✓	-	-	-	▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity

Site	Aquatic Ecosystem	Visual amenity	Primary contact recreation	Secondary contact recreation	Aquatic foods (cooked)	Water quality characteristics*
Iron Cove	✓	✓	✓	✓	-	▪ Low dissolved oxygen levels ▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity
White Bay	✓	✓	✓	✓	-	▪ Elevated nutrient concentrations ▪ Elevated heavy metal concentrations ▪ High turbidity

✓ - value applies to watercourse

*relevant to ANZECC/ARMCANZ (2000) indicators

A review of available existing water quality data collected from Sydney Water, the Councils, University of Western Sydney and the WestConnex M4 East project which was undertaken in the EIS (Section 19.5.2) identifies that the watercourses relevant to the CTP are generally in poor condition and are representative of a heavily urbanised system.

The water quality assessed against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000; Australian and New Zealand Governments and Australian state and territory governments, 2018) is summarised generally as follows:

- Low dissolved oxygen levels
- Elevated nutrient concentrations
- Elevated heavy metal concentrations
- High turbidity.

4.9 FLOODING

The drainage catchments across the CTP are highly urbanised, with large impervious surfaces created by roads, footpaths and buildings. These impervious surfaces are interspersed with pervious surfaces associated with parkland areas and other unsealed surfaces (such as vacant land and landscaped areas). Surface water is generally collected by developed stormwater networks, which consist of road kerb and guttering, lined and unlined drainage channels, and sub-surface pit and pipe networks.

Due to the highly urbanised drainage catchments surrounding the CTP construction sites, flooding behaviour is expected to be largely controlled by the capacity of existing stormwater drainage systems and roadways that form overland flow paths.

Existing flood behaviour for the CTP construction sites is summarised in Table 9 below.

TABLE 9: EXISTING FLOOD BEHAVIOUR OF THE CTP

CTP Site	Existing Flood Behaviour
Sydney Olympic Park Metro Station	One per cent AEP and PMF flood depths, flood hazards, floodway and flood storage areas for the construction site and immediate surrounds could not be determined from the available flood studies and reporting. The construction site is outside the nearest floodplain and is outside of high hazard, floodway and flood storage areas No overland flooding, mainstream flooding or coastal inundation risks relevant to the construction site and immediate surrounds.
North Strathfield Metro Station	Minor overland flooding potential across the construction site from Queen Street of up to 0.1 metres during the one per cent AEP event (low hazard area) and 0.3 metres during the PMF event (predominantly low hazard area) Major overland flooding potential across the northern portion of the construction site of up to one metre during the PMF event (high hazard area) The construction site and immediate surrounds are not located in floodway or flood storage areas No mainstream flooding or coastal inundation risks relevant to the construction site and immediate surrounds.
Burwood North Station	Minor overland flooding potential across the northern construction site. Flood depths could not be determined from the available flood studies and reporting Minor overland flooding potential across the southern construction site of up to 0.2 metres during the one per cent AEP event and up to 0.3 metres during the PMF event.

CTP Site	Existing Flood Behaviour
	Flooding is expected to be contained within the roadway, with a small area of ponding within the construction site. The construction sites and immediate surrounds are outside of high flood hazard, floodway and flood storage areas. No mainstream flooding or coastal inundation risks relevant to the construction sites and immediate surrounds.
Five Dock Station	One per cent AEP and PMF flood depths, flood hazards, floodway and flood storage areas for the western and eastern construction sites and immediate surrounds could not be determined from the available flood studies and reporting. Minor overland flooding potential across the construction site during the one per cent AEP event and PMF event, which is expected to be contained within the roadway The construction sites and immediate surrounds are located outside of high flood hazard, floodway and flood storage areas No mainstream flooding or coastal inundation risks relevant to the construction sites and immediate surrounds
The Bays Station	Major overland flooding potential across the construction site of up to one metre during the one per cent AEP event. Overland flooding of up to one metre affects most of the construction site during the PMF event. Coastal inundation potential across low-lying portions of the construction site during the one per cent AEP event. Low areas within the construction site are located within high flood hazard, floodway and flood storage areas. No mainstream flooding risks relevant to the construction site and immediate surrounds.

4.10 SENSITIVE RECEIVING ENVIRONMENTS

A sensitive receiving environment has a high conservation or community value or supports ecosystems or human uses of water that are particularly sensitive to pollution or degradation of water quality. Watercourses relevant to CTP have been identified as sensitive receiving environments due to their proximity to SEPP Coastal Wetlands and their mapping by DPI (2019) as Key Fish Habitat.

These watercourses have a high conservation or community value or supports ecosystems or human uses of water that are particularly sensitive to pollution or degradation of water quality. These watercourses are outlined below in Table 10.

TABLE 10: SENSITIVE RECEIVING ENVIRONMENTS

Watercourse	Relevant construction site	Reasons for classification
Parramatta River/Sydney Harbour	Ultimate receiving waters for all construction sites.	Type 1 Key Fish Habitat / Numerous SEPP Coastal Wetlands
	The Bays	Potential habitat for threatened aquatic species and protected aquatic vegetation

Watercourse	Relevant construction site	Reasons for classification
Northern Water Feature/Haslams Creek	Sydney Olympic Park	Type 1 Key Fish Habitat Potential Green and Golden Bell Frog habitat* SEPP Coastal Wetlands within 500 metres
Powells Creek	North Strathfield	SEPP Coastal Wetlands within 500 metres
St Lukes Canal**	Burwood North	Canada Bay Council reuse water from St Lukes Canal
Dobroyd Canal/Iron Cove Creek	Five Dock	SEPP Coastal Wetlands within 500 metres

*As indicated through consultation with SOPA.
**As identified through consultation with Canada Bay Council

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5. ENVIRONMENTAL ASPECTS AND IMPACTS

The CTP and surrounding area is highly urbanised and largely disturbed with formalised kerb and stormwater systems managing existing site surface waters.

Aspects and the potential for impacts have been considered in a risk assessment in Appendix C of the CEMP and include:

- Vegetation clearing and stripping of surface soil/spoil;
- Bulk earthworks;
- Construction and use of site accesses;
- Drainage works;
- Material stockpiling including the handling of potentially contaminated material;
- Water use;
- Operations at site compounds including fuel and chemical storage, refuelling and chemical handling
- Water treatment, discharge or reuse.

With the exclusion of vegetation removal, the identified activities will be undertaken at all locations relevant to the CTP.

For those activities with residual environmental risks identified as 'high', the justification for accepting the residual risk was discussed with all attendees. For all activities in this category, an Environmental Work Method Statement (EWMS) will be developed for that activity where other risk assessment strategies are not already in place. Site establishment activities were identified as having a high residual risk for erosion and sedimentation and potential incident resulting in soil or water contamination. The ESCP was identified as the appropriate tool for managing these risks and as such a EWMS is not proposed (refer to Section 6.2). Additionally, a Water Reuse and Discharge Permit will be utilised as a Hold Point for all active discharge activities (refer to Section 6.5)

Section 7 of this plan provides mitigation and management measures that will be implemented to avoid or minimise soil and water impacts during the delivery of the CTP.

The issues requiring management during construction are summarised in below.

TABLE 11: SOIL AND WATER ISSUES REQUIRING MANAGEMENT DURING CONSTRUCTION

Aspects	Potential Impacts (key contaminant)	Site Management
Continuing site establishment involving establishing hardstand areas, erecting sheds	Minor sediment or dust impacts from roadbase materials (sediment)	Soil erosion, sediment controls installed, coupled with inspection and maintenance regime
Minor concrete works for footings, and other establishment works	Concrete spillage and runoff from washout areas (sediment and pH)	Designated concrete washout areas
Material storage including chemicals storage	Spills from liquid chemicals (pH and other minor chemical residue)	Limit chemicals stored and bunded storage areas and spill kits
Machinery operating on site	Leaking from refueling and hydraulic hose bursts (oil and grease)	Refuelling procedures and spill response and clean up

Aspects	Potential Impacts (key contaminant)	Site Management
Drilling works	Sediment from drilled materials (sediment)	Soil erosion, sediment controls coupled with inspection and maintenance regime
Diaphragm wall works	Grout and/or concrete loss or spillage (sediment and pH)	Bunded chemical storage areas, and sediment controls
Utility works	Sediment from trenching (sediment)	Soil erosion, sediment controls coupled with inspection regime
Stockpiling of soils from excavations	Sediment from spoil stockpiles (sediment)	Soil erosion, sediment controls coupled with inspection and maintenance regime
Exposure of potential acid sulphate soils (PASS)	Oxidization of PASS and generation of acidic leachate (sediment and pH)	PASS will be managed in accordance with Acid Sulfate Soil Management Procedure (Appendix F of the Soil and Water Management Plan) and any site specific contaminated land management plans or Remediation Action Plan where it applies.
Concrete works for retaining walls, and shotcrete works	Concrete spillage and runoff from washout areas (sediment and pH)	Designated concrete washout areas
Groundwater seepage into excavation areas, mixing with washdown and dust suppression water	Site water being generated with a mix of potential pollutants entrained (multi-pollutant load)	Detail covered in Groundwater Management Plan.

6. ENVIRONMENTAL CONTROLS

6.1 MITIGATION AND MANAGEMENT MEASURES

Construction associated with the CTP has the potential to impact soil and water quality within and 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 CSSI environmental assessment documents (including the EIS) and other guidance documents. Specific measures and requirements to address impacts on soil and water quality are outlined in Table 12.

TABLE 12: SOIL AND WATER MITIGATION MEASURES

Reference	Measure	When	Responsibility	Source
SWMM1	All staff and Subcontractors will participate in a Site Induction that will introduce basic Soil and Water management measures	Pre-construction/ construction	Environmental Manager	CEMP
SWMM2	Ongoing toolbox talks and specific training packages will be developed to address key personnel responsibilities associated with the management of Soil and Water	Pre-construction/ construction	Environmental Manager	CEMP
SWMM3	A Soil Conservationist may be used during construction to provide advice during initial site establishment or during planning for high-ERSED risk activities. .	Construction	Environmental Manager	Best Practice
SWMM4	Erosion and Sediment Control Plans must be prepared prior to ground disturbance which has the potential to cause erosion. These plans are to include controls in accordance with the 'Blue Book' (Landcom, 2004) during construction, as further detailed in Appendix C.	Construction	Environmental Manager	CEMF
SWMM5	A Water Reuse and Discharge Permit will be raised for every manual discharge event.	Construction	Site Supervisor Environmental Manager	Good practice
SWMM6	Refuelling or maintenance and cleaning of plant and equipment including concrete agitators, bitumen spray bars and asphalt pavers will be away from live stormwater lines and pit inlets	Construction	Site Supervisor	Good practice
SWMM7	Works will be designed and programmed to minimise the extent and duration of disturbance to vegetation.	Construction	Project Engineers	Good practice
SWMM8	Restrict use of herbicides to control weeds during and post-construction, particularly near watercourses and immediately before/during wet weather.	Construction	Environmental Manager	Good practice

Reference	Measure	When	Responsibility	Source
SWMM9	Measures will be implemented to minimise dust, soil or mud from being deposited by vehicles on public roads. This will be achieved by implementing mitigation measures such as automated wheel washes, wheel baths rumble grids or large aggregate at entry/exit points. Gate controls will differ depending on location, physical attributes of the access point and the duration the mitigation measure will be in place.	Construction	Site Supervisor	Good practice
SWMM10	Hardstand areas and surrounding public roads will be cleaned as required, using methods which may include brooms, bobcat attachments or street sweepers.	Construction	Site Supervisor	Good practice
SWMM11	Where feasible and reasonable works will be staged to break up catchment areas (and within work zones where appropriate) to ensure that disturbed areas generate an annual soil loss of less than 150m^3. This negates the requirement for large scale sediment retention basins. Where basins are not utilised management measures may include: ▪ Temporary stabilisation or revegetation/management works to reduce the extent of disturbed surfaces ▪ Application of temporary surface treatments or blanketing on exposed earth surfaces ▪ Sediment barriers ▪ Stabilised drainage lines incorporating rock check dams at regular intervals. Water may be stored for treatment before discharge or re-use in basins or temporary detention areas / containers on the CTP site. In particular, water within excavations that does not meet the criteria for discharge may be pumped into storage tanks or an impermeable bund for treatment,	Construction	Environmental Manager	Good practice

Reference	Measure	When	Responsibility	Source
	allowing works to recommence in parallel with water treatment.			
SWMM12	Emergency spill kits would be kept on-site at all times. All staff would be made aware of the location of the spill kit and be trained in its use.	Construction	Site Supervisors	CEMF
SWMM13	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	Construction	Site Supervisors	Best Practice
SWMM14	If Acid Sulfate Soils are encountered within the CTP, they will be managed in accordance with the Acid Sulfate Soils Procedure in Appendix F.	Construction	Project Engineers	CEMF
SWMM15	Excavated material leaving the site will be classified in accordance with the Waste Classification Guidelines so that correct resource recovery and or off-site disposal occur.	Construction	Project Engineers	EPA Waste Guidelines

Reference	Measure	When	Responsibility	Source
SWMM16	In the event of an environmental incident or emergency, the environmental incident and emergency response procedures will be implemented (refer to CEMP). These procedures include the initial actions required to be undertaken to avoid or minimise environmental harm and notify relevant CTP personnel.	Construction	Environmental Manager	CEMF
SWMM17	An up-to-date register of hazardous chemicals and dangerous goods will be kept onsite at all times	Construction	Environmental Manager	Best Practice
SWMM18	Any potential hazardous or contaminant materials (for example fuels, curing compounds, and oils) will not be stored within 40 m of any natural waterway, flood prone areas, or on slopes steeper than 1:10. Storage areas would be impervious and adequately bunded.	Construction	Site Supervisors	PIRMP
SWMM19	The refuelling of plant and maintenance of machinery will be undertaken in impervious bunded areas where possible. Refuelling will be attended at all times. The use of any hazardous chemicals and dangerous goods that could result in a spill will be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds	Construction	Plant operators	Good practice
SWMM20	Vehicle wash down and/or concrete truck washout water will be collected for appropriate disposal or treatment.	Construction	Site Supervisors	Good practice
SWMM21	Plant will be inspected prior to arriving on site to ensure it is fit for operation. Daily pre-start plant checks will be undertaken to check for oil, fuel or other liquids leaks.	Construction	Plant operators	Good practice
SWMM22	Concrete wash out areas - where necessary, will be adequately sized, regularly maintained and located in a position where wastewater will not enter any drainage lines or waterways.	Construction	Site Supervisors	Good practice

Reference	Measure	When	Responsibility	Source
SWMM23	Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas;	Construction	Site Supervisors	CEMF
SWMM24	Control measures will be installed downstream of works, stockpiles and other disturbed areas;	Construction	Site Supervisors	CEMF
SWMM25	Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction;	Construction	Site Supervisors	CEMF
SWMM26	Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume.	Construction	Site Supervisors	CEMF
SWMM27	Hazardous chemicals and dangerous goods only be used onsite as required and will be stored onsite in lockable containers, in their original receptacles	Construction	Site Supervisors	Best Practice
SWMM28	All spills or leakages will be immediately contained and absorbed. Routine inspections of all construction vehicles and equipment would be undertaken for evidence of fuel/oil leaks	Construction	Site Supervisors	Best Practice

6.2 EROSION AND SEDIMENT CONTROL

Erosion and Sediment Control measures will be guided by the Erosion and Sediment Control Strategy in Appendix C, which has been developed in accordance with the requirements of Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Managing Urban Stormwater: Soils and Construction Volume 2A and 2D (DECC 2008) (the "Blue Book').

Erosion and Sediment Control Plans describing these controls will be prepared as a Hold Point prior to any ground disturbance with the potential to cause erosion.

6.3 ENVIRONMENTAL CONTROL MAPS

To assist with design and construction planning and management, identified site constraints are consolidated on a series of map-based sheets for each CTP construction site/work site called Environmental Control Maps (ECMs), as described in Section 3.4.5 of the CEMP. Each ECM will delineate site boundaries and identify environmental controls, procedures and relevant environmental requirements to that location or specific activity.

Where required, the ECMs will be updated to include specific elements described in this SWMP or the Surface Water Monitoring Program.

6.4 WATER STORAGE AND REUSE

Water may be stored for treatment before discharge or re-use in basins or temporary detention areas / containers on the CTP site. In particular, 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, any water collected in excavations / work sites will be reused within, the Premises (e.g. dust suppression, watering retained vegetation, re-use in wheel washes and/or wheel baths). In-line with the CEMF the following water resource management objectives will apply to the construction of the CTP:

- Minimise use of potable water; and
- Maximise opportunities for the reuse of rainwater, stormwater, wastewater and groundwater.

The AFJV - Water Discharge or Reuse Procedure regulates both onsite reuse and offsite point source discharge. This procedure includes surface water and groundwater discharge and reuse permits; prior to any discharge off the premises, or reuse within the premises, the AFJV 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 CTP Water Discharge or Reuse Permit included in the Procedure.

For onsite water reuse, the following criteria will be utilised:

- pH – 6.5 to 8.5;
- No visible oil and grease;
- 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.

Where water is proposed to be re-used on the Project sites, the proposed re-use would also need to be approved by the AFJV Safety Team to ensure the water meets all occupational health requirements.

6.4.1 WATER BALANCE STUDY

A Water Balance Study will be completed in accordance with CoA D79, prior to the commencement of construction and will estimate the quantities, types and potential sources of water that will be required for the CTP. The study will identify the best opportunities to use non-potable water (where available) instead of potable water and minimise the quantities of both potable and non-potable water which will be consumed.

The water balance study will consider the following:

- Site facilities;
- Dust control for construction activities;
- Subgrade treatments;
- Trenching activities;
- Piling activities;
- Landscape establishment; and
- Water demand ongoing for operation and maintenance.

Measures to minimise water consumption are identified in the Sustainability Management Plan. Examples of initiatives that will be investigated and implemented where practicable include:

- Installing water efficient controls, fixtures and fittings in temporary facilities;
- Harvesting and reusing rainwater from roofs of temporary facilities and operation facilities;
- Using non-potable water sources for dust suppression during construction;
- Using water efficient construction methods and equipment;
- Specifying within supply chain contracts that offsite batching plant concrete production operation water is recycled, suitably treated and incorporated into concrete production that is supplied the CTP;
- Maximise the use of stormwater in the urban design; and
- Include a drought tolerant planting schedule in the urban design.

Refer to the Sustainability Management Plan for further detail on the Water Balance Study and management of potable water use onsite.

6.5 WATER QUALITY AND DISCHARGE

Testing and where necessary treatment of construction water from sediment basins and/ or excavations will be undertaken in accordance with the CTP's Water Reuse and Discharge Permit.

A Water Reuse and Discharge Permit will be raised for every manual discharge event as a Hold Point. This permit will monitor the compliance with the discharge criteria listed in the CTP EPL (*when this is received*).

For each proposed discharge, the Water Reuse and Discharge Permit can only be approved by a member of the AFJV environmental team.

All water discharges will be documented using AFJV's CTP Water Discharge or Reuse Approval Form or site-specific equivalent. No water will be discharged off site until it has been tested and a permit to discharge is approved by the Environmental Manager (or delegate). Refer to Section 3.4 for hold points.

Water quality testing will be undertaken prior to discharge offsite in accordance with the AFJV – Water Discharge or Reuse Procedure for the following parameters and monitored on a daily basis. Refer to Table 13 for testing criteria for offsite discharge in accordance with the Blue Book. This criterion will only be used for water that is captured on the surface that has not encountered any potentially contaminated material or groundwater.

TABLE 13: CRITERIA FOR OFFSITE DISCHARGE OF SURFACE WATER

Parameter	Criterion	Method	Time prior to discharge
Oil and grease	None visible	Visual inspection	< 1 hour
pH	6.5 – 8.5	Probe/Meter	< 1 hour
Total Suspended Solids (TSS)	<50 mg/L	Meter/grab sample	< 1 hour/ <24 hours

In accordance with REMM SSWQ3, discharges from construction water treatment devices would be monitored to ensure compliance with the discharge criteria, as stated above. Discharges from the Construction Water Treatment Plants (WTP) is managed in accordance with the Groundwater Management Plan and Monitoring Program.

Where water captured on the surface has a risk of encountering contaminated material or contaminated groundwater, this captured surface water will be taken to the construction WTPs, prior to being treated and discharged off site in accordance with the Groundwater Monitoring Program and the Project EPL. 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.

The Surface Water Quality Monitoring Program, as included within Appendix D, will be implemented to monitor and potential impacts on surface water quality during construction in the surrounding receiving waterways.

Should offsite discharge be required, AFJV will be responsible for identifying and proposing suitable discharge points which are to be defined in the EPL, to be obtained for the CTP. This Plan will be revised to include any discharge points to be utilised by AFJV. Should AFJV obtain an EPL which contains additional discharge criteria, this SWMP will be revised to include this.

6.6 STORMWATER AND WATERWAY CROSSINGS

Permanent stormwater design and construction for the construction of Sydney Metro Project is not part of the CTP scope.

There are no surface waterway crossings in the CTP scope.

Apart from the port and wharf facilities at The Bays, which are not currently proposed to be utilised, there are no waterfront lands associated with the CTP works.

6.7 WASTE CLASSIFICATION AND OFFSITE DISPOSAL

The waste classification and disposal will be carried out in accordance with the AFJV's Waste Management Plan and Spoil Management Plan, which have been developed in accordance with relevant standards and requirements, including the NSW EPA (2014) Waste Classification Guidelines – Part 1: Classifying Wastes.

