Appendix B8
Construction Soil and Water Management Sub-plan
M12 Motorway West

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Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	29/04/2022	G. Bolton	Second Draft to address Arcadis/TfNSW review comments
C	25/06/2022	A. Zvirzdinas	Third Draft to address TfNSW/Arcadis comments on Rev B
D	14/07/2022	A. Zvirzdinas	Fourth Draft to address TfNSW/Arcadis/ER comments on Rev C. Document number change.
E	22/07/2022	A. Zvirzdinas	Minor updates to Appendix A and D as per ER and TfNSW comments on Rev D
00	28/07/2022	A. Zvirzdinas	First Controlled Issue
F	25/01/2023	J. Ibrahim	Six monthly review and additional design changes updates
01	03/04/2023	J. Ibrahim	Second Controlled Issue

Document Review

Position	Name	Signature	Date
Project Director	[redacted]	[redacted]	21/4/23

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Acronyms and Abbreviations

Abbreviations	Expanded text
AEP	Annual Exceedance Probability
ANZECC	Australian and New Zealand Environment and Conservation Council
AR	Amendment Report
ARI	Annual Recurrence Interval
ARSR	Amendment Report to the Submissions Report
ASS	Acid Sulfate Soil
ASRIS	Australian Soil Resource Information System
AWS	Automatic Weather Station
BGL	Below Ground Level
BH	Borehole
BOM	Bureau of Meteorology
BTEXN	Benzene, toluene, ethylbenzene, xylene and naphthalene
CAQMP	Construction Air Quality Management Sub-plan
CCLMP	Construction Contaminated Land Management Sub-plan
CFMP	Construction Flood Management Sub-plan
CoA	Conditions of Approval
CPBGG JV	CPB Contractors and Georgiou Group Joint Venture
CPESC	Certified Professional in Erosion and Sediment Control
CSWMP	Construction Soil and Water Management Sub-plan
CWRMP	Construction Waste and Resources Management Sub-plan
CSEP	Community and Stakeholder Engagement Plan
CSSI	Critical State Significant Infrastructure
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DEC	Former NSW Department of Environment and Conservation
DECC	Former NSW Department of Environment and Climate Change
DECCW	Former NSW Department of Environment, Climate Change and Water
DO	Dissolved Oxygen
DPE	NSW Department of Planning and Environment (formerly DPIE)
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
EC	Electrical conductivity
EIS	Environmental Impact Statement
EES	Environment, Energy and Science Group

Abbreviations	Expanded text
Environmental Assessment Documentation	Collective reference to the M12 EIS (Oct 2019(, Submissions Report (Oct 2020), Amendment Report (Oct 2020), Amendment Report-Submissions Report (Dec 2020) and supplementary reports
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
ER	Environmental Representative (independent)
ESCP	Erosion and Sediment Control Plan
ESM	Environment and Sustainability Manager (TfNSW)
ESR	Environmental Site Representative (CPBGG JV)
ESRP	Emergency Spill Response Sub-Plan
EWMS	Environmental Work Method Statements
GDE	Groundwater Dependent Ecosystem
HRC	Healthy Rivers Commission
LEP	Local Environment Plan
NSW CoA	NSW Conditions of Approval
NRAR	Natural Resources Access Regulator
OCEMP	Overarching Construction Environmental Management Plan
OCS	Overarching Communication Strategy
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PESCP	Progressive Erosion and Sediment Control Plan
PIRMP	Pollution Incident Response Management Plan
POEO Act	*Protection of the Environment Operations Act 1997*
Primary CoA/REMM	CoA or REMM that is specific the development of this Plan
Redox	Reduction-oxidation
REMM	Revised Environmental Management Measure as provided in the Amendment Report
RUSLE	Revised Universal Soil Loss Equation
RTA	Roads & Traffic Authority. Former NSW Roads and Maritime Services. Now Transport for NSW
RUSLE	Revised Universal Soil Loss Equation
SDS	Safety Data Sheet
SEARS	Secretary's Environmental Assessment Requirements

Abbreviations	Expanded text
Secondary CoA/ REMM	CoA or REMM that is related to, but not specific to, the development of this Plan
SEPP	State Environmental Planning Policy
SMP	Sustainability Management Plan
SRE	Sensitive Receiving Environment
TN	Total nitrogen
TP	Total phosphorus
TfNSW	Transport for New South Wales (formerly NSW Roads and Maritime Services)
WSIA	Western Sydney International Airport

1 Introduction

1.1 Context

This Construction Soil and Water Management Sub-plan (CSWMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway West project (the Project). The CPB Contractors and Georgiou Group Joint Venture (CPBGG JV) has been awarded the M12 West (construct only contract) – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek.