6.8 SOIL CONTAMINATION

6.8.1 POTENTIAL OR KNOWN CONTAMINATION AREAS

Contaminated soils are anticipated at some sites, such as The Bays, North Strathfield and Sydney Olympic Park. Prior to the commencement of soil excavation at all of the surface work sites, AFJV will complete Detailed Site Investigations (DSIs) and in situ waste classifications for all materials to be excavated in a manner documented in a Sampling Analysis and Quality Plan (SAQP). Areas of

potential contamination and (following completion of the DSIs) known contamination will be clearly identified within Environmental Control Maps (ECMs). ECMs will be updated during course of the CTP where additional contamination is confirmed.

Waste classification of all spoil material will be undertaken by specialist contamination consultants, following procedures in accordance with the NSW EPA Waste Classification Guidelines.

Completing in-situ waste classifications as part of the DSIs will be beneficial in reducing the need to temporarily stockpile contaminated materials on site. Additionally, the in-situ classification will allow strategic planning of excavation to minimise the risk of occupational health exposure, environmental harm and cross contamination.

Further waste classification will be undertaken during the excavation of spoil to provide appropriate detail for waste management.

Where required by the DSI and in consultation with the Site Auditor, Remedial Action Plans for specific sites may be developed.

6.8.2 CONTAMINATION MANAGEMENT PROCESS

The contamination management process is clearly defined as part of the Project conditions, including:

- D71: preparation of DSI
- D72: Preparation of Remedial Action Plan (RAP)
- D73: Site Audit Statement
- D74: Validation report
- D75: Site Audit Statement / Site Audit Report

The documentation required under these conditions above describes a step-wise process for the management of known and unknown contamination and is either written to the acceptance of, or prepared by, an independent NSW EPA Accredited Site Auditor, thus ensuring the appropriate management of contamination.

This process and the interaction of the documentation with the Site Auditor is clarified in Figure 4 below.

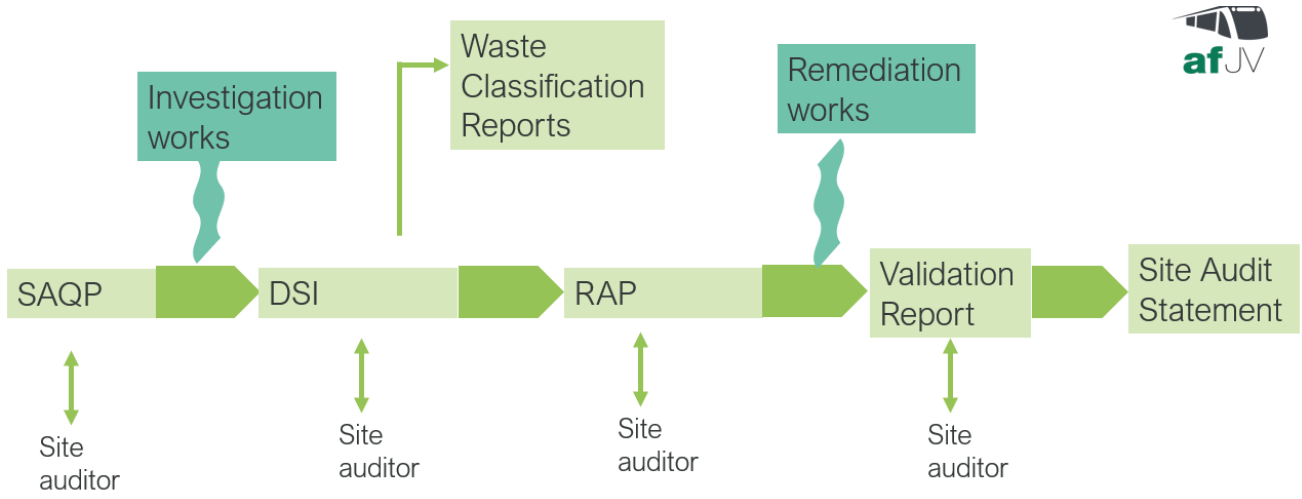

FIGURE 4: CONTAMINATION MANAGEMENT PROCESS

The completion of this process, if it is required, from the initial works (SAQP) to the completion of works (Site Audit Statement) is validated at all stages by the Site Auditor. Specific requirements for the management of contamination at each site is described in the RAP.

In accordance with CoA D76, a copy of DSIs, RAPs, Validation Report(s), Site Audit Report(s) and Site Audit Statement(s) will be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) for information.

At the completion of works, in accordance with CoA D75, Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report will be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) after remediation and before the commencement of operation of the Project.

6.8.3 CONTAMINATION MANAGEMENT ACTIONS

In accordance with CoA D77, an Unexpected Contaminated Land and Asbestos Finds Procedure has been prepared for the commencement of construction and will be followed should unexpected, contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction. This is included as **Appendix E**.

For the purposes of this plan AFJV are considering unexpected contamination or asbestos finds to be any contamination or asbestos found outside of what is described in the Detailed Site Investigation.

Any unexpected contaminated land or asbestos excavated would be assessed, managed and/or remediated in accordance with this Unexpected Contaminated Land and Asbestos Finds Procedure as well as the Waste Management Plan and Spoil Management Plan in the CEMP. These document detail appropriate waste classification and removal of material off-site and in accordance with its classification status to an EPA licenced facility or facility that can lawfully accept the waste.

Environmental controls/measures will be included on ECMs and PESCPs and implemented to manage and prevent the spread of contamination within and external form the CTP sites. Typical examples of controls/measures would include (although is not limited to), including those for the protection of workers and the public:

- Segregating contaminated material to minimise cross contamination (where safe to do so)
- Signposting of material types
- Securing of the area
- Covering material
- Implementing measures outlined within **Appendix F** of this plan for ASS/PASS
- Identifying reporting requirements, including requirements under the *Contaminated Land Management Act 1997*, when contamination is encountered
- Providing inductions and toolbox talks detailing the correct response when contaminated material is encountered

Where contamination is encountered, workers will apply the appropriate Personal Protective Equipment (PPE). The appropriate PPE will depend on the contaminant type and the works to be undertaken. Appropriate PPE will be decided upon in consultation with an Occupational Hygienist.

Additional detail for stockpiling management is also detailed in the Spoil Management Plan which forms part of the CEMP.

6.9 FLOODING

Potential flooding during the construction phase will be considered by the design team in the temporary works design, with appropriate safeguards implemented during construction. The construction of the CTP should have a negligible impact on flooding within the catchment, with minimal loss of flood storage and minimal changes or restrictions to existing flood regimes.

The majority of the CTP construction sites are at a low risk of flooding as the sites are generally located away from overland and mainstream flood areas and/or are at elevations above the effects of coastal inundation. The sites that are impacted by the 1% annual exceedance probability (AEP) flood event are only affected by minor, shallow overland flooding in the 1% AEP event. Some sites would also be affected by flooding in the probable maximum flood event.

Currently, there is the potential for a residual risk of flooding, after mitigation, at The Bays construction sites in the 1% AEP flood event and up to the probable maximum flood. This will be confirmed during the detailed design process for temporary works. As detailed in the Section 12.2(a)(xi) of the CEMF and CoA D10 and D11, stormwater and flooding management plans would be prepared for construction sites that have a residual risk of flooding after mitigation. These plans would:

- Identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks
- Develop procedures so that threats to human safety and damage to infrastructure are not exacerbated during the construction period.

If a stormwater and flooding management plan is required to be developed, consultation with the State Emergency Service (SES), SOPA and relevant Councils will be carried out in accordance with CoA D11, during the development of the management plan.

6.10 GROUNDWATER MANAGEMENT

The CTP surface construction activities are anticipated to have negligible impacts to the groundwater table and local groundwater hydrology. Some groundwater seepage into excavations may occur and will be managed as detailed in the Groundwater Management Plan of the CEMP. Contaminated groundwater will be investigated as part of the DSI and be managed in accordance with the RAPs (where relevant) and the Groundwater Management Plan and Groundwater Monitoring Program.

6.11 REFUELLING, CHEMICALS AND SPILL MANAGEMENT

AFJV will ensure hazardous chemicals and dangerous goods will be stored and used onsite in accordance with the mitigation measures identified in Table 12.

7. COMPLIANCE MANAGEMENT

7.1 PEOPLE, RESPONSIBILITIES AND COMMUNICATION

Refer to CEMP for full details on people, responsibilities and communication.

In addition to those listed in the CEMP for general environmental management, the AFJV may engage a suitably qualified soil conservationist to undertake review and certification of site erosion and sediment control plans and the implementation of erosion and sediment control on the sites. The Project soil conservationist would work collaboratively with the sites to develop effective management strategies for implementation and undertake routine (i.e., monthly) site inspections for compliance / verification inspections as required.

7.2 TRAINING

Refer to CEMP for full details on the delivery of soil and water management.

All personnel, including subcontractors, are required to attend a compulsory site induction that includes an environmental component, prior to commencement onsite. The environmental component will include an overview of:

- Relevant details of the CEMP including purpose and objectives
- Key environmental issues
- Due diligence, duty of care and responsibilities
- Conditions of environmental licences, permits and approvals
- Specific environmental management requirements and responsibilities
- Mitigation measures for the control of environmental issues
- Incident response and reporting procedures
- Contamination and Unexpected Finds.
- Maintenance of environmental controls (e.g. erosion and sediment controls);
- Water discharge and reuse procedure
- Communication protocols for interactions with the community and stakeholders.

The Environmental Manager (or delegate) will conduct the environmental component of the site induction.

A record of all environment inductions will be maintained and kept onsite. The Environmental Manager may authorise amendments to the induction and the Independent ER will review and endorse the induction program and monitor its implementation.

7.2.1 TOOLBOX TALKS AND AWARENESS

Toolbox talks will be scheduled weekly and used to raise awareness and educate personnel on construction related environmental issues during construction. They will include details of EWMS for relevant personnel.

The talks will be tailored to specific environmental issues including:

- Erosion and sedimentation control
- Emergency and spill response
- Vegetation clearing controls and protection
- Dust control.

Attendance at toolbox talks is mandatory and attendees are required to sign an attendance form. Attendance records are maintained.

7.2.2 DAILY PRE-START MEETINGS

The pre-start meeting is a tool for informing the workforce at each site of the day's activities, safe work practices, environmental protection practices, work area restrictions, activities that may affect the

works, coordination issues with other trades, hazards and other information that may be relevant to the day's work.

The Supervisor will conduct a daily pre-start meeting for the site workforce before the commencement of work each day (or shift) or where changes occur during a shift. Pre-start meetings may be project-wide and/or held for specific work areas. The environmental component of pre-starts will include any environmental issues that could potentially be impacted by, or impact on, the day's activities. All attendees will sign on to the pre-start and acknowledge their understanding of the issues explained.

7.3 MONITORING, INSPECTIONS & AUDITS

Review and confirmation of the implementation of soil and water quality management measures described in this document will be undertaken as part of the auditing and inspection regimes described in the CEMP. Site environmental inspections will include a check on the soil and water mitigation measures and the specific erosion and sediment controls implemented for the site.

Internal monitoring of Soil and Water will enable tracking against the objectives and targets established for this SMP. The frequency and responsibility for monitoring and inspection activities is detailed in Table 14.

TABLE 14: MONITORING AND INSPECTION

Item	Frequency	Standards	Responsibility
Site inspections	Weekly environmental inspections ER inspections to occur weekly with members of the AFJV site Environment Team unless otherwise agreed with the ER. Prior to any site closure of greater than 76 hours (i.e. anything longer than a long weekend) (Sydney Metro and DPIE inspections – monthly (TBC))	Effectiveness of PESCPs; Adequacy of spill response equipment; Appropriate management of contaminated materials in accordance with the DSI's, and any RAP's or site specific contamination management plans. Adequacy of waste segregation practices for waste classifications.	Environment Coordinator
Pre and Post Rainfall Inspections	Prior to major rainfall event forecasted (>20mm, in 24 hours) Following a rainfall event in any 24 hour period (>20mm),	Environmental inspection checklist Pre / Post rainfall inspection	Environment Coordinator
Surface water monitoring program	Refer to **Appendix D**	Refer to Appendix D	Environment Coordinator
Site Auditor Inspections	As determined by the Site Auditor	Compliance with the RAP	Site Auditor

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental mitigation and management measures, compliance with this SWMP and other relevant approvals, licenses and guidelines. Audit management is detailed in the CEMP.

The CTP specific water quality monitoring program as required under CoA 14 (c) is included in **Appendix D** to his SWMP.

Refer to the CEMP for more information on monitoring, inspections and audits.

7.4 REPORTING AND RECORDS

Refer to the CEMP for full details on reporting and record keeping requirements and processes.

In addition to any records listed in the CEMP, the following compliance records will be kept by AFJV:

- Register of all ESCP and their current revision status;
- Copies of current ESCPs for all active construction sites;
- Records of Environmental Inspections undertaken;
- Observations and works undertaken to repair and/or maintain soil and water management works;
- Records of Surface Water Discharge and Re-use Permits undertaken in accordance with the AFJV Water Discharge and Reuse Procedure;
- Records of water quality monitoring and results (refer to the Surface Water Monitoring Program);
- Records of unexpected Finds; and
- Records for contamination management, including soil classification, spoil tracking, disposal dockets, remedial action plans, occupational hygienist clearances, and Site Auditor sign-offs.

8. REVIEW AND IMPROVEMENT

8.1 CONTINUOUS IMPROVEMENT

The Soil and Water Management Plan forms part of the CEMP. Refer to the CEMP for the process on continuous improvement and Plan update and amendment.

In addition to the process on continuous improvement identified in the CEMP opportunities for improvement may arise through findings of the Project soil conservationist inspections, where undertaken, including a review of relevant plans and documentation to incorporate the recommendations and actions.

APPENDIX A OTHER CONDITIONS OF APPROVAL, REMMS AND CEMF REQUIREMENTS RELEVANT TO THIS PLAN

Minister's Conditions of Approval (11 March 2021) (SSI 10038)

Ref	Requirement	Where addressed
A6	Where the conditions 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 and a summary of the issues raised by them; (c) documentation of the follow-up with the identified party(s) where feedback has not been provided to confirm that the party(s) has none or has failed to provide feedback after repeated requests; (d) outline of the issues raised by the identified party(s) and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party(s) and the reasons why they have not been addressed.	Section 3.5 Appendix B
C12	C12 In addition to the relevant requirements of the CEMF, the Soil and Water CEMP Sub-plan must include, but not be limited to: (a) details of construction activities and their locations which have the potential to expose areas known to contain, or potentially contain, contaminated soils and / or materials; (b) measures for the handling, treatment and management of hazardous and contaminated soils and materials including measures to manage and / or minimise worker and public health and safety with regards to exposure to contamination; and (c) a description of how the effectiveness of the actions and measures for managing contamination impacts would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, and how the results of the monitoring would be recorded and reported.	Section 4.5 Section 6.8 Section 6.8
C18	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval	Appendix D
C19	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1 of this schedule. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase.	Appendix D
C20	Any of the Construction Monitoring Programs which require Planning Secretary approval must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase.	Appendix D
C21	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring	CEMP

Minister's Conditions of Approval (11 March 2021) (SSI 10038)		
	Programs and all relevant baseline data for the specific construction activity has been collected.	
C22	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), 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 or the ER (whichever is applicable), whichever is the greater.	Appendix D
C23	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER 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 D
D71	Before commencement of any construction that would result in the disturbance of moderate to high risk contaminated sites as identified in the documents identified in Condition A1 of this schedule, Detailed Site Investigations (for contamination) must be conducted to determine the full nature and extent of the contamination. The Detailed Site Investigation Report(s) and the subsequent report(s), 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 Detailed Site Investigations must be undertaken in accordance with guidelines made or approved under section 105 of Contaminated Land Management Act 1997 (NSW). The Detailed Site Investigation for Sydney Olympic Park metro construction site must be prepared in consultation with SOPA. Note: Nothing in this condition prevents the Proponent from preparing individual Detailed Site Investigation Reports (for contamination) for separate sites.	Section 6.8 Detailed Site Investigation (DSI) reports, once complete.
D72	Should remediation be required to make land suitable for the final intended land use, a Remedial 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 (NSW) 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 for Sydney Olympic Park metro construction site must be prepared in consultation with SOPA. Note: Nothing in this condition prevents the Proponent from preparing individual Remedial Action Plans for separate sites.	Section 6.8 Remediation Action Plans (RAPs) once complete.
D73	Before commencing remediation, a Section B Site Audit Statement(s) must be prepared by an NSW EPA-accredited Site Auditor that certifies that the Remedial Action Plan(s) is/are appropriate and that the site can be made suitable for the proposed use. The Remedial Action Plan(s) must be implemented and any changes to the Remedial Action Plan(s) must be approved in writing by the NSW EPA-accredited Site Auditor. Note: Nothing in this condition prevents the Proponent from engaging an NSW EPA-accredited Site Auditor to prepare individual Site Audit Statements for Remedial Action Plans for separate sites.	Section 6.8 Site Audit Statements once complete.

Minister's Conditions of Approval (11 March 2021) (SSI 10038)		
D74	Validation Report(s) must be prepared in accordance with Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA, 2020) and relevant guidelines made or approved under section 105 of the Contaminated Land Management Act 1997 (NSW). Note: Nothing in this condition prevents the Proponent from preparing individual Validation Reports for separate sites.	Section 6.8 Validation Reports once complete
D75	A Section A1 or Section 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, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI. Note: Nothing in this condition prevents the Proponent from obtaining Section A Site Audit Statements for individual parcels of remediated land.	Section 6.8 Site Audit Statements once complete.
D76	A copy of Detailed Site Investigation Report(s), Remedial Action Plan(s), Validation Report(s), Site Audit Report(s) and Site Audit Statement(s) must be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) for information.	Section 6.8
D77	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared before the commencement of construction and must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction.	Section 6.8 Appendix E
D79	A Water Reuse Strategy must be prepared, which sets out options for the reuse of collected stormwater and groundwater during Stage 1 of the CSSI. The Water Reuse Strategy must include, but not be limited to: (a) evaluation of reuse options; (b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required; (c) measures to avoid misuse of recycled water as potable water; (d) consideration of the public health risks from water recycling; and (e) time frame for the implementation of the preferred reuse option(s). The Water Reuse Strategy must be prepared based on best practice and advice sought from relevant agencies, as required. The Strategy must be applied during construction. Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be made publicly available. Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction phases of Stage 1 of the CSSI.	Section 6.3 Water Reuse Strategy
D115	Work on waterfront land must be carried out in accordance with controlled activity guidelines	Section 3.4
D116	Before undertaking any works and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with LandCom's Managing Urban Stormwater series (The Blue Book).	Section 6.2
D117	Stage 1 of the CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO 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	Section 6.5 Groundwater Monitoring Program

Minister's Conditions of Approval (11 March 2021) (SSI 10038)		
	contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with.	
D118	Unless an EPL is in force in respect to Stage 1 of the CSSI and that licence specifies alternative criteria, discharges from wastewater treatment plants to surface waters must not exceed: (a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (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 2000 (ANZECC/ARMCANZ); and (c) for bio accumulative and persistent toxicants, the ANZG (2018) guidelines 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 6.5 Groundwater Monitoring Program
D119	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 6.5 Groundwater Monitoring Program
D120	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be carried out in accordance with relevant guidelines and designed by a suitably qualified and experienced person.	Section 6.6

REMM No.	REMM Requirement	Where addressed
Property and land use		
LU1	"Except where required for subsequent construction activities associated with future stages of the Concept, temporary use areas for construction purposes would be stabilised and appropriately rehabilitated as soon as feasible and reasonable following completion of construction. This would be carried out in consultation with the relevant landowner."	Section 6.1
GW1	"Site inspection would be carried out on private domestic supply bore GW305646 to confirm the current viability of that bore. If found to be viable	GWMP
GW2	"A review of additional geotechnical and hydrogeology data would be undertaken to confirm the geological and groundwater conditions and determine, based on these local conditions, whether predicted groundwater drawdown from Stage 1 is likely to occur in the vicinity of these creeks. Where the additional data review shows local conditions and predicted groundwater drawdown are likely to cause surface water/groundwater interaction, then additional site investigations (in accordance with GW3) would be undertaken for those creeks or surface water bodies."	GWMP
GW3	Additional site investigations would be carried out at creeks or surface water bodies where the additional data review in GW2 shows there is a likely surface water/groundwater interaction. This would involve baseline monitoring of creek flows (streamflow gauging) prior to construction, and baseflow streamflow analysis to confirm the existing groundwater baseflow contribution to	GWMP

REMM No.	REMM Requirement	Where addressed
	streamflow for each creek. Where a significant reduction in baseflow is predicted due to Stage 1, design responses would be implemented at station and shaft excavations to reduce potential baseflow loss.	
GW4	"Monitoring of groundwater levels and quality at the site area would occur before, during and after construction. This would also include monitoring of potential contaminants of concern. Groundwater level data would be regularly reviewed during and after construction by a qualified hydrogeologist. Groundwater monitoring data would be provided to the NSW Environment Protection Authority and Department of Planning, Industry and Environment and the Natural Resources Access Regulator for information."	GWMP
GW5	"A detailed geotechnical and hydrogeological model for Stage 1 would be developed and progressively updated during design and construction. The detailed geotechnical and hydrogeological model would include: • Assessment of the potential for damage to structures, services, basements and other sub-surface elements through settlement or strain • Predicted groundwater inflows, groundwater take and changes to groundwater levels including at nearby water supply works. • Where building damage risk is rated as moderate or higher (as per the CIRIA 1996 risk-based criteria), a structural assessment of the affected buildings/structures would be carried out and specific measures implemented to address the risk of damage. • Where a significant exceedance of target changes to groundwater levels are predicted at surrounding land uses and nearby water supply works, an appropriate groundwater monitoring program would be developed and implemented. The program would aim to confirm no adverse impacts on groundwater levels or to appropriately manage any impacts. Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner."	GWMP
GW6	Condition surveys of buildings and structures in the vicinity of the tunnel and excavations would be carried out prior to the commencement of excavation at each site.	CEMP – Section 4.1
Soils		
SSWQ1	"Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998)."	Section 4.4 Appendix F
SSWQ2	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC, 2008). Erosion controls would be implemented in accordance with the 'Blue Book' (Landcom, 2004).	Section 4.3
Surface Water Quality		
SSWQ3	"Erosion and sediment measures would be implemented at all construction 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, Climate Change and Water 2008), commonly referred to as the 'Blue Book'. Additionally, any water collected from construction sites would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts.	Section 6.2

REMM No.	REMM Requirement	Where addressed
	Temporary sediment basins would be designed in accordance with Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction (DECC, 2008)."	
SSWQ5	The water treatment plants would be designed so that wastewater is treated to a level that is compliant with the ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines for 95 per cent species protection and 99 per cent species protection for toxicants that bioaccumulate unless other discharge criteria are agreed with relevant authorities.	Section 6.5
SSWQ6	A surface water monitoring program would be implemented to observe any changes in surface water quality that may be attributable to Stage 1 and inform appropriate management responses. The program would be developed in consultation with the EPA and relevant Councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the WestConnex M4 East monitoring. Monitoring would occur during pre-construction and during construction at all waterways with the potential to be impacted. Monitoring sites could be located upstream and downstream of the potential discharges and would include sampling for key indicators of concern.	**Appendix D** Section 3.5
SSWQ7	Further design development would confirm the local stormwater system capacity to receive construction water treatment plant inflows. In the event there is a stormwater infrastructure capacity issue with existing infrastructure, mitigation measures such as storage detention to control water outflow during wet weather events would be implemented.	GWMP
Hydrology and Flooding		
HF1	"Detailed construction planning would consider flood risk at construction sites. This would include: • Identification of measures to not worsen flood impacts on the community and on other property and infrastructure during construction up to and including the one per cent AEP flood event • Provide flood-proofing to excavations at risk of flooding or coastal inundation during construction, where feasible and reasonable, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure • Review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required. This includes design of site hoardings to minimise disruption to flow paths (if possible). Not worsen is defined as: • A maximum increase in flood levels of 50mm in a one per cent AEP flood event • A maximum increase in time of inundation on one hour in a one per cent AEP flood event • No increase in potential soil erosion and scouring from any increase in flow velocity in a one per cent AEP flood event."	Section 4.9
HF4	Drainage at construction sites would be designed, where feasible and reasonable, to mitigate potential alterations to local runoff conditions due to construction sites.	Temporary Works Design Report
HF5	Detailed construction planning for The Bays Station construction would aim to minimise changes to existing levels in relation to potential impacts on flood behaviour, along the north-western side of site adjacent to low-lying property, to minimise reduction in floodplain storage.	Temporary Works Design Report

REMM No.	REMM Requirement	Where addressed
HF7	Construction planning regarding flooding matters would be carried out in consultation with the NSW State Emergency Service and the relevant local council.	Section 3.5
HF8	Detailed construction planning for The Bays Station construction site would aim to avoid conflicts with the potential construction of flood mitigation works in Robert Street, Rozelle in consultation with Inner West Council.	Section 3.5
Air Quality		
AQ1	"The following best-practice dust management measures would be implemented during all construction works: • Regularly wet-down exposed and disturbed areas including stockpiles, especially during dry weather • Adjust the intensity of activities based on measured and observed dust levels and weather forecasts • Minimise the amount of materials stockpiled and position stockpiles away from surrounding receivers • Regularly inspect dust emissions and apply additional controls as required • Consider all relevant measures listed in the UK IAQM corresponding to the highest level of risk determined around each Stage 1 construction site.	Air Quality Management Plan Section 6.1 Appendix C
Spoil, waste management and resource use		
WR2	"A hazardous material survey would be completed for those buildings and structures suspected of containing hazardous or special waste materials (particularly asbestos) prior to their demolition. If hazardous waste or special waste (e.g. asbestos) is encountered, it would be handled and managed in accordance with relevant legislation, codes of practice and Australian standards."	Waste Management Plan

APPENDIX B CONSULTATION

Condition of Approval A6 Evidence – Spoil Management Plan

In accordance with C5(c) and C14(c) the Soil and Water Management Plan and Surface Water Monitoring Program were prepared in consultation with the following government agencies and stakeholders:

- DPIE EES
- DPIE Water
- Sydney Olympic Park Authority
- Inner West Council
- City of Canada Bay Council
- Burwood Council
- Strathfield Municipal Council
- City of Parramatta Council
- Sydney Water (if affected)

The attached supporting evidence has been included to demonstrate compliance with Condition of Approval (CoA) A6 in the development of the Soil and Water Management Plan and Surface Water Monitoring Program.

The Soil and Water Management Plan and the Surface Water Monitoring Program were provided to the required agencies and stakeholders for consultation as follows:

CoA C5(e) Soil and Water Management Plan Consultation and C14(c) Surface Water Monitoring Program Consultation		
Government Agency/Stakeholder	**Date consulted**	**Date of Response**
Sydney Olympic Park Authority	20/08/2021	08/09/2021
Inner West Council	20/08/2021	10/09/2021
City of Canada Bay Council	20/08/2021	30/08/2021
Burwood Council	20/08/2021	13/08/2021
Strathfield Municipal Council	20/08/2021	No comments received
City of Parramatta Council	20/08/2021	No comments
Sydney Water	20/08/2021	06/09/2021
DPIE EES	20/08/2021	06/09/2021
DPIE Water	20/08/2021	No response received

REVIEW COMMENTS SHEET

DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	COMMENTS / RESPONSE
27/08/2021	CCB	JEARLS	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Please investigate the impact of the Burwood North ground water management with regard to the harvesting of base water flows in the St Lukes stormwater Canal. Please provide your strategy to prevent impacts to Council's ability to harvest water.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	It is stated in the EIS that there will not be a significant impact on groundwater affected baseflows in St Lukes Stormwater Canal and currently there is no change in design and construction that indicates a change to this outcome. In accordance with CoA D122 a revised Groundwater Modelling Report will be completed and submitted to the DPIE prior to bulk excavations at each site. Following preparation of the Groundwater Modelling Report AFJV we will review the potenital impacts and compare with the outcomes of the EIS. Where a worsening of impacts is identified the AFJV will review design options to reduce potential impact on the St Luke's Stormwater Canal to be consistent with EIS outcomes.
27/08/2021	CCB	JEARLS	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Please assess your stormwater/ ground water drainage requirements as you are required to achieve an approval under section 68 of the LGAct to connect to Council's stormwater drainage systems.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Requirements to connect with Councils stormwater drainage systems are still being confirmed as part of site layout design. AFJV acknowldges this requirement and wherever a utilites approval is required across the Project this will be managed through the Projects Utility Coordination Manager, a mandated role required as per CoA D101.
6/09/2021	ENV	SHARRISON	SMWSTCTP-AFJ-1NL-PE-PLN-000003	The SWMP notes that “stormwater and flooding management plans would be prepared for construction sites at risk of flooding” and concludes that “a stormwater and flooding management plan will be prepared for The Bays Station construction site”. This conclusion needs to be updated to state that management plans would be prepared for eachrelevant service facility and tunnel support facility. An overarching plan should indicate which facilities are flood affected and require management plans.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	The Bays site is the only site that has been identified as being significantly affected by flooding in the EIS and therefore the only site that is required to have a stormwater and flooding management plan in accordance with the CEMF. The current wording in the SWMP states "The majority of the CTP construction sites are at a low risk of flooding as the sites are generally located away from overland and mainstream flood areas and/or are at elevations above the effects of coastal inundation. The sites that are impacted by the 1% annual exceedance probability (AEP) flood event are only affected by minor, shallow overland flooding in the 1% AEP event. Some sites would also be affected by flooding in the probable maximum flood event. There is residual risk of flooding, after mitigation, at The Bays Station construction sites in the 1% AEP flood event and up to the probable maximum flood. As detailed in the Construction Environmental Management Framework (CEMF), stormwater and flooding management plans would be prepared for construction sites at risk of flooding".
10/09/2021	IWC	DCROSBY	SMWSTCTP-AFJ-1NL-PE-PLN-000003	You mention there will be ongoing reporting. Will there be any remediation reports made available at the end of the works?

DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	COMMENTS / RESPONSE
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Yes, as required under CoA D75 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report must be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI. Further, CoA D76 requires Detailed Site Investigation Report(s), Remedial Action Plan(s), Validation Report(s), Site Audit Report(s) and Site Audit Statement(s) to be provided in a similar fashion. These requirements are addressed in Section 6.7
10/09/2021	IWC	DCROSBY	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Also, page 1 of the Acid Sulphate Soil section is missing the project title and there is a formatting error in various tables and sections.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Noted. Formating errors have been reviewed and rectified throughout.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Please clarify the extent of any groundwater wells that are to beinstalled within the construction footprint to assess groundwaterquality that is to affect Sydney Water Assets, and the associatedtrigger levels and action plans
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	The Groundwater Management Plan and Groundwater Monitoring Program addresses groundwater aspects. The environmental Groundwater Monitoring Program identifies current proposed monitoring bores locations for ongoing monitoring throughout construction. However, these locations may be altered or additional bores identified as a result of the updated Groundwater Modelling Report that is required by the CoA D122.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	What are the roles and responsibilities of the project team fromproject director to project engineer in managing soil and wateraffecting Sydney Water assets
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	The main body of the CEMP outlines the roles and responsibilities for the project. As this is a sub-plan to the CEMP, it is not proposed to duplicate this information. The roles and responsibilities outlined in this sub-plan are those that are additional to the main roles described in the CEMP, which are specifically related to the SWMP. CoA D102 conditions that a Utility Coordination Manager must be appointed for the duration of the Project. They will be responsible for any interaction with Sydney Water assets. This role is identified in the CEMP. There will also be a AFJV Interface Manager who will also be available to facilitate the interface with Sydney Water.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Section 3.5 Sydney Water not listed in bullet points. Many assetsoutlined in the report are SWCs assets.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	The first and second paragraphs of Section 3.5 reference consultation requirements with Sydney Water; we have now also included Sydney Water in the dot points.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Cross reference in Table 1 requires updating ?Page 2?.General sweepof referencing required as a number of error flags appearing withinthe document.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Amended throughout.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	There appears to be an error on Page 5 of the document as the firstpage of the Project Planning Approval Conditions table appearsblank? Similarly, there is missing text/references in the same table onPage 7.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	This error could not be identified in the word document to enable a fix, however AFJV will review pdf formatting on the revised document prior to submission for approval.

DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	COMMENTS / RESPONSE
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	Ministers Conditions of Approval and REMM no. tables ?Page 42 - 47?- the "where addressed" sections point to sections of the report thatcurrently dont cover these items.Is the intent that these are coveredin separate reports or future versions of this report.E.g.: - D79 Water Reuse Strategy - Reference is made to Section 6.3, butthis Section does not cover the elements of this condition. - HF1 - Measures not to worsen flood impacts are not defined inSection 4.9 ?this section covers only existing flood risk?.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Included reference to the Water Reuse Strategy in the table and added more detail into the table and the referenced sections to ensure the relevant compliance elements are more clear. Note where another document addresses the requirements (such as the Water Reuse Strategy) the information will not be replicated into this document, as this causes potential errors should the source document be updated. The content will only be copied across in the case that this content is mandated for inclusion under the CoAs.
6/09/2021	SYW	HSHABILLA	SMWSTCTP-AFJ-1NL-PE-PLN-000003	There's no indication of what Sydney Water land the project may beinteracting with or impacting upon at this stage. If the projectinvolves works on any Sydney Water owned land then Sydney watercan advise on any potential risks to Sydney Water in relation toasbestos or contaminated land. At this stage, the contaminationsections 4.5, 6.7 and Appendix E look appropriate for a high-leveldocumention.
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Noted. The consultation interface with Sydney Water will be available throughout construction through the Utilities Coordination Manager and the Project Interface Manager. Where impacts on Sydney Water land are identified these will be managed in consultation with Sydney Water. Additional wording has been added to Section 3.5 to address this comment.
1/09/2021	SOA	SHAMILTON	SMWSTCTP-AFJ-1NL-PE-PLN-000003	The document is very high level and doesn't provide detailed site-specific information specific to stormwater management at Sydney Olympic Park as would normally be expected in a Soil and Water Management Plan - Comment by HD
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	The SWMP is intended to a high level document which discusses the overall approach, including additional investigations and procedures to soil and water management. Management of stormwater, meaning both the runoff of precipitation from site and any discharge of water into the stormwater system, will be managed on a site-specific basis through the Temporary Works Design and Site Layout Plans (which identifies the site drainage system), the Progresssive Erosion and Sediment Control Plans, and site specific Environmental Control Maps. Futher detail explaining the above has been included in Appendix C, Section 6.2, 6.3, and 7.2. There are also additional requirements for the management of discharge water quality as required under CoA D117, D118, and D119 which are described in Section 6.2, 6.4 and 6.5.
1/09/2021	SOA	SHAMILTON	SMWSTCTP-AFJ-1NL-PE-PLN-000003	The document incorrectly identified Haslams Creek as the receiving waters for stormwater runoff and discharge of water from the Sydney Olympic Park site. The receiving waters are the Northern Water Feature. This is a constructed freshwater wetland that is known habitat for the endangered Green and Golden Bell Frog. Neither the Soil and Water Management Plan nor the Flora and Fauna Management Plan consider management of risks to this species posed by stormwater discharge from the construction site.- Comment by HD

DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	COMMENTS / RESPONSE
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	AFJV were unaware that the stormwater run-off from the whole of Sydney Olympic Park is all directed to the Northern Water Feature (noting that the EIS does not state this; the EIS says that stormwater is discharged to Haslams Creek). As such, AFJV have updated the SWMP and GWMP following this comment to now state that all stormwater in the vicinity of the SOP site is directed to the Northern Water Feature which is understood subsequently discharges into Haslams Creek. In addition, the EIS did not identify any impact on GGBF habitat however any stormwater discharge requirements will need to comply with the EPL, which will be based on a Water Pollution Impact Assessment as required in CoA D119. This Water Pollution Impact Assessment is prepared in consideration of the existing water quality of the receiving waters, and guides the criteria to prevent water quality impacts. In the same manner, unless the EPL specifies otherwise, any groundwater discharge from the Water Treatement Plants needs to comply with the requirements of CoA D118, which sets a standard minimum compliance of water quality criteria which considers 95% species protection level (or 99% for bioaccumulative or persistent toxicants). Detail on compliance with this requirements is described in the Groundwater Monitoring Program.
1/09/2021	SOA	SHAMILTON	SMWSTCTP-AFJ-1NL-PE-PLN-000003	The document notes that while gypsum will be the flocculant usually used, other flocculants may be used to meet particular water quality standards. Because of the ecological sensitivity of the receiving waters, gypsum is the only flocculant that should be used at this site. Sydney Olympic Park Authority does not permit use of allum flocculants within the Park.- Comment by HD
			SMWSTCTP-AFJ-1NL-PE-PLN-000003	Gypsum will be the default flocculant for all surface water treatment, however Water Treatment Plants which process groundwater are required to treat numerous physical and chemical properties of discharge water, and are therefor required to use different methodology. As per the response to the comment above, discharge water must be compliant with D118 (groundwater) and D119 (surface water) which provides stringent criteria and includes consideration of receiving waterways. As AFJV are developing detailed design of WTP and finalisng water quality dischrge criteria to be incporated in the Project EPL, AFJV would welcome consultation with SOPA on this matter.

Gregor Wilson

From:	Dylan Porter <Dylan.Porter@burwood.nsw.gov.au>
Sent:	Monday, 13 September 2021 3:21 PM
To:	Erran Woodward
Cc:	Lorryn Williamson; ankur.arora@transport.nsw.gov.au
Subject:	Re: Comments on Environmental Documents.
Attachments:	image001.png

Hi Erran

We will be providing comment for the Heritage Management plan abs noise and vibrant job plans. No comments on the others.

Regards ,

Dylan Porter
Director City Strategy
T: 02 9911 9850
E: Dylan.Porter@burwood.nsw.gov.au
2 Conder Street, Burwood, NSW, 2134

On 13 Sep 2021, at 2:58 pm, Erran Woodward <Erran.Woodward@ctp-afjv.com.au> wrote:

Hi Dylan,

Following my email last week, can you please confirm if Burwood Council will be providing comment on the following documents, provided for the Sydney Metro West Central Tunnelling Package:

- Noise and Vibration Management Plan and Monitoring Program
- Flora and Fauna Management Plan
- Soil and Water Management Plan including Surface Water Monitoring Program
- Heritage Management Plan
- Spoil Management Plan.

Your response would be appreciated as soon as possible if one is to be provided, as the consultation and review phase has now been completed.

Thanks,
ew

Erran Woodward
Environmental Approvals Manager
Acciona Ferrovial Joint Venture

Sydney Metro West
Central Tunnelling Package
+61 437 343 178

On 13 Sep 2021, at 2:58 pm, Erran Woodward <Erran.Woodward@ctp-afjv.com.au> wrote:

Hi Dylan,

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- Soil and Water Management Plan including Surface Water Monitoring Program
- Heritage Management Plan
- Spoil Management Plan.

Your response would be appreciated as soon as possible if one is to be provided, as the consultation and review phase has now been completed.

Thanks,
ew

Erran Woodward
Environmental Approvals Manager
Acciona Ferrovial Joint Venture

Sydney Metro West
Central Tunnelling Package
+61 437 343 178

From: Paul Dewar
To: Lorryn Williamson
Subject: Environmental Management Plans - SMW - CTP
Date: ay, 30 August 2021 6:50:56 PM
Attachments: f0a4b2.PNG
7b4215.PNG
ca5472.PNG
e1c1a8.PNG
5d77f7.PNG
of AFJV Comments Review sheet - FFMP.xlsx
Comments Review sheet - Soil & Water.xlsx
Comments Review sheet - Spoil .xlsx
Comments Review sheet - Surface Water Monitoring Program.xlsx
- AFJV Comments Review sheet - Heritage.xlsx

Hi Lorryn

Thank you for providing Council with the opportunity to provide feedback on the Environmental Management Plans for the tunnel and stations excavation associated with Sydney Metro West.

Should I receive any further feedback, I will send it through.

Regards

Paul

Paul Dewar | Manager, Strategic Planning
City of Canada Bay

1a Marlborough St Drummoyne NSW 2047 | www.canadabay.nsw.gov.au
T: 02 9911 6402 | Paul.Dewar@canadabay.nsw.gov.au

Our ref: DOC21/732097
Senders ref: SSI-10038

John Ieroklis
Sydney Metro West
PO Box K659
HAYMARKET NSW 1240

Attention: Lorryn Williamson - Acciona Ferrovial Joint Venture (AFJV)

Dear Mr Ieroklis

Subject: EES comments on Sydney Metro West Project – Stage 1 - Central Tunnel Package SSI-10038 – Soil and Water Management Plan - between The Bays and Sydney Olympic Park

I refer to the email received on 20 August 2021 requesting comments on the draft Soil and Water Management Plan (SWMP) for the Sydney Metro West Project – Central Tunnel Package.

The Environment, Energy and Science Group (EES) has reviewed the draft SWMP and provides the following comments.

The SWMP notes that “stormwater and flooding management plans would be prepared for construction sites at risk of flooding” and concludes that “a stormwater and flooding management plan will be prepared for The Bays Station construction site”. This conclusion needs to be updated to state that management plans would be prepared for each relevant service facility and tunnel support facility. An overarching plan should indicate which facilities are flood affected and require management plans.

If you have any queries regarding this matter, please contact Janne Grose, Senior Conservation Planning Officer on 02 8837 6017 or at janne.grose@environment.nsw.gov.au.

Yours sincerely

S. Harrison

06/09/21

Susan Harrison
Senior Team Leader Planning
Greater Sydney Branch
Biodiversity and Conservation Division

CC: Matthew Todd-Jones – Department of Planning, Industry and Environment

Erran Woodward

From: Matthew Marrinan <Matthew.Marrinan@transport.nsw.gov.au>
Sent: Monday, 20 September 2021 9:15 AM
To: nrar.servicedesk@dpie.nsw.gov.au
Cc: Stuart Hodgson; John Ieroklis; Matthew Todd-Jones; Lorryn Williamson; Erran Woodward; Michael Woolley
Subject: Re: Sydney Metro West - CTP documentation review

Dear NRAR Service Desk,

As of this morning the review of the Central Tunnelling Package (CTP) documentation for Sydney Metro West is closed. You were provided two documents on 20 August 2021:

- The AFJV Surface Water Monitoring Program; and
- The AFJV Groundwater Monitoring Program.

During the time period for the review we did not receive any comments from you, but made inquiries in relation to whether there is a point of contact outside the Service Desk, and the email below requesting your comments urgently if you intend to make some. As we have not heard from you, we are now assuming there is no intent to make comment on the documentation.

We understand you may have other priorities at this time and if you would like to discuss Sydney Metro West with me in the future, please get in touch via my contact details below.

Kind regards,

Matthew Marrinan
Senior Manager Environment
Sydney Metro West
Transport for NSW

M 0475 966 938
Level 40, 680 George Street, SYDNEY 2000
PO Box K659, HAYMARKET NSW 1240

From: Matthew Marrinan
Sent: Thursday, September 9, 2021 2:27 PM
To: nrar.servicedesk@dpie.nsw.gov.au <nrar.servicedesk@dpie.nsw.gov.au>
Cc: Stuart Hodgson <Stuart.Hodgson@transport.nsw.gov.au>
Subject: Sydney Metro West - CTP documentation review

Dear NRAR Service Desk,

Recently Sydney Metro provided documentation through the service desk with respect to Sydney Metro West and the review of two Monitoring programs under Planning Approval SSI 10038.