An Overarching Construction Environmental Management Plan (OCEMP) has been prepared by TfNSW to address to address the requirements of the NSW Conditions of Approval (CoA), the Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report (AR), Amendment Report Submissions Report (ARSR), all applicable legislation and Transport for New South Wales (TfNSW) Quality Assurance (QA) specifications. The OCEMP, sub-plans and associated monitoring programs were approved by DPIE on 21/12/2021.

This CSWMP has been prepared by CPBGG JV to address the requirements of the OCEMP, all relevant TfNSW specifications, EPL conditions and legislation.

1.2 Background

The Project EIS assessed soil and water impacts from construction of the Project and detailed soil and water assessments were prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW DPIE and the Commonwealth EIS Guidelines issued by the Commonwealth Department of the Water, Agriculture and Environment (DAWE, now Department of Climate Change, Energy, the Environment and Water (DCCEEW)). These detailed soil and water assessments included:

- Surface water quality and hydrology assessment (EIS Appendix I)
- Groundwater quality and hydrology assessment (EIS Appendix J)
- Soil and contamination assessment (EIS Appendix O).

Further assessment of soil and water impacts was undertaken subsequent to exhibition of the EIS and incorporated into the Amendment Report (AR). The additional assessment considered the impacts on soil and water due to refinements in the Project design, including changes in the Project footprint and ancillary facilities. The updated assessments included:

- Surface water quality and hydrology supplementary technical memorandum (AR Appendix I)
- Groundwater quality and hydrology supplementary technical memorandum (AR Appendix J)
- Soils and contamination supplementary technical memorandum (AR Appendix K).

REMMs were provided within the Amendment Report – Submissions Report (ARSR). Where applicable, the REMMs have been included in this Plan. Further, design development has progressed, providing additional environmental assessment, and where relevant, this detail has been included within this Plan.

The detailed Project description is outlined in Section 1.3 of the CEMP.

1.3 Scope of the Plan

The scope of this CSWMP is to describe how the CPBGG JV propose to manage potential soil and water impacts during construction of the Project.

In accordance with NSW CoA A7, references in the terms of this CSWMP to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this CSWMP.

Operational soil and water impacts and operational measures do not fall within the scope of this CSWMP and are therefore not included within the processes contained within the CSWMP.

For works on the Western Sydney International Airport (WSIA), section 1.3 of the CEMP outlines the requirements.

1.4 Environmental Management Systems Overview

The overall Environmental Management System for the Project is described in Section 1.4 of the Construction Environmental Management Plan (CEMP)

The CSWMP forms part of CPBGG JV's environmental management framework for the Project, as described in Section 1.4 of the CEMP.

Management measures identified in this CSWMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS) and Erosion and Sediment Control Plans (ESCP). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS. EWMSs will be developed and provided to TfNSW in advance of works under TfNSW G36 Hold point cl 3.2.4.

EWMS will be prepared for:

- Activities that involve work in waterways or that pose a risk to receiving water quality, including:
  - Construction and operation of sediment basins and/ or buffer swales and connecting drainage for the associated catchment area
  - Construction of culverts and bridges over waterways, including associated staging, flow diversions, any dewatering, short and long term stabilisation and removal of existing structures
  - Vegetation clearing and grubbing
  - Activities where construction water may be discharged into natural waterways
  - Construction and operation of concrete wash out areas
- Topsoil stripping, including temporary stockpiling and disposal of excavated material and protocols for the management of materials containing asbestos
- All works associated with rehabilitation of farm dams including, but not limited to, dewatering and filling
- Any other high risk activities identified in the CPBGG JV environmental risk workshops.

EWMS will be prepared by the Environmental Site Representative (ESR) and reviewed by the TfNSW Project Manager and TfNSW Environment and Sustainability Manager (ESM) (or delegate) and independent Environmental Representative (ER) prior to the commencement of the construction activities to which they apply. Construction personnel undertaking a task governed by an EWMS will undertake the activity in accordance with the mitigation and management measures identified in the EWMS.

ESCPs are designed for use as a practical guide to provide more detailed site-specific erosion and sediment control measures. ESCPs will be developed by the ESR in consultation with construction personnel and the Contractor Soil Conservationist, as required. ESCPs will be modified to reflect site conditions at the time of construction.