These documents related to our Central Tunnelling Package (CTP) and the review under Condition C14 for the Surface Water Quality and Groundwater Monitoring Programs produced by Acciona Ferrovial JV (AFJV).

I am following up with you because we have not received any comments at this stage and the review period has expired.

Could you please get in touch with me urgently if it is still your intention to provide Sydney Metro with comments on these documents?

Kind Regards,

Matthew Marrinan
Senior Manager Environment
Sydney Metro West
Transport for NSW

M 0475 966 938
Level 40, 680 George Street, SYDNEY 2000
PO Box K659, HAYMARKET NSW 1240

Erran Woodward

From: David Crosby <david.crosby@innerwest.nsw.gov.au>
Sent: Friday, 10 September 2021 2:40 PM
To: Erran Woodward
Cc: Ken Welsh; Lorryn Williamson; Ankur Arora
Subject: RE: Pending comments from Inner West Council

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Erran

Please see below our comments:

Flora and Fauna Management Plan:

- Section 6.2 states that pre-clearance inspections should be undertaken prior to clearing of native vegetation. As native wildlife also use non-native vegetation for nesting and roosting and other purposes pre-clearance inspections should be undertaken prior to non-native and native vegetation clearance.
- The wharf/jetty infrastructure in White Bay is possible roosting habitat for *Myotis Macropus* (fishing bats) so this infrastructure needs to be inspected/surveyed by qualified ecologist prior to any demolition/disturbance.
- To reduce impacts on various native wildlife best practice lighting guidelines should be followed for any temporary or permanent lighting – see Appendix A of the National Light Pollution Guidelines for Wildlife - https://www.environment.gov.au/biodiversity/publications/national-light-pollution-guidelines-wildlife

Spoil Management Plan:

- Is there a way to ensure that the council streets will be cleaned? Which council street will be impacted the most (i.e. what streets around the tunnel dive site at The Bays?)

Soil and Water Management Plan:

- You mention there will be ongoing reporting. Will there be any remediation reports made available at the end of the works?
- Also, page 1 of the Acid Sulphate Soil section is missing the project title and there is a formatting error in various tables and sections.

Noise and Vibration Monitoring Plan:

- At The Bays, would there be any cumulative noise and vibration effects from the Eastern tunnel package that need to be considered?
- Have other major projects' CEMPs been considered in these Central Tunnelling CEMPs?

I'm yet to hear back on the Heritage Management Plan, but I'll let you know next week on that one.

Regards

David Crosby
Road Access Project Engineer
p +61 2 9392 5650 e david.crosby@innerwest.nsw.gov.au

Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.

From: Erran Woodward <Erran.Woodward@ctp-afjv.com.au>
Sent: Friday, 10 September 2021 1:58 PM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Ken Welsh <Ken.Welsh@innerwest.nsw.gov.au>; Lorryn Williamson <Lorryn.Williamson@ctp-afjv.com.au>; Ankur Arora <Ankur.Arora@transport.nsw.gov.au>
Subject: Pending comments from Inner West Council

> Some people who received this message don't often get email from erran.woodward@ctp-afjv.com.au. Learn why this is important

Hi David,

I reached out via phone this morning to follow up on comments on documents provided to Inner West Council for review for the Sydney Metro West Central Tunnelling Package project.

To date the Acciona Ferrovial Joint Venture has provided the following documents to Inner West Council for their opportunity to comment:

- Noise and Vibration Management Plan including Monitoring Program
- Flora and Fauna Management Plan
- Soil and Water Management Plan including Monitoring Program
- Heritage Management Plan
- Spoil Management Plan

Could you please confirm if Council is intending on providing comment on these documents, as the review period has now reached completion.

Thanks,
ew

Erran Woodward
Environmental Approvals Manager
Acciona Ferrovial Joint Venture

Sydney Metro West
Central Tunnelling Package
+61 437 343 178

From: Kerry Darcovich
To: Julie Currey
Subject: FW: TRIMs: METRO TUNNELLING CEMP - KD review
Date: esday, 22 September 2021 12:11:48 PM
Attachments: Comments Review sheet - Template.xlsx

From: Kerry Darcovich
Sent: Wednesday, 1 September 2021 4:16 AM
To: Richard Seaward <Richard.Seaward@sopa.nsw.gov.au>
Cc: Sally Hamilton <Sally.Hamilton@sopa.nsw.gov.au>; Vivienne Albin <Vivienne.Albin@sopa.nsw.gov.au>; Julie Currey <Julie.Currey@sopa.nsw.gov.au>
Subject: TRIMs: METRO TUNNELLING CEMP - KD review

Hi Richard – please see my comments in the attached spreadsheet, also in the directory. I have not added in my comments previously provided re the Flora and Fauna report

I don't want a further meeting with AFJV- I just want to see the missing information.

Kerry

From: Richard Seaward <Richard.Seaward@sopa.nsw.gov.au>
Sent: Thursday, 26 August 2021 1:29 PM
To: Kerry Darcovich <Kerry.Darcovich@sopa.nsw.gov.au>; Julie Currey <Julie.Currey@sopa.nsw.gov.au>; Hassan Narimani <Hassan.Narimani@sopa.nsw.gov.au>; David Martin <David.Martin@sopa.nsw.gov.au>; Andrzej Listowski <Andrzej.Listowski@sopa.nsw.gov.au>; Stephen Kennett <Stephen.Kennett@sopa.nsw.gov.au>; Michael Copping <Michael.Copping@sopa.nsw.gov.au>; Susan Skuodas <Susan.Skuodas2@sopa.nsw.gov.au>; Grant Sutcliffe <Grant.Sutcliffe@sopa.nsw.gov.au>
Cc: Sally Hamilton <Sally.Hamilton@sopa.nsw.gov.au>; Vivienne Albin <Vivienne.Albin@sopa.nsw.gov.au>; John Ferguson <John.Ferguson@sopa.nsw.gov.au>
Subject: METRO TUNNELLING CEMP

<< File: AFJV Comments Review sheet - Template.xlsx >>

X:\Metro Tunnelling Conditions

Dear all,

Further to our meeting with AFJV please see the link to the management plans. The planning condition tracker and consent is also in the file

Please could you review the management plans and let me know if you have any comments by

st

Tuesday 31 / as discussed we can request a further meeting with AFJV once you have reviewed the plans – please let me know before Tuesday if you would like this?.

If you need to refer back to the SSI – please follow the link:
https://www.planningportal.nsw.gov.au/major-projects/project/25631

DPIE Reference: SSI-10038

If you haven't already provided comments – **please could you provide them on the AFJV Comments Review Excel sheet attached** (also saved in the X:drive folder) CC'ing Vivienne and Sally

Kerry – noted we have received your comments on F&F – the heritage noise and groundwater plans are now available.

Julie and Hassan- noted your comments received on the Spoil Management. Other reports are now available for your Review

Regards

Richard Seaward
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We acknowledge the Wangal as the first Custodians of the land, air and waters now known as Sydney Olympic Park. We pay respect to all First Nations People and our community Elders past, present and emerging.

PROJECT NO	AFJV_SMWCJV	PHONE	
PROJECT	Sydney Metro West Central Tunnelling Package	FAX	
COMPANY	Acciona Ferrovial Joint Venture	REF	WDR#0021

Working Document Review

STATUS FOR REVIEW

ISSUED 19-AUG-21 09:39 PM

DUE 2-SEP-21 09:35 PM

	AUTHOR	COMPANY	PHONE	MOBILE
	Lorryn Williamson	Acciona Ferrovial Joint Venture		
COLLABORATORS	ACTION			
	Lorryn Williamson	Acciona Ferrovial Joint Venture		
	INFO			
	Erran Woodward	Acciona Ferrovial Joint Venture		
	Hanka Shabilla	Acciona Ferrovial Joint Venture		

SMW-CTP AFJV Soil & Water Management Plan

DISCIPLINE Environment and Planning : Planning Management

Comment

Dear Ms Shabilla

The Acciona Ferrovial Joint Venture (AFJV) are engaged with Sydney Metro to construct the tunnel and station boxes of the Sydney Metro West – Central Tunneling Package between The Bays and Sydney Olympic Park. The project was approved with Conditions of Approval (SSI 10038) issued on 28 July 2021.

AFJV invites you to review the attached AFJV Soil & Water Management Plan for the project in accordance with these conditions.

Please note that this document is also being sent via TeamBinder to retain distribution and review records. If you are confident using the Teambinder workflow to provide your comments, please do so on receipt of the Teambinder notification.

*Alternatively, you are welcome to complete the attached Comment Review sheet and follow the prompts to attach and reply via the **Respond** tab in this email.*

AFJV are kindly requesting that comments be provided within 10 working days, however would welcome the opportunity to discuss the document via Teams with your reviewers, to facilitate your review in explaining the environmental management approach of AFJV, as described in this document. Please forward your request with preferred date and time to myself.

Kind regards

Lorryn Williamson

Environmental Manager

Acciona Ferrovial Joint Venture

Lorryn.williamson@ctp-afjv.com.au

ATTACHMENTS

File Name	Size	Date Attached	Attached By
SMW-CTP Soil and Water Management Plan (Rev00) - Merged.pdf	1.8Mb	19-AUG-21 09:39 PM	Lorryn Williamson
AFJV Comments Review sheet - Soil & Water.xlsx	18k	19-AUG-21 09:39 PM	Lorryn Williamson

COMMENTS

Lorryn Williamson (AFJV-LWIL) — FOR REVIEW

6-SEP-21 01:15 PM

The document has been viewed

Hanka Shabilla (AFJV-758385) — FOR REVIEW

6-SEP-21 12:35 PM

Please clarify the extent of any groundwater wells that are to be installed within the construction footprint to assess groundwater quality that is to affect Sydney Water Assets, and the associated trigger levels and action plans

What are the roles and responsibilities of the project team from project director to project engineer in managing soil and water affecting Sydney Water assets

Section 3.5 Sydney Water not listed in bullet points. Many assets outlined in the report are SWCs assets.

Cross reference in Table 1 requires updating (Page 2). General sweep of referencing required as a number of error flags appearing within the document.

There appears to be an error on Page 5 of the document as the first page of the Project Planning Approval Conditions table appears blank? Similarly, there is missing text/references in the same table on Page 7.

Ministers Conditions of Approval and REMM no. tables (Page 42 - 47) - the "where addressed" sections point to sections of the report that currently dont cover these items. Is the intent that these are covered in separate reports or future versions of this report. E.g.:
- D79 Water Reuse Strategy - Reference is made to Section 6.3, but this Section does not cover the elements of this condition.
- HF1 - Measures not to worsen flood impacts are not defined in Section 4.9 (this section covers only existing flood risk).

There's no indication of what Sydney Water land the project may be interacting with or impacting upon at this stage. If the project involves works on any Sydney Water owned land then Sydney water can advise on any potential risks to Sydney Water in relation to asbestos or contaminated land. At this stage, the contamination sections 4.5, 6.7 and Appendix E look appropriate for a high-level documention.

Administrator (ADMIN) FOR REVIEW

3-SEP-21 09:04 AM

This item has passed its due date. Notifications have been sent

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Lorryn Williamson (AFJV-LWIL) FOR REVIEW

19-AUG-21 09:39 PM

SMW-CTP AFJV Soil & Water Management Plan Issued to AFJV

APPENDIX C EROSION AND SEDIMENTATION CONTROL STRATEGY

Acciona Ferrovial Joint Venture

Erosion and Sediment Control Strategy

Project: SSI 10038

Document Number:

Revision Date: 19/08/21

CONTENTS

1. INTRODUCTION

1.1 PURPOSE OF STRATEGY

This Erosion and Sediment Control Strategy has been prepared to provide an outline of the strategic approach to the management of erosion and sediment risks for the Central Tunnelling Package (CTP). The information in this document will guide the implementation of erosion and sedimentation management and form part of the Soil and Water Management Sub Plan.

1.2 IMPACTS OF EROSION AND SEDIMENTATION

The construction activities to be undertaken on this project have the potential to impact on soil and water resources during surface earthwork and station box work. Land to be disturbed will require clearing of vegetation and the disturbance of pre-existing hardstand areas which will expose these areas to erosion by stormwater and wind action.

Generally, soil particles eroded by stormwater runoff are transported downslope, usually settling in rivers, watercourses, lakes, dams and wetlands etc (i.e. sedimentation). This may result in many adverse environmental impacts including:

- Reduction in water quality, increased turbidity and nutrient enrichment of water bodies.
- Contamination of waterways.
- Damage to vegetation communities.
- Disturbance to aquatic flora and fauna.
- Increased potential for flooding.
- Reduction in recreational values.
- Reduction in aesthetic values.
- Increased maintenance costs.
- Promotion of weed growth.

Additionally, erosion may be caused by wind moving unprotected soil particles. This action may result in adverse impacts including:

- Loss of valuable soil (e.g. topsoil).
- Safety on and off site (e.g. traffic hazards) and
- Loss of amenity for surrounding sensitive receivers.

This strategy is intended to guide the construction work to minimise on-site erosion and offsite sedimentation and therefore reduce adverse environmental impacts.

1.3 SCOPE OF THE STRATEGY

This document describes the intentions and fundamental principles to be used for the implementation of erosion and sediment controls for the duration of the project, in order to comply with Project requirements and the Landcom (2004), Managing Urban Stormwater: Soils and Construction, Vol 1, 4th Edition.

2. RELEVANT GUIDELINES

2.1 RELEVANT LEGISLATION AND GUIDELINES

This Erosion and Sedimentation Control Strategy is based on the requirements and guidelinescontained in the following manuals/documents:

- Landcom (2004), Managing Urban Stormwater: Soils and Construction, Vol 1, 4th Edition (i.e. Blue Book).
- Department of Environment and Climate Change (2008), Managing Urban Stormwater: Soils and Construction, Vol 2D, Main Road Construction (i.e. Blue Book).
- Environmental Impact Statement.
- The strategies and techniques detailed in the above documents are appropriate for the protection of the adjacent environment of this project.

3. KEY MANAGEMENT STRATEGIES

The following list outlines principles and control measures that will be implemented on this project for minimising erosion and sedimentation. They have been identified as key issues and techniques to control erosion and sedimentation on many construction projects. These points collectively fulfil the principles of sound soil conservation practice as detailed in the previously mentioned manuals/documents. This will ensure a 'preventative' rather than a 'cosmetic or remedial' approach to erosion and sediment control.

3.1 PROFESSIONAL EXPERTISE

The engagement of a professional Soil Conservationist with extensive experience who will provide guidance on erosion and sediment control aspects during construction.

3.2 TRAINING

Specific training in key aspects of soil conservation for staff with direct management on erosion and sediment controls will be implemented in the following way:

- Highlighting the importance of soil conservation issues will be included during site inductions.
- Scheduling awareness seminars early in the project for all personnel involved inconstruction.

The program will cover:

- Environmental impacts;
- Relevant legislation;
- Principles of erosion and sediment control;
- Techniques of erosion and sediment control.

Advanced training programs may be rolled out for relevant personnel and could include:

- Flocculation techniques and water quality
- Management of water quality treatment infrastructure
- Preparation of Erosion and Sediment Control Plans (ESCPs).

Additionally, ongoing training will be provided to continually address relevant matters at regular 'toolbox' pre-start and other meetings. Post rainfall toolbox sessions will be carried out, as required, with construction personnel to review and assess the efficacy of existing controls andconsider potential improvements.

3.3 EROSION AND SEDIMENT PLANS

3.3.1 ESCP STRATEGY

The strategy will be complimented during construction by the preparation of a series of detailed ESCP's for:

- The different stages of construction (eg; Clearing and Grubbing; Stripping and Stockpiling of Topsoil; Bulk Earthworks).
- Specific work areas or activities.

The ESCP's will identify risks and be prepared prior to the construction activity 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 (eg haulage).
- Compounds and storage areas.
- Stockpile sites.
- Temporary work areas.
- Material processing areas.
- Permanent and temporary controls (including order of implementation).

In some instances, more than one (1) ESCP may be required for an activity due to:

- Where processes are complicated and have several stages.
- Change in the construction process, scope of work or work method.
- Controls are found to be ineffective following rainfall.

ESCPs will be prepared jointly by the Environmental Team with review by the Environmental Manager, and/or Project Soil Conservationist in the case of areas or activities of significant risk. Preparation of the ESCPs will include input from field personnel to formulate practical documents for field implementation.

ESCPs may be developed jointly with Environmental Work Method Statements for complex construction areas.

3.3.2 ESCP CONTENT

The purpose of the Preliminary ESCPs is to demonstrate:

- The approach to erosion and sediment control (eg runoff control, separation of 'clean' from 'dirty' flows, separation of contaminated runoff).
- Different types of controls with an emphasis on early construction of critical permanent drainage structures (eg catch drains upslope).
- Use of existing onsite materials (eg vegetation, mulch, rock) and stable ground cover.

The ESCPs may contain the following key management measures, as applicable to the works:

3.3.2.1 SITE ENTRY AND ACCESS REQUIREMENTS

- 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; and
- Exclusion zones would be designated on construction sites to limit disturbance.

3.3.2.2 SOIL STRIPPING AND STOCKPILING

- Stockpile areas are to be established within approved low-hazard areas clear of watercourses, stormwater drainage lines/culverts and not within the dripline of any retained trees where feasible and reasonable;
- 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. Long-term stockpiles (>30 days) will be stabilised and /or covered in accordance with “Blue Book” requirements;
- Topsoil and mulch stockpiles will be constructed to no more than 2m in height where possible;
- Stockpiles will be battered down to a maximum slope of 2:1 (H:V) where space permits; and
- Material transport from site to surrounding pavement surfaces would be minimised

3.3.2.3 DUST CONTROL

- Dust suppression will be carried out whenever necessary to minimise sediments becoming air borne due to wind erosion; and
- Wherever possible, water detained onsite will be re-used for dust control.

3.3.2.4 STABILISATION

- 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; and
- Scour protection and energy dissipation would be used around discharge points at local points to reduce erosion where necessary.

3.3.2.5 SEDIMENT CONTROLS

- Locations of nearest existing drainage channels and stormwater inlets to the works will be displayed on the ESCP;
- 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;
- Maximise the diversion of turbid construction runoff into sediment retention devices such as sediment sumps, sediment fences and other sediment traps;
- Mulch bunds will not be used in concentrated flow areas or if they have the potential to result in tannin leachate into waterways;
- All erosion and sediment controls will be inspected by the Environmental Manager (or delegate) at least weekly, before forecast rainfall exceeding 20 mm in 24 hours, after rainfall exceeding 20 mm in 24 hours and before a site closure of two days or more. Maintenance will be carried out as required prior to the next forecast rainfall event;
- Site supervisors will undertake daily erosion and sediment control checks and record any issues within site diaries. Site supervisors will ensure controls are maintained and in working order;
- Concrete washout will be confined to designated concrete washout locations or using a Concrete Waste Separation Unit (CWSU), which allows for recycling of concrete waste;
- Clean water diversions would be constructed and stabilised around work areas; and

- No stockpiles of materials or storage of fuels or chemicals would be located adjacent to the existing culverts.

ESCPs will provide guidance on the installation of control measures, as per the Blue Book. The Environment Coordinator will liaise with the construction teams to ensure the ESCP are understood and implemented on site. A series of ESCPs will be developed for the CTP work area during progression. The ESCPs will focus on the erosion and sediment risks for each work front as they are established and closed out.

3.4 MINIMISING EXTENT AND DURATION DISTURBANCE

Key aspects to manage the extent of disturbance are:

- Clearly define clearing limits with highly visible flagging/fencing and signage consistent with measures in the CEMP and Sub Plans
- Staging of clearing operations
- Initially clearing and grubbing mature trees and shrubs to leave the soil surface in a reasonably rough condition with some surface vegetative groundcover.
- Minimising disturbance of vegetation along access roads and other construction sites (eg Site Compounds) with special emphasis on management of construction activities adjacent to watercourses.

3.5 CONTROL OF STORMWATER FLOW ONTO, THROUGH AND FROM THE SITE

Key aspects to manage stormwater flows are:

- Separating ‘clean’ run-on water from ‘dirty’ (eg turbid) construction area run-off.
- Constructing permanent drainage structures early in the project wherever possible including:
  - Sediment basins sumps and traps;
  - Catch drains with linings upslope of works;
- Completing construction of culverts and associated inlet and outlet protection (eg rock dissipators and head/wing walls) as soon as possible after pipe/culvert installation.
- Maximising the diversion of turbid construction runoff into sediment basins, sediment traps, excavations or similar.
- Controlling run-off during the construction of embankments (eg fill shaping and the construction of temporary dykes and batter drains)
- Diverting uncontaminated dirty water from formation works through sediment traps into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths and velocities.
- Consider existing stormwater flows when directing water to existing pits and ponds to control potential flooding issues
- Potential disturbance of sediment in the receiving waterways to be considered for discharge of treated water. Where there is a risk of sediment being disturbed in the receiving waterway, measures such as reducing flow rate and/or installing dissipating structures will be considered.

3.6 EROSION CONTROL MEASURES TO LIMIT ON-SITE EROSION

The strategies to be used to control erosion on incomplete section of works are:

- Breaking the site into sub-catchment areas and implementing a range of erosion controls (eg weir type structures, diversion banks, progressive revegetation) to reduce flow velocities and to compliment and increase the effectiveness and efficiency of sediment controls in the lower areas.

- Using geotextile or similar linings to provide temporary surface protection in areas ofconcentrated flows (eg batter drains, culvert construction, temporary drains etc).
- Siting stockpiles of soil material in low-hazard areas clear of watercourses (ie at least 50 metres). Additional protection to be afforded with temporary vegetation, upslope diversionbanks and downslope sediment control measures as required.
- Stockpiles to be in accordance with CEMP and sub plan requirements including the Soil and Water Management Plan and the Spoil Management Plan.
- The toes of stockpiles no closer than one metre from clearing limits.

3.7 SEDIMENT CONTROL LONG-TERM MEASURES TO PREVENT OFF-SITE SEDIMENTATION

The strategies to be used to control offsite impacts from works are:

- Installing control measures as close to the potential source of sediment as possible.
- Ensuring management of turbid water within a suitable timeframe after rain with one or acombination of:
    - Pump-out for construction purposes or dust control
    - Treat and discharge if water meets the water quality criteria as specified in the Soil and Water Management Plan and the EPL
    - Pump to Construction Water Treatment Plant for treatment and either reuse for construction purposed or dust control; or discharge in accordance with the criteria specified in the Groundwater Management Plan (construction water treatment plants will primarily treat groundwater hence the reason for the water quality criteria being located in the Groundwater Management Plan).
- Ensure that dirty water generated by site activities is used on site where possible prior to further treatment and disposal off site. Examples for reuse include:
    - Construction water
    - Dust suppression
    - Rehabilitation of vegetated areas
    - Vehicle washdown
- Water not to be discharge from site prior to achieving acceptable water quality standards inaccordance with EPL requirements and the discharge water quality criteria documented in the Soil and Water Management Plan and the Groundwater Management Plan.
- Managing water quality during de-watering activities (eg dust suppression, filtering techniques, flocculation with approved chemical flocculant, pumping for treatment into a water treatment plant), in accordance with a water movement permit system and EWMS/methodology to be implemented for dewatering
- Controlling the deposition of mud and soil material onto local sealed roads. Maintain hardstand areas as much as practicable to minimise mud/soil generation.
- Dust suppression via water carts, sprays and restricting plant and vehicle movements to designated routes, limiting vehicle speeds and using soil stabilisers or similar products to bind soil particles.

3.8 SEDIMENT BASINS AND SEDIMENT BASIN MANAGEMENT

3.8.1 SEDIMENT BASIN CONSTRUCTION AND CAPACITY

Construction Sediment Basin design capacities will be based on the design requirements and parameters outlined in the Blue Book, together with the estimated contributing catchment area and topography of the construction site. Where possible, construction basins are to be located in areas where they will be converted to operational basins later in the CTP if they are deemed to be required as part of the Detailed Design. Construction sediment basins will be constructed consistent with 'Managing Urban Stormwater, Volumes 1 and 2 guidelines. Construction sediment basins are to be built in the optimum location for maximising trapping of sediment and pollutants. Inlets and spillways are to be installed within one month of basin installation.

A review of the site potential for sediment yield in accordance with the Blue Book requirements will be undertaken with the progression of the CTP. This assessment will utilise the Revised Universal Soil Loss Equation (RUSLE) to determine the areas with predicted soil yield greater then 150m^3 per year which will guide basin requirements and locations on the CTP.

3.8.2 FLOCCULATION

The management of site runoff is required to meet required water quality parameters prior to discharge as defined in the conditions of approval and Environment Protection Licence for the CTP. To achieve this, it is likely that site water will be treated (flocculated) to remove sediment from suspension.

In the first instance, this will involve manual dosing with gypsum typically within 24hrs of the conclusion of each rain period. Gypsum may also be used to 'prime' basins, inlets and catchment drains prior to runoff events to facilitate early mixing of flocculent.

Where flocculation with gypsum does not meet water quality parameters within the required timeframe, alternative flocculants may be trialled subject to Sydney Metro approval (e.g. anionic polyacrylamides). Automated dosage systems and alternative agents (e.g. flocculent blocks, inlet sumps) will also be considered to promote more rapid management of sediment basins and reduce ongoing basin maintenance should gypsum be insufficient to achieve the desired result.

Water quality criteria for the CTP are presented in Surface Water Monitoring Program.

3.8.3 SEDIMENT BASIN MAINTENANCE

Sediment basins will be maintained to ensure that accumulated sediment does not exceed 30% of the sediment storage zone. Markers will be installed within the basin to enable fast and effective measurement. Disposal of accumulated sediment will be incorporated into construction activities following drying and must ensure that sediment will not be conveyed back into the construction area or into watercourses. Where practical, sediment will be re-used on site (e.g. within sound mounds if approved/ practical) or incorporated into fill material. Where this is not a practical option, sediment will be disposed of offsite as a waste product. Suitable access to basins will be provided to enable maintenance in all weather conditions.

Runoff water stored in basins will be used on site in dust suppression as a preference prior to discharge from site.

3.9 STABILISATION AND REVEGETATION

Key aspects to manage successful rehabilitation of disturbed areas to be implemented are:

- Ensuring the success of the later revegetation program by implementing a robust

topsoil testing and management program.

- Keying-in of topsoil to batters with a suitable depth in accordance with specifications
- Progressively revegetating disturbed areas utilising appropriate non-invasive species.
- Temporary stabilisation of disturbed areas with a soil stabiliser, cover crops or similar.
- Leaving temporary erosion and sediment controls in place until the disturbed catchments have over 70% vegetation cover.
- Controlling dust through progressive revegetation techniques.

APPENDIX D WATER QUALITY MONITORING PROGRAM

Surface Water Monitoring Program

SMWSTCTP-AFJ-1NL-PE-PRG-000001 Revision 02

Sydney Metro West – Central Tunnelling Package

DOCUMENT APPROVAL

	Prepared By	Reviewed By	Approved By
Name:	Erran Woodward	Lorryn Williamson	Lorryn Williamson
Position:	Environmental Approvals Manager	Environment Manager	Environment Manager
Date:	01/10/21	01/10/21	01/10/21

REVISION HISTORY

Rev:	Date:	Pages:	By:	Description:
00	18/08/21	All	EW	For internal review
01	01/10/21	All	EW	For submission to Sydney Metro
02	25/10/21	All	EW	Response to comments

CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

Sydney Metro is Australia's biggest public transport program. Services on the North West Metro Line between Rouse Hill and Chatswood started in May 2019. The Sydney Metro network also includes Sydney Metro City & Southwest, Sydney Metro West and Sydney Metro Western Sydney Airport.

Sydney Metro West is a new 24 kilometre metro line between Westmead and the Sydney CBD. This infrastructure investment will double the rail capacity of the Greater Parramatta to Sydney CBD corridor with a travel time target between the two centres of about 20 minutes.

The planning approvals and environmental impact assessment for Sydney Metro West has been split into a number of stages recognising the size of the project. This includes:

- Stage 1 – Concept and all major civil construction works including station excavation and tunnelling between Westmead and The Bays. Planning approval for this stage was granted in March 2021.
- Stage 2 – All major civil construction works including station excavation and tunnelling from The Bays to Sydney CBD
- Stage 3 – Tunnel fit-out, construction of stations, ancillary facilities and station precincts, and operation and maintenance of the Sydney Metro West line

An Environmental Impact Statement (EIS) (Jacobs/Arcadis, 2020) for the Concept and Stage 1 (herein referred to as the Project) assessed the soil and surface water quality impacts in response to the Secretary's Environmental Assessment Requirements issued by the Department of Planning, Industry and Environment (DPIE). The soil and surface water quality impact assessment is included in Chapter 19 and Technical Paper 10 of the EIS. The Project was approved on 11 March 2021 (SSI 10038). An administrative modification (Modification 1) was approved on 28 July 2021.

1.2 SCOPE

The Surface Water Monitoring Program will be appended to the Soil and Water Management Plan (SWMP) which forms part of the Project Construction Environmental Management Plan (CEMP). This Program outlines how Acciona Ferrovial Joint Venture (AFJV) will comply with and implement the applicable environmental requirements for the Central Tunnelling Package (CTP) to monitor the construction surface water impacts during construction of the CTP civils construction phase B1 (in accordance with the Sydney Metro Phasing Report).

This FFMP outlines how AFJV will comply with and implement the applicable elements from the following documents, collectively referred to herein as the 'Project requirements':

- NSW Minister for Planning and Public Spaces Conditions of Approval (CoA)
- Revised Environmental Mitigation Measures (REMMs) and the
- Sydney Metro Construction Environmental Management Framework (CEMF)

1.3 OBJECTIVES

This Program will be utilised to define, address, and implement surface water quality monitoring requirements and will apply for the duration of construction.

This Program outlines how AFJV will comply with and implement the applicable elements of the following documents, collectively referred to herein as the 'Project requirements' for the CTP:

- The CoA (issued on 11 March 2021 and as modified on 29 July 2021)
- The Project EIS, Submissions Report and Amendment Report
- Sydney Metro Construction Environmental Management Framework (CEMF).

2. LEGAL AND OTHER REQUIREMENTS

2.1 RELEVANT LEGISLATIONS AND GUIDELINES

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

Guidelines and standards specifically relating to this monitoring program include:

- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (known as 'ANZG Guidelines'),
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000),
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (2004),

2.2 PROJECT REQUIREMENTS

The Project Requirements relevant to the development of this Surface Water Monitoring Program are listed in Table 2-1.

Monitoring of surface water discharge is outlined in the SWMP and discussed throughout this program. Some of the CEMF requirements have been included as they partially relate to general monitoring related to soil and water management.

TABLE 2-1 PROJECT REQUIREMENTS

Project Planning Approval		
C14	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 Stage 1 of the CSSI against the performance predicted in the documents listed in Condition A1 of this schedule or in the CEMP: (c) Surface water quality Consultation with: DPIE Water, Relevant Councils and Sydney Water (if any Sydney Water assets are impacted)	This plan
C15	Each Construction Monitoring Program must provide:	Section 4.3
	(a) details of baseline data available including the period of baseline monitoring;	
	(b) details of baseline data to be obtained and when;	Section 4.3
	(c) details of all monitoring of the project to be undertaken	Section 6

Project Planning Approval		
	(d) the parameters of the project to be monitored;	Section 6.2
	(e) the frequency of monitoring to be undertaken;	Section 6.2
	(f) the location of monitoring;	Section 6.1
	(g) the reporting of monitoring results and analysis results against relevant criteria;	Section 6.6
	(h) details of the methods that will be used to analyse the monitoring data;	Section 6.5
	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;	Section 6.7
	(j) a consideration of SMART principles; and	Section 7
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 3.1
	(l) any specific requirements as required by Conditions C16 to C17 of this schedule.	n/a
D117	Stage 1 of the CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO 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 WQO, in which case those requirements must be complied with.	Section 2.1 Section 4.2 Section 6
SSWQ6	A surface water monitoring program would be implemented to observe any changes in surface water quality that may be attributable to Stage 1 and inform appropriate management responses. The program would be developed in consultation with the EPA and relevant Councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the WestConnex M4 East monitoring. Monitoring would occur during pre-construction and during construction at all waterways with the potential to be impacted. Monitoring sites could be located upstream and downstream of the potential discharges and would include sampling for key indicators of concern.	This plan
CEMF		
12(a) vii	A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the	SWMP Section 6.6

Project Planning Approval		
	locationswhere monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified.	Section 8 Section 11

2.3 ENVIRONMENTAL PROTECTION LICENCE

An Environmental Protection Licence (EPL) will be required for the CTP. Once any EPL conditions relevant to surface water monitoring have been finalised, a review of this Program will be undertaken and the document updated as required.

3. DOCUMENT CONSULTATION AND APPROVAL

3.1 DOCUMENT CONSULTATION

This monitoring plan builds on the consultation that had been undertaken by the EIS, and Response to Submissions managed by the project proponent, Sydney Metro.

In accordance with CoA C14(c), this Program will be provided to the following government agencies for review and comment.

- DPIE Water
- Sydney Water (if any Sydney Water assets are impacted)
- Inner West Council
- City of Canada Bay
- Strathfield City Council
- Burwood Council
- City of Paramatta Council

Details of issues raised by a government agency during consultation will be included as **Appendix B** of the SWMP, including copies of all correspondence from those agencies, as required under CoA A6.

Ongoing consultation with stakeholders may be undertaken as required during project delivery.

In line with CoA B11, a copy of the Construction Monitoring Reports will be published on the AFJV project website.

3.2 DOCUMENT APPROVAL

In accordance with CoA C18 this Monitoring Program will be submitted to the Planning Secretary for approval, following ER endorsement.

4. EXISTING ENVIRONMENT

4.1 OVERVIEW

The CTP is located across two estuaries which are sub-catchments of Parramatta River and Sydney Harbour. Sydney Olympic Park, North Strathfield, Burwood North and Five Dock are all located within the upper estuary of the Parramatta River catchment, one of the main tributaries of Sydney Harbour. The Bays drains to White Bay in the lower estuary of Sydney Harbour.

The CTP surface sites are located within urban catchments that generally drain directly into highly modified constructed drainage systems which are extensively channelised or hard-edged concrete structures. Relevant watercourses and the receiving waters are shown in the table and map below.

These catchments are generally highly urbanised and altered from a natural state, with pockets of open spaces and parkland. These land uses influence the water quality and quantity and speed of drainage flows within the catchment.

Despite the highly urbanised and altered nature of the receiving watercourses along the Project, several were classified in Chapter 19 of the EIS as sensitive receiving environments. This is generally either owing to the presence of SEPP coastal wetlands or the designation of the waterway as Key Fish Habitat (KFH).

Table 4-1 below identifies the distance from the site to the listed receiving creeks, as well as the classification of creek as Key Fish Habitat and the proximity to SEPP Coastal Wetlands.

TABLE 4-1 WATERCOURSES AND RECIEVING WATERS

Project Site	Watercourse	Distance from site to creek	Condition	Receiving waters	Key Fish Habitat (KFH)?	SEPP coastal wetlands
Sydney Olympic Park metro site	Northern Water Feature Haslams Creek Saleyards Creek	1km 960m	All stormwater in the vicinity of the SOP Project Site discharges into the Northern Water Feature, prior to being discharged into Haslams Creek. In its upper reaches Haslams Creek is a concrete channel running through the Lidcome semi-industrial area. It passes through a rehabilitated estuarine area before discharging into Homebush Bay. Saleyards creek is a concrete lined stormwater drain that discharges into the Powells Creek drain.	Homebush Bay	Haslams Creek Type 1 KFH Northern Water Feature has potential Green and Golden Bell Frog Habitat.	SEPP coastal wetlands within 500m
North Strathfield metro site	Powells Creek	350m	Powells Creek is mainly a concrete-lined channel with a highly urbanised riparian corridor, consisting of commercial land use with extensive impervious surfaces and only isolated vegetated pockets.	Homebush Bay	The Northern section of Powells Creek is KFH	SEPP coastal wetlands within 500m
Burwood North metro site	St Lukes Park Canal Barnwell Park Canal	230m 1km	St Lukes Park Canal is a concrete-lined channel that originates at Parramatta Road, then discharges into Canada Bay. The canal is tidal. Barnwell Park Canal is a concrete channel that discharges into Kings Bay, just south of Canada Bay. The riparian corridor is urban residential with some open space.	Canada Bay Hen and Chicken Bay	Not KFH	No SEPP coastal wetlands within 500m
Five Dock metro site	Dobroyd Canal / Iron Cove Creek	600m	Dobroyd Canal is highly urbanised tidal concrete channel. At lower reaches the riparian corridor is open space with scattered trees.	Iron Cove	The Northern section of Iron Cove Creek is KFH	SEPP coastal wetlands within 500m

The Bays metro site	White Bay	Immediately adjacent to water	White Bay is a working port with docking facilities for small ships.	Sydney Harbour	White Bay is Type 1 KFH	SEPP coastal wetlands within 500m

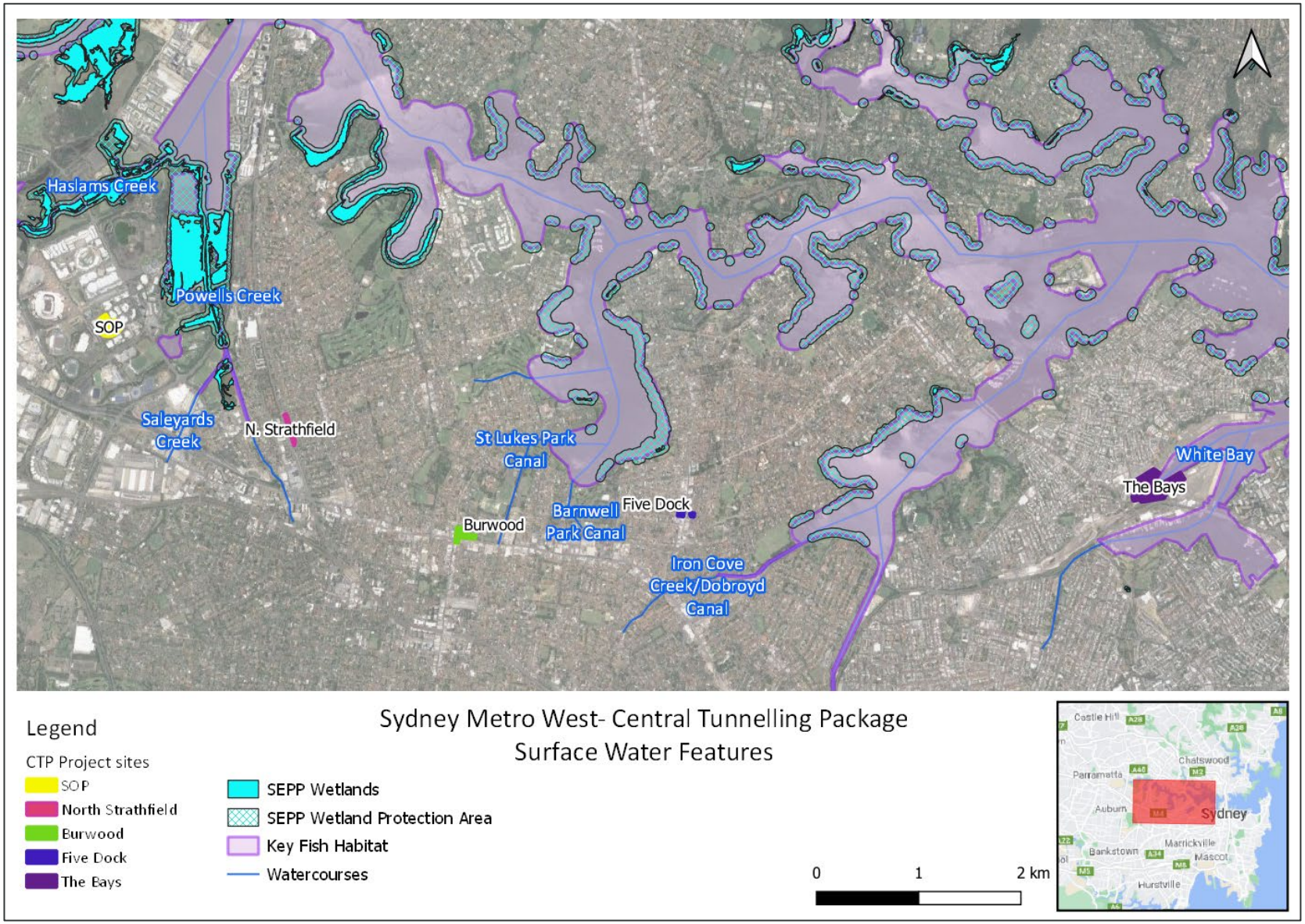

FIGURE 1 WATERCOURSES ALONG THE SYDNEY METRO WEST, CTP ALIGNMENT.

4.2 WATER QUALITY OBJECTIVES

The NSW Water Quality and River Flow Objectives (NSW Department of Environment, Climate Change and Water, 2006) provide environmental values for the Sydney Harbour and Parramatta River regional catchments.

The table below shows the environmental values assigned within the NSW Water Quality and River Flow Objectives to each of the watercourses relevant to CTP, as taken from the Project's Environment Impact Statement (EIS) (Jacobs/Arcadis April 2020).

These objectives provide a framework to assess water quality in terms of whether the water is suitable for a range of environmental values. These provide environmental values for NSW waters and the ANZECC 2000 Guidelines provide the technical guidance to assess the water quality needed to protect those values.

TABLE 4-2 WATER QUALITY OBJECTIVES (SOURCE: TABLE 19-5 OF THE EIS)

Site	Aquatic Ecosystem	Visual amenity	Primary contact recreation	Secondary contact recreation
Haslams Creek	✓	✓		✓
Powells Creek	✓	✓		
Saleyards Creek		✓		✓
St Lukes Park Canal	✓	✓		
Barnwell Park Canal	✓	✓		
Dobroyd Canal	✓	✓		
Iron Cove	✓	✓	✓	✓
White Bay	✓	✓	✓	✓

4.3 BASLINE MONTORING

There has been no detailed pre-project baseline surface water monitoring data identified in the Sydney Metro West EIS documentation.

A review of available existing water quality data collected from Sydney Water, Local Councils, University of Western Sydney and the WestConnex M4 East project undertaken as part of the EIS indicated that some background levels exceed the ANZECC (2000) water quality trigger values for slightly to moderately disturbed ecosystems (Section 19 of EIS). These are summarised in Table 4-3.

TABLE 4-3 SUMMARY OF EXISTING WATER QUALITY CONDITIONS

Watercourse	Water quality characteristics relevant to ANZECC/ARMCANZ (2000) Indicators
White Bay	• Elevated nutrient concentrations • Elevated heavy metal concentrations • High turbidity

Dobroyd Canal	• Low dissolved oxygen levels • Elevated nutrient concentrations • Elevated heavy metal concentrations • High turbidity
St Lukes Park Canal	• Low dissolved oxygen levels • Elevated nutrient concentrations • Elevated heavy metal concentrations • High turbidity
Powells Creek	• Low dissolved oxygen levels • Elevated nutrient concentrations • Elevated heavy metal concentrations • High turbidity
Saleyards Creek	• Low dissolved oxygen levels • Elevated nutrient concentrations • Elevated heavy metal concentrations • High turbidity
Haslams Creek	• Elevated nutrient concentrations • Elevated concentrations of faecal coliforms

Note: source of data is EIS Chapter 19, Table 19-6 (which is sourced from City of Parramatta, Sydney Water, Cumberland City Council and WestConnex M4 East, undated).

As previously mentioned, no detailed baseline surface water monitoring data was collected as part of the EIS; the data presented in Table 4-4 comes from the M4 East and the M4-M5 Link Project Documentation, as described below:

1. Appendix R of the M4 East project EIS:
   - Sal1 and Sal2 – Salesyard Creek
   - Pow1 and Pow2 – Powells Creek
   - Slp2 – St Lukes Park Canal
   - Bar2 – Barnwell Park Canal
   - Dob1 and Dob2 – Dobroyd Canal.

2. Other Major Projects:
   - SW01 - Rozelle Bay from the WestConnex Rozelle Interchange Project Soil and Surface Water Management Plan
   - SW09 - Dobroyd Canal from the WestConnex M4-M5 Link Mainline Tunnels Soil and Surface Water Management Sub-Plan

The monitoring data that was gathered from other projects was generally the background data that was used for those projects, as current monitoring data was not always readily available. The data provides an indication of general waterway health and is utilised in leu of baseline surface water monitoring data was collected as part of the EIS.

Additional baseline data will also be gathered prior to the commencement of construction – and in particular, the commencement of ground disturbance that has the potential to cause run-off. A minimum of at least two baseline monitoring events (two monthly monitoring events) will be carried out to allow for direct comparison to baseline data captured immediately prior to construction commencing. Where possible, more than two monitoring events will take place.

TABLE 4-4 BACKGROUND WATER QUALITY MONITORING

Parameter	ANZECC Guideline [1]	Sal1 (U/S)[3] – Salesyard creek	Sal2 (D/S)[3]- Salesyard creek	Pow1 (U/S)[3] - Powells Creek	Pow2 (D/S)[3] - Powells Creek	SLP2 (D/S)[3] -St Lukes Park Canal	Bar2 (D/S)[3] - Barnwell Park Canal	Dob1 (U/S)[3] - Dobroyd Canal	Dob2 (D/S)[3] - Dobroyd Canal	SW09 Dobroyd Canal[4]	SW01 Rozelle Bay[5]
pH	7.0 – 8.5 [2]	7.8-9.4	7.5-9.1	7.6-9.5	7.7-9.9	7.8-9.7	7.1-8.2	8.1-9.1	7.0-9.1	7.0 – 8.5	5.6-8.0
Conductivity (uS/cm)	Lowland rivers: 125–2200 µS/cm	126-3744	203-40,823	99-2977	101-36,323	165-4,535	258-30,752	230-1718	260-52,630	42 average	403-541,180
DO (mg/L)	N/a	8.8-15	5.4-14	6.9-13	6.8-16	8.2-14	4.7-10.8	9.0-13	4.4-15	n/a	-0.16-558
DO (%sat)	85-110	107-151	67-151	89-130	75-168	96-161	56-110	106-132	58-159	n/a	n/a
Turbidity (ntu)	0.5 – 10 [2]	0-138	5-101	4-501	2-444	0-364	6-48	11-549	2.5-187	n/a	0-52
Oil and grease	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes: 1 – ANZECC (2000) – slightly to moderately disturbed aquatic ecosystems, 2 – Guideline value for SE Australian estuaries **3 -** Appendix R of the M4 East project EIS 4- WestConnex M4-M5 Link Mainline Tunnels Soil and Surface Water Management Sub-Plan 5- WestConnex Rozelle Interchange Project Soil and Surface Water Management Plan

5. IDENTIFICATION OF POTENTIAL IMPACTS

The civils construction works will involve works on hardstand areas and minor surface soil works. When construction excavation works proceed below the groundwater table. Intercepted groundwater is addressed in the Groundwater Management Plan and Groundwater Monitoring Program.

The Table 5-1 lists the environmental aspects associated with the civils construction phase and lists the potential environmental impacts. The site management measures identified in the SWMP are also included for reference; for further detail on aspects, impacts and associated mitigation measures, please refer to the SWMP.

TABLE 5-1 ISSUES REQUIRING MANAGEMENT DURING CONSTRUCTION

Aspects	Potential Impacts (key contaminant)	Site Management
Continuing site establishment involving establishing hardstand areas, erecting sheds	Minor sediment or dust impacts from roadbase materials (sediment)	Soil erosion, sediment controls installed, coupled with inspection and maintenance regime
Minor concrete works for footings, and other establishment works	Concrete spillage and runoff from washout areas (sediment and pH)	Designated concrete washout areas
Material storage including chemicals storage	Spills from liquid chemicals (pH and other minor chemical residue)	Limit chemicals stored and bunded storage areas and spill kits
Machinery operating on site	Leaking from refueling and hydraulic hose bursts (oil and grease)	Refuelling procedures and spill response and clean up
Drilling works	Sediment from drilled materials (sediment)	Soil erosion, sediment controls coupled with inspection and maintenance regime
Diaphragm wall works	Grout and/or concrete loss or spillage (sediment and pH)	Bunded chemical storage areas, and sediment controls
Utility works	Sediment from trenching (sediment)	Soil erosion, sediment controls coupled with inspection regime
Stockpiling of soils from excavations	Sediment from spoil stockpiles (sediment)	Soil erosion, sediment controls coupled with inspection and maintenance regime
Exposure of potential acid sulphate soils (PASS)	Oxidization of PASS and generation of acidic leachate (sediment and pH)	PASS will be managed in accordance with Acid Sulfate Soil Management Procedure (Appendix F of the Soil and Water Management Plan) and any site specific contaminated land management plans or

Aspects	Potential Impacts (key contaminant)	Site Management
		Remediation Action Plan where it applies.
Concrete works for retaining walls, and shotcrete works	Concrete spillage and runoff from washout areas (sediment and pH)	Designated concrete washout areas
Groundwater seepage into excavation areas, mixing with washdown and dust suppression water	Site water being generated with a mix of potential pollutants entrained (multi-pollutant load)	Detail covered in Groundwater Management Plan.

The potential water quality impacts from these construction activities are principally presented as reduction in water quality of receiving waters in the aspects of sediment entrainment, pH and traces of oil and grease.

Where surface water interacts with contaminated areas, this water will be considered to also be contaminated (unless water quality testing proves otherwise) and will either be transferred to the construction WTP's or be removed from site and disposed in accordance with the Waste Classification Guidelines (EPA, 2014). Monitoring requirements for the construction WTP's is outlined in the Groundwater Monitoring Program.

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.

6. SURFACE WATER QUALITY MONITORING

6.1 PROPOSED MONITORING SITES

The proposed surface water quality monitoring sites are indicated in Table 6-1 below and show in the maps included in Attachment A. These sites have been chosen (where applicable) as they are similar to surface water monitoring locations from previous infrastructure projects, such as the WCX M4 East and WCX M4-M5 Link, to enable a continuation of existing information.

These sites may be subject to discussion with Sydney Water Corporation who manage the drainage assets, and may be revised following further ground truthing and consultation to ensure the monitoring locations are representative of potential Project impacts, and to minimise (wherever possible) potential confounding issues of non-project impacts. Monitoring locations will also be determined in consideration of safe access and any property owner access/permission requirements.

Where sampling locations are updated within the same reach of the same waterway, these will be considered to be minor and can be approved by the ER.

TABLE 6-1 SURFACE WATER QUALITY MONITORING SITES

Name	Waterway	Nearest access street address	Location
WB-D/S	White Bay	White Bay Port	-33.866245° S, 151.180450° E
DC-U/S	Dobroyd Canal / Iron Cove Creek	Henley Marine Drive near Parramatta Rd, Five Dock	-33.873828 ° S, 151.128243° E

DC-D/S	Dobroyd Canal / Iron Cove Creek	Henley Marine Drive, Timbrell Park, Five Dock	-33.870604° S, 151.141474° E
SLP-D/S	St Lukes Park Canal	Near Crane Street car park, Concord	-33.861571° S , 151.113347° E
PC-U/S	Powells Creek	At the Allen St bridge, Homebush	-33.862145° S, 151.086294° E
PC-D/S	Powells Creek	Footbridge at Mason Park, end of Conway Avenue, Homebush	-33.852589° S, 151.082359° E
SC-D/S	Saleyards Creek	Other footbridge at Mason Park, via end of Conway Avenue, Homebush	-33.852282° S, 151.081934° E
HC-D/S	Haslams Creek	Bennelong Parkway bridge	-33.834564° S, 151.075772° E

Maps showing these locations are provided in Attachment 1.

6.2 SAMPLING

During civils construction surface water quality monitoring will be undertaken monthly, both in dry weather and wet weather conditions. During this period there will be extensive ground disturbance prior to establishing hardstand across the site, and the erection of spoil sheds which will protect stockpiles from erosion. Standard soil erosion and sediment control measures will be implemented during this phase to mitigation potential impacts until the sites are fully established for operation during the tunnelling phase.

The monitoring data will be collated into a monitoring record spreadsheet and compared against the Water Quality Objectives. Monitoring parameters are outlined in Section 6.6.

During all works, water quality sampling may be undertaken at any time in response to complaint or incident, or as otherwise determined by the Environment Manager or regulatory agency. All water quality monitoring will also include a visual inspection of the receiving waters to identify any anomalies.

TABLE 6-2 MONITORING SCHEDULE

Item	Frequency	Standards	Responsibility
Civils Construction	Quarterly	Water Quality Objectives	Environment Coordinator
Monthly Water Quality Monitoring	Monthly	Water Quality Objectives	Environment Coordinator
Wet Weather water quality monitoring	Within 48 hours (where practical) of more than 25mm of rain is received in the local catchments.	Water Quality Objectives	Environment Coordinator
Surface Water Discharge from site	Where required prior to discharge.	EPL Blue Book	Environment Coordinator

6.3 RAINFALL RECORDS

To support the surface water monitoring program, rainfall records will be kept by use of the publicly available Bureau of Meteorology monitoring stations at:

- Sydney Observatory, and
- Sydney Olympic Park.

These automatic stations provide weather data via the BOM website at half hour intervals.

6.4 WET WEATHER WATER QUALITY MONITORING

In addition to the construction monitoring program wet weather water quality monitoring will be undertaken during the construction phase.

Wet weather monitoring will happen on average once a quarter, within 48 hours (where practical) of when more than 25mm of rain is received in the local catchments. Wet weather sampling will be undertaken when flow is reasonably constant and safe, not at peak flow.

6.5 MONITORING METHODOLOGY

6.5.1 SAMPLE COLLECTION

Grab samples will be collected manually from the sampling locations identified in Table 6-1. The volume of sample collected will be sufficient for the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s).

6.5.2 FIELD MEASURES

Field physio-chemical parameters including EC, pH, DO, Oil and grease, and turbidity will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s) or provided for laboratory analysis. Other observations including odour and colour may also be recorded where anomalies are observed.

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.

The sampling method for the appropriate water quality parameter is presented in the EPA publication, *Approved Methods for Sampling and Analysis of Water Pollutants in NSW (2004)*.

6.5.3 DECONTAMINATION

Sampling equipment will be cleaned (decontaminated) 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 or something else) equipment will need to be cleaned thoroughly. In addition, equipment will need to be cleaned periodically to prevent a build-up of dirt.

The following method will be followed:

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

De-ionised and tap water will be available for washing equipment in the field, if required.

6.6 SURFACE WATER QUALITY PARAMETERS

6.6.1 SURFACE WATER DISCHARGE PARAMETERS

Water quality testing will be undertaken prior to discharge offsite in accordance with the AFJV – Water Discharge or Reuse Procedure for the following parameters and monitored on a daily basis (during multi-day discharges). Refer to Table 6 3 for testing criteria for offsite discharge in accordance with the Blue Book. This criterion will only be used for water that is captured on the surface that has not encountered any potentially contaminated material or groundwater.

TABLE 6 3: CRITERIA FOR OFFSITE DISCHARGE OF SURFACE WATER

Parameter	Criterion	Method	Time prior to discharge
Oil and grease	None visible	Visual inspection	< 1 hour
pH	6.5 – 8.5	Probe/Meter	< 1 hour
Total Suspended Solids (TSS)	<50 mg/L	Meter/grab sample	< 1 hour/ <24 hours

Where the Project EPL has differing or additional requirements for the discharge criteria, these will be updated in the Monitoring Program once available.

In accordance with REMM SSWQ3, discharges from construction water treatment devices would be monitored to ensure compliance with the discharge criteria, as stated above. Discharges from the Construction Water Treatment Plants (WTP) is managed in accordance with the Groundwater Management Plan and Monitoring Program.

6.6.2 SURFACE WATER QUALITY PARAMETERS

Water quality parameters identified in the NSW Water Quality and River Flow Objectives are classified by the local ecosystem type and the environmental values of the area. Several water quality objectives can be attributed to the receiving watercourses associated with the CTP. To standardise the trigger values across the project the trigger values associated with Aquatic ecosystems have been adopted for the whole Project as they are the most conservative.

On a receiving water body basis, the following table provides the adopted protection trigger values for each waterway associated with the project.

It is noted in Section 5.3 that the existing background data exceeds the ANZECC guidelines for slightly-moderately disturbed systems.

TABLE 6-4 PELIMINARY TRIGGER VALUES TO MAINTAIN WATER QUALITY OBJECTIVES

Receiving watercourse type (WQO)	Turbidity	pH	Dissolved Oxygen	Oil and grease	Electrical conductivity/Salinity
Aquatic Ecosystem (Estuaries)	0.5–10 NTU	7.0-8.5	80-110%	None visible on surface	Lowland rivers: 125–2200 µS/cm

These preliminary trigger values will be used as a guideline until further water quality data is collected and collated from the CTP project.

From investigations on the M4M5 link project, there is wide natural variability in water quality at the receiving waters due to the multiple potential urban runoff sources in the catchment, and between sites. As such, the project's water quality data set will be reviewed annually, and trigger values will be reviewed 6 months after commencement and then annually thereafter, once further surface water data is collated. Any adjustments will be discussed in consultation with the Environmental Representative.

6.7 SURFACE WATER QUALITY TRIGGER ACTIONS

As a result of the highly variable background results outlined in Table 4-4 a step-based trigger action approach will be applied when reviewing and responding to the surface water quality monitoring results.

Step 1 Where an exceedance of any of the preliminary trigger values identified in Table 6-4, steps 2-4 would be followed.

Step 2 The upstream and downstream values will be compared. Where the downstream value is greater than 20% than the upstream value for any parameter, steps 3-4 would be followed. Where the downstream results are consistent with, or less than the upstream results, no further action would be taken.

Step 3 Where the exceedance of the preliminary trigger value is exceeded by 20% at the downstream site, a review will be initiated to determine the significance of the exceedance and the possible causes. The review will consider the corresponding background data, the upstream surface water quality results, recent rainfall records, and recent activities or incidents occurring in the catchment area (both CTP and non-CTP related).

As part of the review, the background water quality values from Table 4-4 will be reviewed and compared to the exceedances to determine whether the values recorded are consistent with the waterway that is being monitored. Results are considered to be inconsistent where there is a worsening of >20% from average background data.

Step 4 An investigation will then be carried out to determine whether the exceedance can be attributable to the Project.

If the exceedance is determined to be attributable to Project works and has the potential to cause environmental harm, the event will be treated as an environmental incident and managed in accordance with the requirements of the CEMP.

Corrective actions will be identified and implemented as part of that process.

7. SMART PRINCIPES

The surface water quality monitoring attempts to use the 'SMART' principles.

- S for specific: The surface water quality monitoring for the CTP will be implemented in the following clear phases:
    - Civils Construction stage water quality monitoring.
    - Tunnelling stage water quality monitoring.

  The locations, method and trigger levels are also specific.
- M for measurable: the monitoring parameters are provided in section 6.5
- A for actionable: the monitoring actions are described in section 6.
- R for realistic: the actions in section 6 are realistically achievable.
- T for timely: The timing for actions are provided in section 6.2.

The monitoring program will continue for the duration of CTP construction. Following AFJV's construction works, other follow on contractors to Sydney Metro may undertake further surface water quality monitoring.

A separate more detailed water monitoring regime will be prepared specifically for the water treatment plants. This monitoring regime will be included in the Groundwater Management Plan and Groundwater Monitoring Program, which also form part of the CEMP. The water treatment plants will be used once the excavations extend below the groundwater table.

8. MONITORING RECORDS

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date, location, and sampler details.

For each monitoring event, the following information shall be recorded:

- Date and time of measurements,
- Name of person undertaking the measurements,
- Type and model number of instruments
- Sample time
- Map of area showing measurement location
- Measurement location details and number of measurements at each location
- Weather Conditions including rainfall in the past 24 hours

9. CALIBRATION, QUALITY ASSURANCE AND COMPETENCY

Specific targeted training will be developed by the Environmental Manager to ensure that officers involved in water quality monitoring are appropriately trained. Refer to the CEMP for full details on environmental training.

All instruments will be calibrated in accordance with manufacturers specifications or relevant Australian Standards. Records of monitoring equipment calibration will be maintained by AFJV throughout delivery of the Project. Any field calibrations will only use standard solutions that are within their recommended use-by date to ensure instruments are field calibrated accurately.

Any sample to be sent to a laboratory will be subject to quality assurance protocols.
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 the following will be undertaken:
- Rinsate blanks (one per sampling event only),
- Blind duplicates (at a rate not less than 20% of total samples), and
- 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 in accordance with the appropriate standard.

10. REVIEW AND IMPROVEMENT

Monitoring data will be reviewed throughout the construction period to provide potential requirements to increase, or decrease, the number of sampling locations. As noted in section 6.5 the project's trigger values will be reviewed six months after commencement of civils construction, once further surface water quality data is collated.

Continuous improvement of this Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets, and the Project performance outcomes of the EIS for the purpose of identifying opportunities for improvement

11. REPORTING

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

Reporting requirements associated with the Program for the construction phase of the Project are presented in Table 11-1.

TABLE 11-1 REPORTING REQUIREMENTS AND SCHEDULE

Schedule (during construction)	Requirements	Submission timeline
Surface Water Monitoring Reports (every six months)	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period. Surface water quality results will be presented, and performance criteria	The six-monthly monitoring reports will be provided to the Planning Secretary, the ER and the relevant regulatory agencies within 40 business

	exceedances will be highlighted. Applicable management responses will be documented.	days of the monitoring period ending. The monitoring report will be submitted via the Planning Portal within this timeframe.

In line with CoA B11, a copy of the Construction Monitoring Report will be published on the project website within one week of its submission to DPIE via the Major Projects Portal.

Separate from the Construction Monitoring Report, additional records relating to soil and water monitoring training, toolbox talks, monitoring results and audit results will be prepared, maintained, and stored in line with the CEMP and the SWMP. The complaints management and reporting procedure is described in the CEMP.

Where the Project EPL has additional requirements for reporting results, these will be added to the Monitoring Program once available.

ATTACHMENTS

ATTACHMENT A –SURFACE WATER MONITORING LOCATIONS

Sydney Metro West CTP - Surface Water Monitoring Locations

Legend

CTP Project sites

- SOP
- North Strathfield
- Burwood North
- Five Dock
- The Bays

See the Surface Water Monitoring Program for further deatils of monitoring sites

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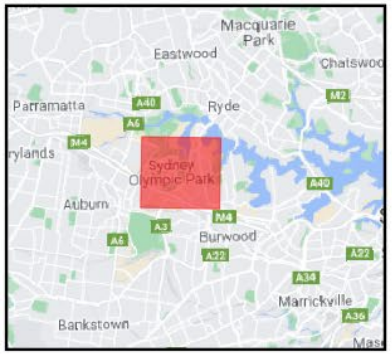

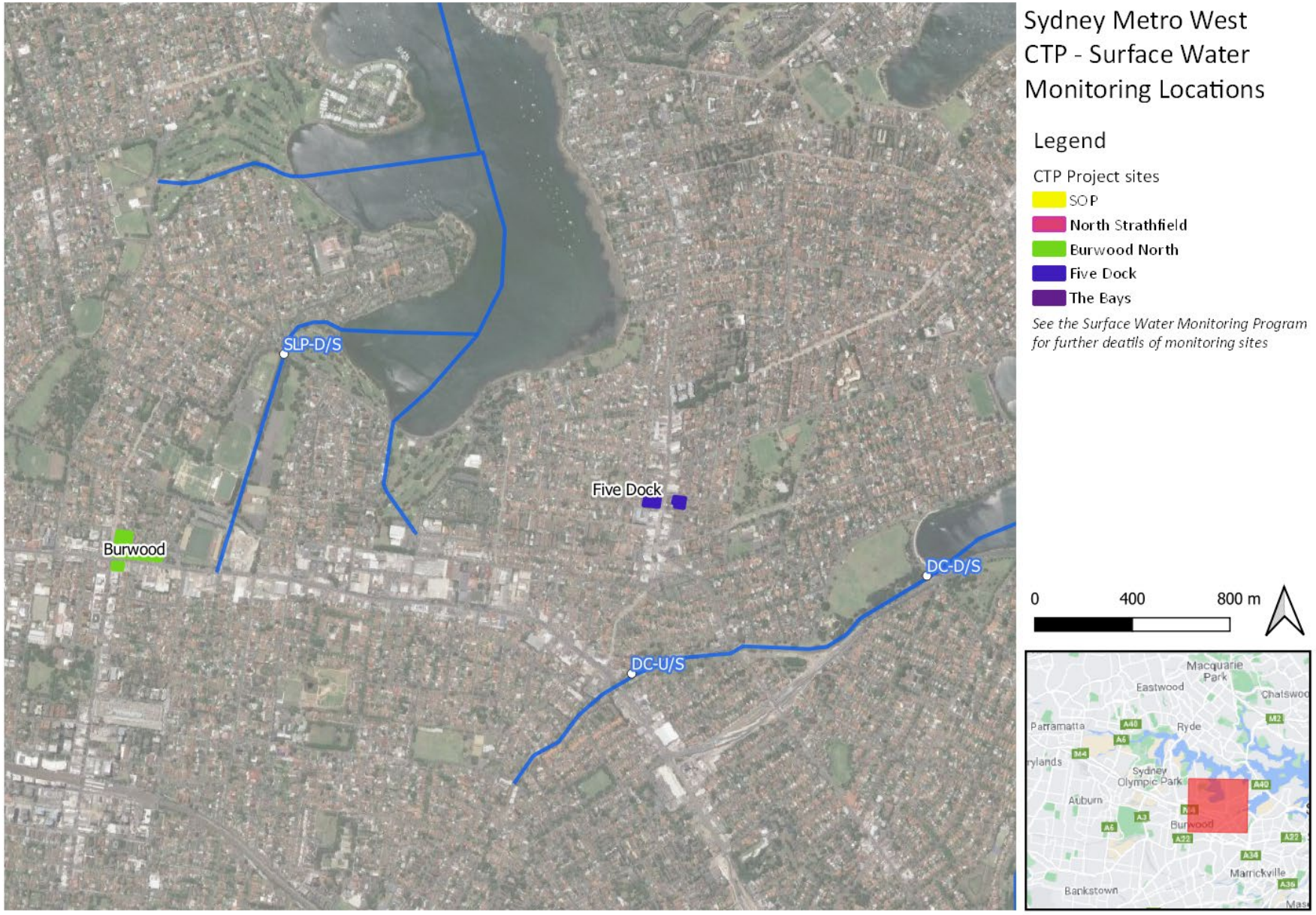

Sydney Metro West CTP - Surface Water Monitoring Locations

Legend

CTP Project sites

- SOP
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- Five Dock
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See the Surface Water Monitoring Program for further deatils of monitoring sites

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Sydney Metro West CTP - Surface Water Monitoring Locations

Legend

CTP Project sites

- SOP
- North Strathfield
- Burwood North
- Five Dock
- The Bays

See the Surface Water Monitoring Program for further deatils of monitoring sites

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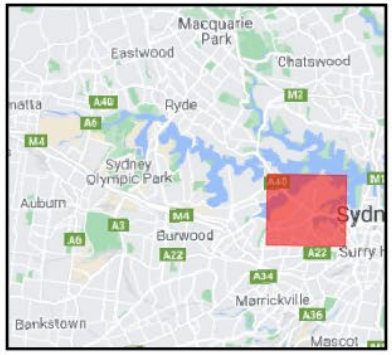

APPENDIX E CONTAMINATION AND ASBESTOS UNEXPECTED FINDS PROCEDURE

Unexpected Finds Procedure – Contaminated

SMWSTCTP-AFJ-1NL-XX-PLN-XXXXXX Revision 01

Sydney Metro West – Central Tunnelling Package

DOCUMENT APPROVAL

	Prepared By	Reviewed By	Approved By
Name:			
Position:			
Date:			

REVISION HISTORY

Rev:	Date:	Pages:	By:	Description:
A		All		For internal review
00		All		For submission to Sydney Metro

CONTENTS

GLOSSARY AND ABBREVIATIONS

Abbreviation	Description / Definition
AFJV	Acciona Ferrovial Joint Venture (the Contractor)
AS/NZS	Australia/New Zealand Standards
ASS/PASS	Acid Sulfate Soils/ Potential Acid Sulfate Soils
Amendment Report	Sydney Metro West Westmead to The Bays and Sydney CBD Amendment Report Concept and Stage 1 (2020)
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan

Abbreviation	Description / Definition
Construction	Includes all work required to construct Stage 1 of the CSSI as described in the documents listed in Condition A1 of Schedule 3, including commissioning trails of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work. *Note: As defined in Table 1 of SSI 10038 Infrastructure approval for the Project.*
CoA	Minister's Conditions of Approval (as relevant to Sydney Metro West Concept and Stage 1)
CTP	Central Tunnelling Package
DECC	Former Department of Environment and Climate Change (NSW) now NSW Office of Environment and Heritage.
DPIE	NSW Department of Planning, Infrastructure and Environment
DPI (Water)	NSW Department of Primary Industries (Water) (Former Office of Water)
EIS	Sydney Metro West Concept and Stage 1 Environmental Impact Statement (April 2020)
EMS	Environmental Management System
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 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 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 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
Environment Policy	Statement by an organisation of its intention and principles for environmental performance
EPA	NSW Environment Protection Authority
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*
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).

Abbreviation	Description / Definition
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
Project	Sydney Metro West Concept and Stage 1
Relevant Councils	Any or all local government councils as relevant, Inner West, Strathfield, Burwood
REMM	Revised Environmental Management Measure
Submissions Report	Sydney Metro West Westmead to The Bays and Sydney CBD Submissions Report Concept and Stage 1 (2020)

1. INTRODUCTION

1.1 BACKGROUND

Sydney Metro is Australia's biggest public transport program comprising four main components including Metro North West Line, Sydney Metro City and Southwest, Sydney Metro West and Sydney Metro Greater West. The Sydney Metro West component involves the construction and operation of a metro rail line, around 24km in length, between Westmead and the Sydney CBD.

The planning approvals and environmental impact assessment for Sydney Metro West has been split into a number of stages recognising the size of the project. This includes:

Sydney Metro West at a Concept level

Stage 1 – All major civil construction works between Westmead and The Bays including station excavation and tunnelling

Stage 2 – All stations, depots and rail systems between Westmead and The Bays

Stage 3 – All major civil construction works including station excavation, tunnels, stations, depots and rail systems between The Bays and the Sydney CBD Station, and operation of the line.

An Environmental Impact Statement (EIS) (Jacobs/Arcadis, 2020) for the Concept and Stage 1 (herein referred to as the Project) assessed the soil and water quality impacts in response to the Secretary Environmental Assessment Requirements issued by the Department of Planning, Industry and Environment (DPIE). The Project was approved on 11 March 2021 (SSI 10038).

Sydney Metro is delivering the Project via several different packages, including the Central Tunnelling Package (CTP). This Unexpected Contaminated Lands and Asbestos (CL&A) Finds Procedure has been prepared to address the Condition of Approval D77 and D78. In addition, the Program has been developed in accordance with the Project EIS, the Revised Environmental Mitigation Measures (REMMs) and all applicable for the design and construction of the CTP.

1.2 SCOPE

This procedure outlines how Acciona Ferrovial Joint Venture (AFJV) propose to manage unexpected contaminated land and asbestos finds during construction of the CTP.

This procedure is applicable to all activities undertaken for the project that have the potential to disturb unexpected, contaminated lands and asbestos.

The existence of this Procedure does not replace the need to prepare Environmental Work Method Statements and Safe Work Method Statements where required in accordance with the requirements outlined in the CEMP and the Safety Management Plan or AFJV Environmental Management Systems, for the management of unexpected, contaminated lands and asbestos.

This document is not intended to provide management controls required to protect human safety or meet health and safety industry requirements.

1.3 INDUCTION AND TRAINING

All site personnel (including sub-contractors) will undertake a Project induction which will include details of this unexpected finds procedure and any known locations of contamination and asbestos on site and control measures and safe work methods required for the management of such material, before they commence work on the Project.

Relevant staff and site management will be trained in the identification of contaminated land and asbestos, use of the waste tracking register and other role specific content as required.

2. LEGAL AND OTHER REQUIREMENTS

2.1 RELEVANT LEGISLATION AND GUIDELINES

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

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),
- National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1) 2013; and
- NSW EPA (2014) Waste Classification Guidelines – Part 1: Classifying Wastes
- PFAS National Environmental Management Plan (HEPA 2018)
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (NSW EPA 2015)
- Guidelines for the NSW Site Auditor Scheme, 3rd edition (NSW EPA, 2017)
- Guidelines for Consultants reporting on contaminated land: Contaminated land guidelines (NSW EPA 2020b)
- Managing Asbestos in or on Soil (SafeWork NSW, 2014)
- National Environment Protection (Assessment of Site Contamination) Measure 1999
- Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2012)
- Sampling design guidelines (NSW EPA, 1995)
- .

2.2 CONDITIONS OF APPROVAL

The CoAs, Revised Environmental Mitigation Measures (REMMs) and Sydney Metro Construction Environmental Management Framework (CEMF) requirements relevant to this Procedure are listed in Table 2-1 below.

TABLE 2-1 RELEVANT REQUIREMENTS

Requirement	Commitment	Timing	Document Reference
Project Planning Approval			
D77	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared prior to the commencement of construction and	Pre-construction	This procedure

Requirement	Commitment	Timing	Document Reference
	must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction.		
D78	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.	Construction	This procedure
Revised Environmental Management Measures			
SSWQ1	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998)	Pre-construction/ Prior to ground disturbance	Section 2 ASSMP
Construction Environmental Management Framework			
12.2a)	Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:	Pre-construction	SWMP
v.	A contingency plan, consistent with the NSW Acid Sulphate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	Pre-construction This document is for the management of previously unidentified contamination, including ASS, and forms part of the SWMP.	Section 4
vi.	Management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;	Pre-construction	Section 4

3. EXISTING ENVIRONMENT

3.1 CONTAMINATION

Construction activities for the CTP construction footprint has the potential to uncover contamination at several locations during excavation and other ground disturbing activities.

Overall, the soils and groundwater in the vicinity of the construction site and tunnel alignment have a moderate potential contamination risk due to current and historical activities. Activities that may have impacts contamination on the CTP area include:

- Leaks and spills from fuel storage infrastructure (hydrocarbons and heavy metals)
- Processing of heavy end hydrocarbons, heavy metals and metalloids
- Land reclamation and other uncontrolled fill material (metals, hydrocarbons, pesticides, polychlorinated biphenyls and asbestos)
- Demolition of buildings that may contain hazardous materials such as asbestos
- Former and current industrial land uses (that may contain contaminants such as hydrocarbons, heavy metals and metalloids, solvents, phenolics, pesticides, heavy metals and metalloids and asbestos in soil)
- Existing railways and associated activities (that may contain contaminants such as metals, hydrocarbons, pesticides, nutrients, phenols, carbamates, pesticides, herbicides and asbestos in soils).

Contaminants of concern for the CTP relevant to soil and water quality include:

- Heavy metals
- Hydrocarbons (TRH, BTEX, PAH)
- Pesticides
- Herbicides
- Asbestos
- PCB and
- PFAS

A summary of potential contamination risk for the CTP construction sites is presented in Table 3-1 below (as taken from EIS Chapter 20).

TABLE 3-1: CONTAMINATION RISK RELEVANT TO THE CTP

Construction Site*	Potential contamination risk			Overall potential contamination risk
	Soil	Groundwater	Vapour / Gas	
SOPMS		✓	✓	High
NSMS	✓			Moderate
BNS	✓	✓		Moderate
FDS	✓			Moderate
TBS	✓	✓		Moderate

*SOPMS – Sydney Olympic Park Metro Station, NSMS – North Strathfield Metro Station, BNS – Burwood North Station, FDS – Five Dock Station, TBS – The Bays Station

3.2 ACID SULFATE SOILS

Soils that are rich in naturally occurring iron sulfides are referred to as ‘acid sulfate soils’ (ASS). Iron sulfide is relatively unstable and exposure to the air causes the soils to undergo a chemical reaction, the end result of which is the generation of sulphuric acid. Sulphuric acid can cause significant environmental damage including the mobilisation of heavy metals (due to changes in

soil pH) into soil at elevated concentrations. Ground excavation and dewatering activities are the most common construction activities by which ASS can be disturbed.

Disturbance of ASS/PASS soils can result in adverse impacts on surface and groundwater quality, flora and fauna, and degradation of habitats.

Section 19 of the EIS assessed the existing environment in relation to ASS/PASS.

TABLE 3-2 ACID SULFATE SOILS IN THE PROJECT AREA

Project area	ASS/PASS summary
The Bays	The Bays site is located on are classed as disturbed terrain. There is a high risk that sediments in this located are ASS.
Five Dock	Most of the project is located in Class 5 area where ASS are not typically found but are located within 500m of an area classes 1,2,3 or 4. Low probability of ASS occurring Low risk area
Burwood North	Most of the project is located in Class 5 area where ASS are not typically found but are located within 500m of an area classes 1,2,3 or 4. Low probability of ASS occurring Low risk area
North Strathfield	Most of the project is located in Class 5 area where ASS are not typically found but are located within 500m of an area classes 1,2,3 or 4. Low probability of ASS occurring Low risk area
Sydney Olympic Park (SOP)	Located within 500m of disturbed terrain and land classified as having a high risk of ASS within 1m of the surface. Low probability of ASS occurring within the Project area.

In accordance with the Project requirements listed in **Error! Reference source not found.**, prior to ground disturbance in areas of possible ASS/PASS occurrence, testing would be carried out to determine the presence of these materials. If encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998).

4. UNEXPECTED FINDS PROCEDURE

An unexpected find of contaminated land or asbestos is triggered in the event of identification or disturbance of contamination in an area of works that is not already under the management

controls described in this document (i.e., already being managed for contamination or asbestos).

The process of disturbance of the existing ground in any location may result in the discovery of contaminated land or asbestos however is influenced by a variety of factors including the location, nature, extent and magnitude of construction activities.

In order to ensure appropriate environmental management, in the event that a person on site identified or disturbs contaminated land or asbestos the process described in Table 3 will be implemented until testing results or other confirmation that the contamination is false.

TABLE 3 UNEXPECTED FINDS PROCEDURE

1. Potential Contaminated Soil / Material Encountered during Construction Activities
If potential contaminated soil / material is encountered during excavation / construction activities: • STOP ALL WORK in the immediate / affected area. • Immediately notify the Environment Manager (EM). • Recommence works in an alternate area where practicable.
2. Personal Protective Equipment (PPE)
Prior to any contamination investigation/management, appropriate personal protective equipment (PPE) is to be worn as per the relevant Safety Data Sheet(s) (SDS). This may include, but not be limited to: • Eye goggles. • Rubber boots. • Rubber gloves. • Work clothes (i.e. long sleeve shirt/pants and steel capped boots).
3. Undertake a Site / Area Contamination Investigation
The Environment Manager, or delegate, is to assess the situation and if considered necessary, commission a suitably qualified contamination specialist to undertake a contamination investigation in the area of the find. The material is to be classified in accordance with the *Waste Classification Guidelines* (DECCW, 2009). The EM in consultation with specialists will determine the appropriate management measures to be implemented. This may include treatment or offsite disposal. If the material is to be disposed of offsite, ensure the waste facility is appropriately licensed. The EM will liaise with the client, Sydney Metro and keep them up to date on management options.
4. Remedial Action
If material is determined to be contaminated a Remediation Action Plan (RAP) may be required and the management of contaminated land will be carried out in accordance with the AF JV Contamination Land Management Procedure from the SWMP. If the material is determined to be acid sulfate soil or potential acid sulfate soil, the Acid Sulfate Soil Management Procedure is to be followed.

If the material is determined to be asbestos, record the discovery in the Asbestos Register, and arrange a licensed asbestos removalist to safely remove the asbestos from site, in accordance with the Asbestos Management Plan.

Remedial actions are to be incorporated into specific Environmental Work Method Statements (EWMS) and training provided to site personnel and subcontractors through inductions and toolbox training sessions.

5. Recommence Works

Recommence works once remedial works have been implemented. The EM grants approval once hold point is released.

Figure 1 is a summary of the procedure as a flow chart. It details the steps to be taken in the event of the unexpected discovery of contaminated land.

4.1 REMOVAL OF ASBESTOS

Removal of asbestos or Asbestos Containing Material would be undertaken by suitably qualified persons in accordance with NSW Government Health and Safety protocols. This process will be detailed in relevant Project safety documentation.

4.2 REPORTING

Notification and reporting to authorities such as the EPA will be undertaken as required in the CEMF in accordance with the NSW EPA Guidelines on the Duty to Report Contamination under the *Contaminated Land Act 1997* (2015) and *CLM Act* 1997 where relevant.

Reporting would also be required under the relevant category related in accordance with the Sydney Metro's Environmental incident classification and reporting procedure.

UNEXPECTED FINDS PROCESS-

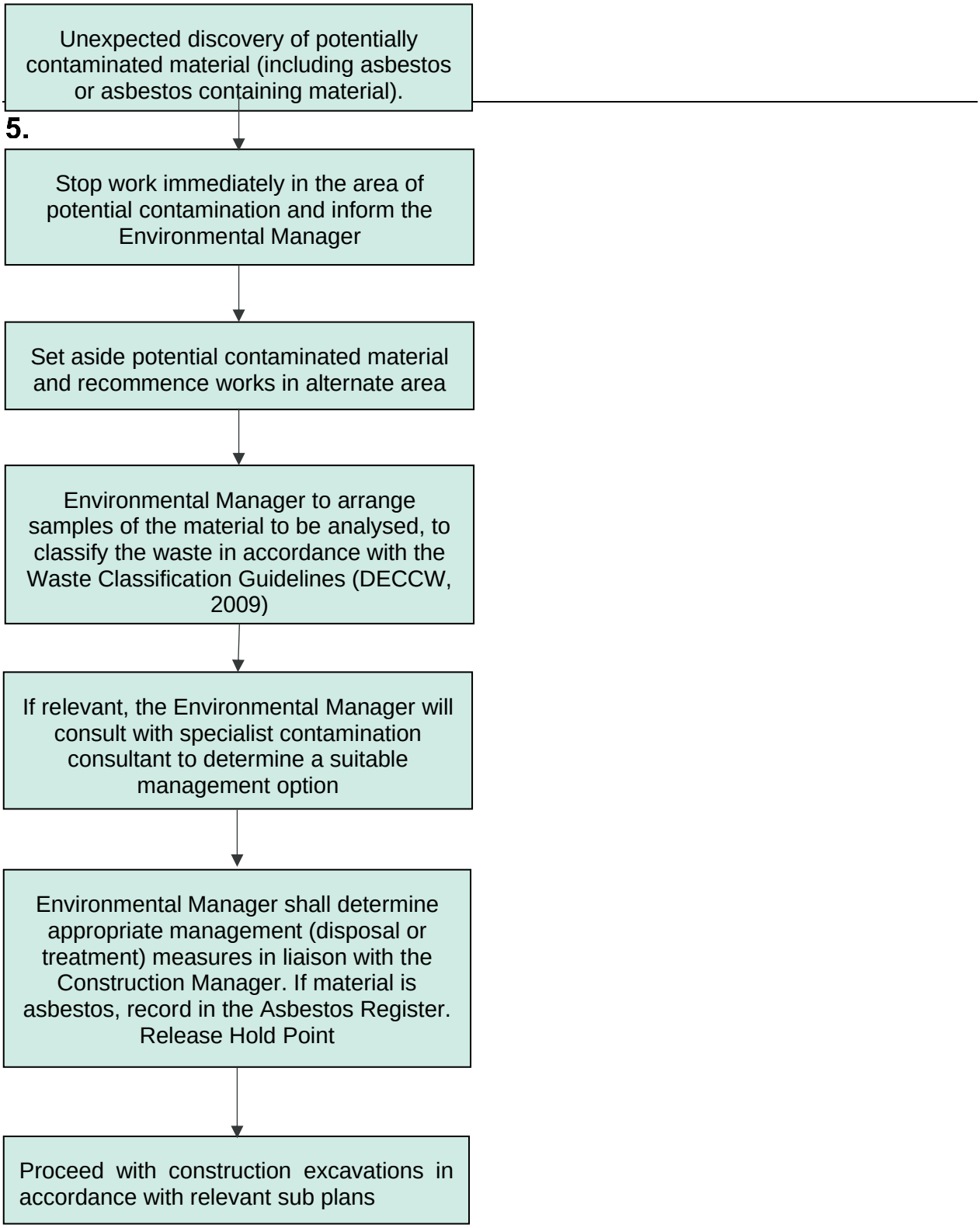

FIGURE 1 **UNEXPECTED DISCOVERY OF CONTAMINATED LAND PROCEDURE FLOW CHART**

APPENDIX F ACID SULFATE SOIL MANAGEMENT PROCEDURE

Acciona Ferrovial Joint Venture

Acid Sulfate Soils Management Procedure

Project:

Document Number:

Revision Date: 18/08/21

Document control

File name	
Report name	Acid Sulfate Soils Management Procedure
Revision number	00

Plan approved by:

Project Director	**Environmental Manager**	**Environment Branch representative**	**Project Manager**
AF JV	**AF JV**	**Sydney Metro**	**Sydney Metro**

Revision history

Revision	Date	Description	Approval
00	18/08/21	Prepared for review	EW

Distribution of controlled copies

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1		
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CONTENTS

GLOSSARY / ABBREVIATIONS

Abbreviation	Description / Definition
AFJV	Acciona Ferrovial Joint Venture (the Contractor)
AS/NZS	Australia/New Zealand Standards
ASS/PASS	Acid Sulfate Soils/ Potential Acid Sulfate Soils
Amendment Report	Sydney Metro West Westmead to The Bays and Sydney CBD Amendment Report Concept and Stage 1 (2020)
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
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Environment Policy	Statement by an organisation of its intention and principles for environmental performance
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EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*

Abbreviation	Description / Definition
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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	Sydney Metro West Concept and Stage 1
Relevant Councils	Any or all local government councils as relevant, Inner West, Strathfield, Burwood
REMM	Revised Environmental Management Measure
Submissions Report	Sydney Metro West Westmead to The Bays and Sydney CBD Submissions Report Concept and Stage 1 (2020)

1. INTRODUCTION

1.1 BACKGROUND

Sydney Metro is Australia's biggest public transport program comprising four main components including Metro North West Line, Sydney Metro City and Southwest, Sydney Metro West and Sydney Metro Greater West. The Sydney Metro West component involves the construction and operation of a metro rail line, around 24km in length, between Westmead and the Sydney CBD.

The planning approvals and environmental impact assessment for Sydney Metro West has been split into a number of stages recognising the size of the project. This includes:

- Sydney Metro West at a Concept level
- Stage 1 – All major civil construction works between Westmead and The Bays including station excavation and tunnelling
- Stage 2 – All stations, depots and rail systems between Westmead and The Bays
- Stage 3 – All major civil construction works including station excavation, tunnels, stations, depots and rail systems between The Bays and the Sydney CBD Station, and operation of the line.

An Environmental Impact Statement (EIS) (Jacobs/Arcadis, 2020) for the Concept and Stage 1 (herein referred to as the Project) assessed the soil and water quality impacts in response to the Secretary Environmental Assessment Requirements issued by the Department of Planning, Industry and Environment (DPIE). The Project was approved on 11 March 2021 (SSI 10038).

Sydney Metro is delivering the Project via several different packages, including the Central Tunnelling Package (CTP). The ASSMP addresses the requirements of Section 12.2a of the Sydney Metro Construction Environmental Management Framework (CEMF).

In addition, the Program has been developed in accordance with the Project EIS, the Revised Environmental Mitigation Measures (REMMs) and all applicable for the design and construction of the CTP.

1.2 SCOPE

The scope of this ASSMP is to describe how Acciona Ferrovial Joint Venture (AFJV) proposes to manage potential impacts of mishandling of ASS or 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 Acid Sulfate Soils and Material on the Project.

2. PURPOSE AND OBJECTIVES

2.1 PURPOSE

The purpose of this Acid Sulfate Soil Management Procedure is to describe how the AFJV proposes to manage the potential discovery and disturbance of potential or actual acid sulfate soil (ASS) during the construction of the Project.

This Procedure is applicable to all design and construction activities conducted by personnel on the Project. The Procedure forms an attachment to the Soil and Water Management Subplan (SWMP) within the Construction Environmental Management Plan (CEMP) for the Project.

2.2 OBJECTIVES

The key objective of this Procedure is to provide instruction on potential Acid Sulfate Soils (ASS) during design and construction to protect the environment. To achieve this objective, AFJV will undertake the following:

- Ensure all activities which may potentially expose, impact on, or handle ASS include procedures and controls;
- Ensure all Project personnel involved in activities which may potentially expose, impact on, or handle ASS are aware of the requirements for ASS management; and
- Maximise the reuse of on-site materials generated on site where practical.

2.3 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.

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.

3. LEGAL AND OTHER REQUIREMENTS

3.1 RELEVANT LEGISLATION AND GUIDELINES

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

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),

3.2 CONDITIONS OF APPROVAL

The CoAs, Revised Environmental Mitigation Measures (REMMs) and Sydney Metro Construction Environmental Management Framework (CEMF) requirements relevant to this Procedure are listed in Table 3-1 below.

TABLE 3-1 RELEVANT REQUIREMENTS

Requirement	Commitment	Timing	Document Reference
Project Planning Approval			
D77	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared prior to the commencement of construction and must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction.	Pre-construction	This procedure
D78	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.	Construction	This procedure
Revised Environmental Management Measures			
SSWQ1	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998)	Pre-construction/ Prior to ground disturbance	Section 5
Construction Environmental Management Framework			
12.2a)	Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:	-	-
v.	A contingency plan, consistent with the NSW Acid Sulphate Soils Manual (ASSMAC 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	Pre-construction	Section 5.2. Appendix E of SWMP – Unexpected Finds Procedure.

4. DESCRIPTION OF ASS ASPECTS AND IMPACTS

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 indicated a low potential for the presence of Potential Acid Sulfate Soils (PASS) in the project area.

Based on the Environmental Assessment, Potential Acid Sulfate Soils or potentially acid forming rock are unlikely to be present within the Project boundary and site ancillary facilities. During the project the following relevant construction activities have been identified for cautionary measures:

- Excavations (deep)
- Piling
- Dewatering.

Potential actions during construction activities that can result in 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 into the environment
- Inadequate treatment of ASS reused for construction material
- Potential ASS effects on concrete structures, road surfaces and road railings 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.

5. PROCEDURES FOR MANAGING AND TREATING ASS

Material source (ie. generated in a cut) 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.

5.1 ASS AVOIDANCE AND MITIGATION

In accordance with the Project requirements listed in Table 3-1, prior to ground disturbance in areas of possible ASS/PASS occurrence, testing would be carried out to determine the presence of these materials. 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
- 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.

5.2 UNEXPECTED DISCOVERY OF ACID SULFATE SOILS

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.

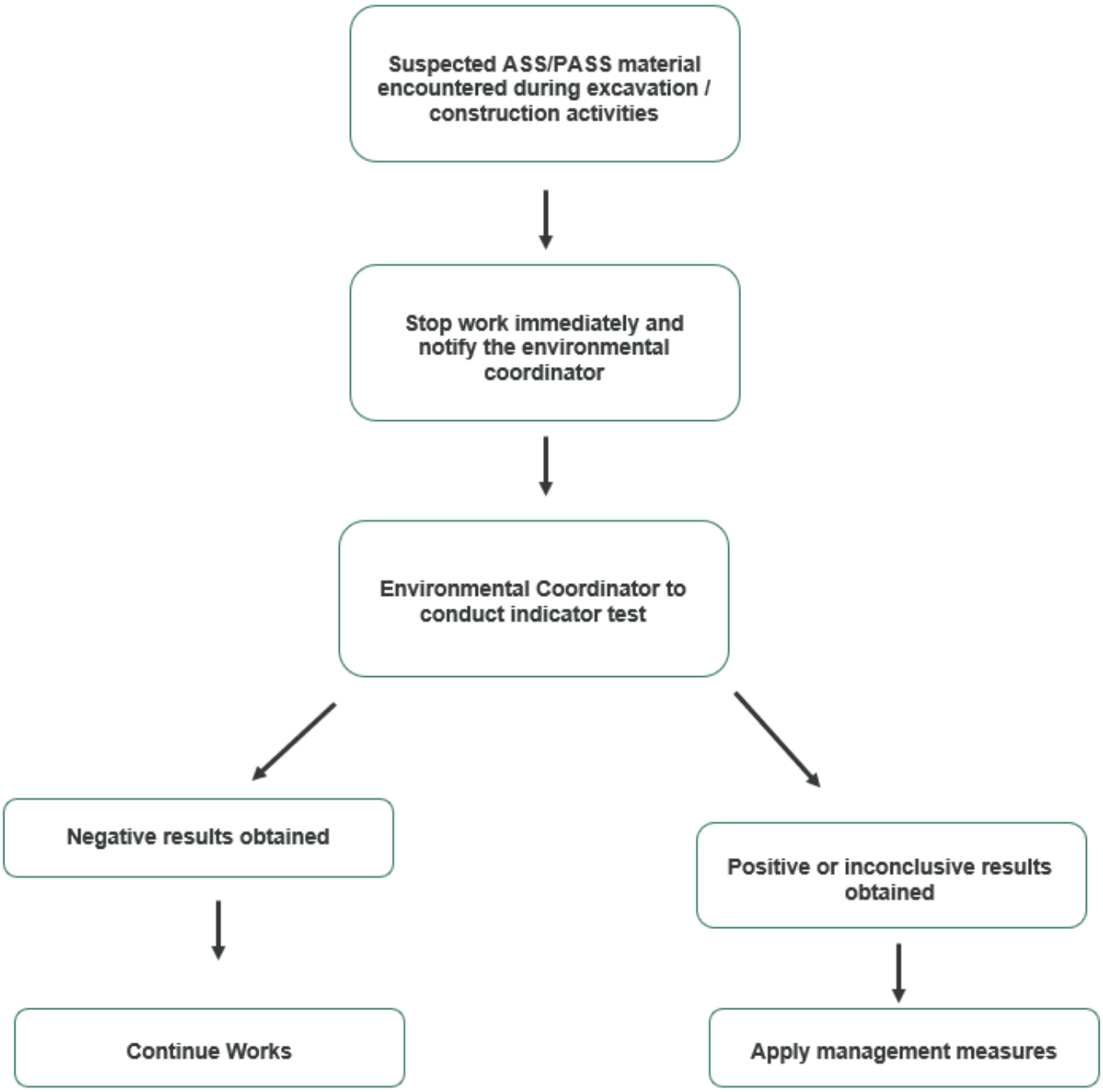


FIGURE 1: UNEXPECTED DISCOVERY OF ASS / PASS

5.3 ASS TREATMENT METHODOLOGY

5.3.1 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.

5.3.2 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 D 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 4-5 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 (Appendix C).
- 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.

5.3.3 TREATMENT OF ASR ONSITE

A simple indicator for determining liming rates for Acid Sulfate Rock is provided in Appendix D 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.

5.3.3.1 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 250 m^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.

5.3.3.2 REUSE OF ASS ON SITE

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.

5.3.3.3 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 (DECCW 2008) 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 AFJV 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 Management sub plan.

5.4 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.

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 6-1 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 and soil conservationist. • 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.

Potential failure	Potential impact	Contingency measures
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.

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 insitu techniques for assessing the likelihood of ASS. The test involves measuring soil pH before and after oxidation using the following parameters:

pH_F — measure of soil pH of a soil:water paste

pH_{FOX} — measure of soil pH after rapid oxidation with hydrogen peroxide (H_2O_2)

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 (pH_F) and field peroxide pH (pH_{FOX}) are detailed as follows:

A.2.1 FIELD PH TEST (PH_F)

The pH_F 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 (PH_{FOX})

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 pH_{FOX} 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 pH_{FOX} 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.

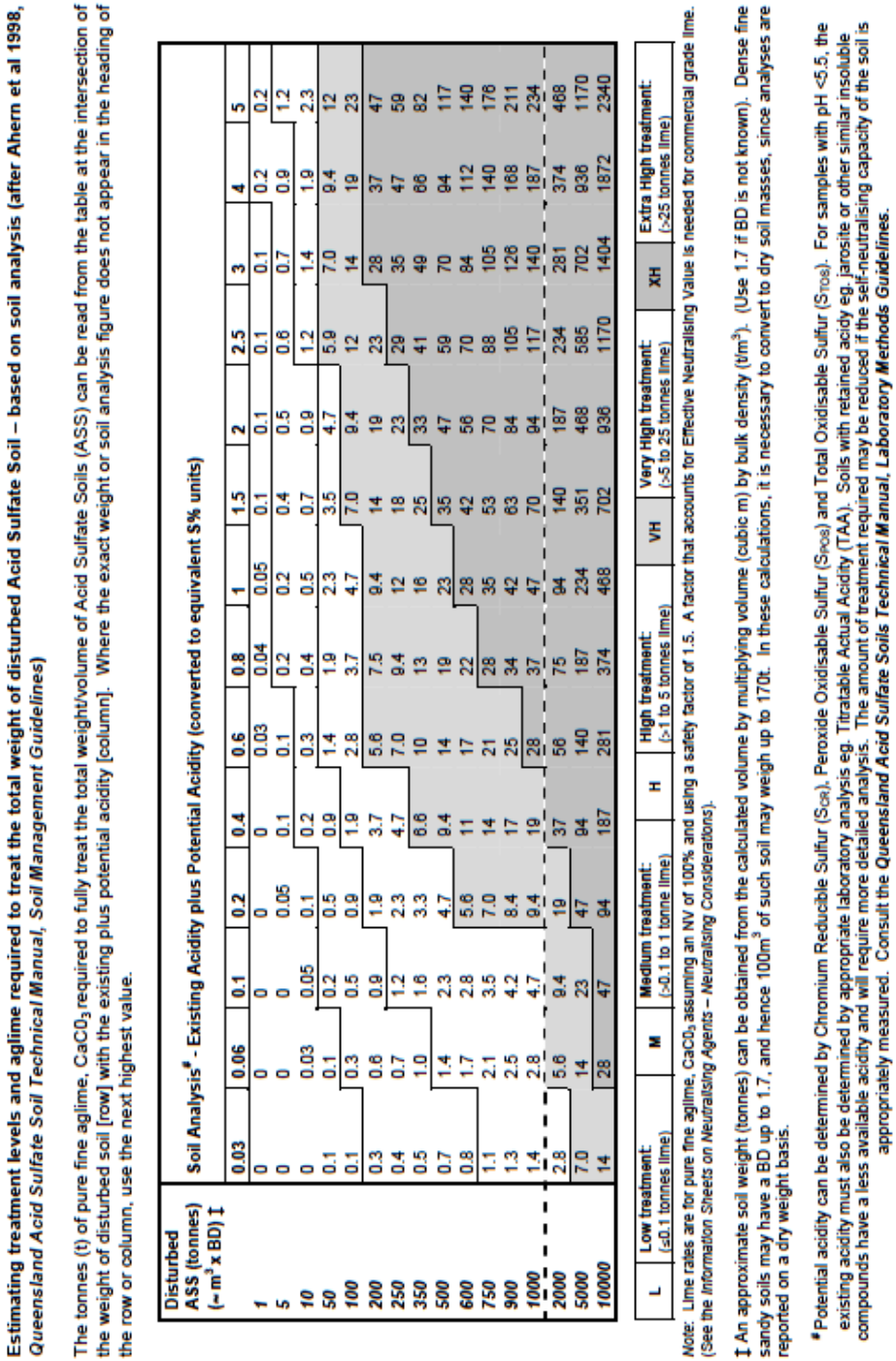
Note of caution with testing of soil with high organic content

- 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.

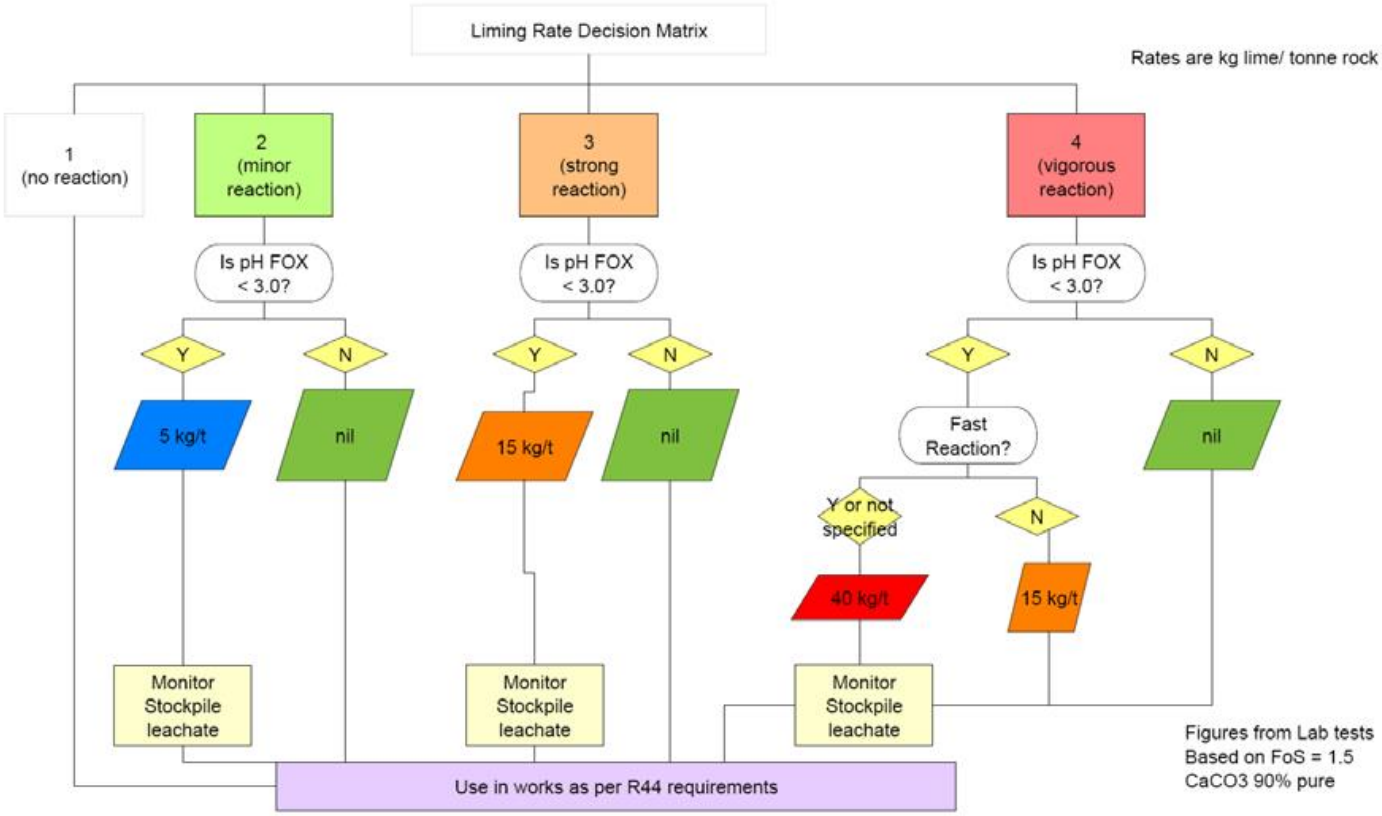
*Potential acidity can be determined by Chromium Reducible Sulfur (S_{CR}), Peroxide Oxidisable Sulfur (S_{POS}) and Total Oxidisable Sulfur (S_{TOS}). For samples with pH <5.5, the existing acidity must also be determined by appropriate laboratory analysis eg. Titratable Actual Acidity (TAA). Soils with retained acidity 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 - ESTIMATING ASR TREATMENT LEVELS AND AGLIME RATES

Figure C1 provides an example flowchart for the treatment of Acid Sulfate Rock, based on pH and liming rates. The requirements for reuse of treated ASR will be undertaken in accordance with the Earthworks Management Plan to conform with RMS Specification R44: Earthworks.

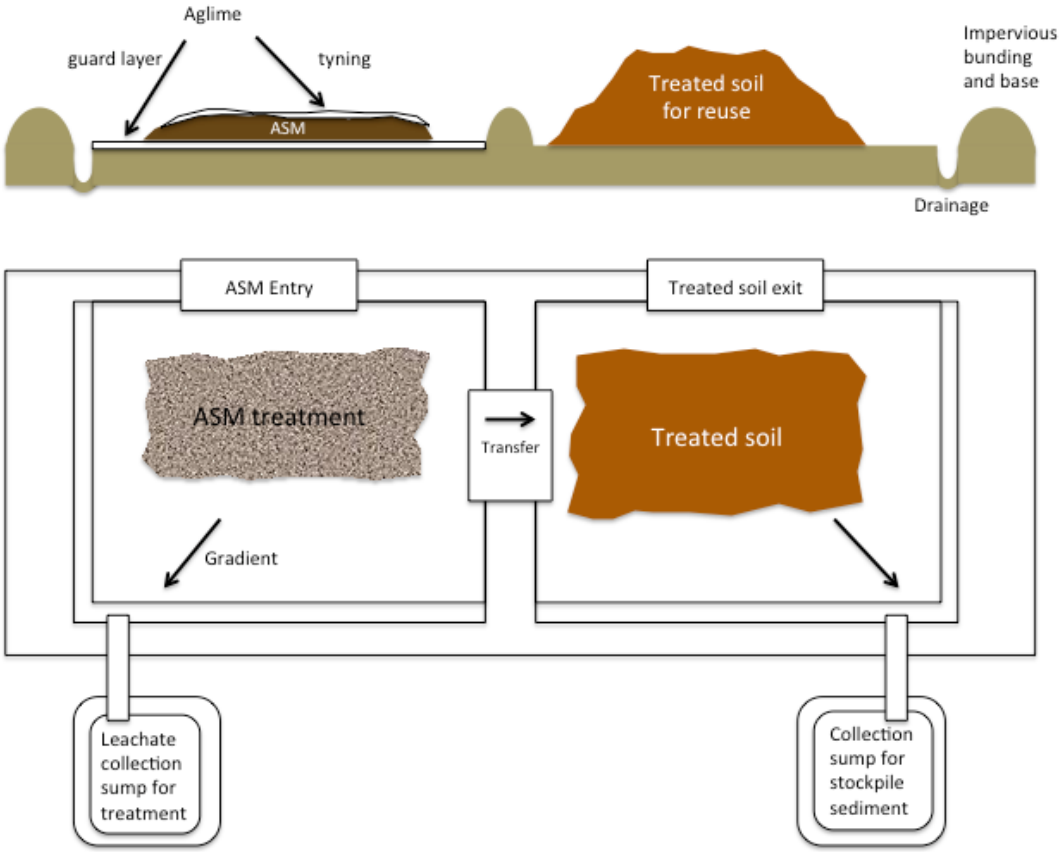
Management of stockpiles and monitoring will be undertaken in accordance with the requirements prescribed in section 6 and 7 of this Procedure.

FIGURE C1: ASR PH AND LIMING RATES FOR TREATMENT FLOWCHART



Appendix D - 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