Used together, the CEMP, strategies, procedures, EWMS and ESCP form management guides that clearly identify required environmental management actions for reference by CPBGG JV personnel and subcontractors

The review and document control processes for this CSWMP are described in sections 3.11, 3.12 and 3.13 of the CEMP.

1.4.1 CSWMP Preparation, Endorsement and Approval

This CEMP sub plan will be approved by the CPBGG JV Project Director and ESR prior to submission to TfNSW.

This CSWMP has been reviewed by the CPBGG JV Soil Conservation, evidence is contained in Appendix H.

The CEMP, Sub-Plans and monitoring programs will go through a review and update process as described in section 3.1 of TfNSW Specification G36 to ensure the CEMP and associated documents have been developed in accordance with the OCEMP. TfNSW will provide the CEMP, sub-plans and monitoring programs to the ER for approval.

A hold point shall be submitted in accordance with G36 Section 3.1 - Preparation and submission of CEMP. TfNSW shall consider the documents prior to authorising the release of the Hold Point. Where

appropriate, CPBGG JV may provide TfNSW with an alternative equivalent procedure or plan that meets the requirements identified in this CSWMP and the relevant TfNSW specifications.

TfNSW will review the documentation to confirm consistency with the requirements of this CSWMP and specifications. TfNSW may request additional information for inclusion in the CEMP before authorising the release of the Hold Point. The CEMP, all associated sub plans and monitoring programs require endorsement / approval by the ER prior to construction. The monitoring programs must be implemented for the duration of construction or for any longer period as set out in the monitoring program or as specified by the Planning Secretary, whichever is greatest in accordance with NSW CoA C17.

1.4.2 Interactions with other management plans

This Plan has the following interrelationships with other management plans and documents:

- The Construction Flood Management Sub-plan (CFMP) addresses how flood related impacts will be managed during construction of the Project
- Pollution incidents will be managed in accordance with a stage specific Pollution Incident Response Management Plan (PIRMP)
- The Construction Contaminated Land Management Sub-plan (CCLMP) addresses the management of contaminated lands, unexpected contaminated finds and landfill gas
- The Construction Air Quality Management Sub-plan (CAQMP) addressed the management of dust and odour
- The Construction Waste and Resources Management Sub-plan (CWRMP) addresses the management of waste including the classification and handling of spoil.
- The Sustainability Management Plan (SMP) addresses sustainability matters and sets sustainability targets/requirements for the Project

1.5 Consultation

1.5.1 Consultation for preparation of the CSWMP

Section 1.9.2 (Table 1-5) of the OCEMP outlines consultation undertaken during the development of the OCEMP as required by the CoA and Revised Environmental Management Measures (REMMs).

A copy of this CEMP Sub-Plan will be provided to the relevant government agencies for their information once these documents have been approved by the Independent Environmental Representative (ER).

CPBGG JV will liaise with TfNSW regarding any additional consultation requirements required for the development of the Contractors CEMP.

1.5.2 Ongoing consultation during construction

Ongoing consultation between CPBGG JV, TfNSW and stakeholders, the community and relevant agencies regarding the management of soil and water impacts will be undertaken during the construction of the Project as required. The process for the community consultation will be documented in the Community and Stakeholder Engagement Plan (CSEP).

In accordance with NSW CoA E108, TfNSW will consult NSW Department of Primary Industries (DPI) Fisheries and Environment and Heritage Group during the detailed design of permanent watercourse crossings.

During construction CPBGG JV will notify NSW Department of Primary Industries (DPI) Fisheries in accordance with the Fisheries Management Act 1994 for any dredging or reclamation works associated with temporary works in waterways e.g. watercourse crossings.

2 Purpose and objectives

2.1 Purpose

The purpose of this CSWMP is to describe how impacts on soil and water will be managed during construction of the Project.

2.2 Objectives

The key objective of the CSWMP is to ensure all OCEMP, CoAs, TfNSW specifications and licence/permit requirements relevant to soil and water including water quality are described, scheduled and assigned responsibility as outlined in:

- Environmental Assessment Documentation
- NSW CoA granted to the Project on 23 April 2021
- EPL 21595
- TfNSW QA Specifications
- All relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3 Targets

Targets for the management of soil and water impacts during the Project include:

- Achieve full compliance with relevant legislative requirements, the OCEMP, CoA and TfNSW specifications
- Achieve full compliance with EPL water quality discharge parameters for all planned basin discharges (i.e. those within design capacity)
- Manage downstream water quality impacts attributable to the Project and maintain waterway health by avoiding the introduction of nutrients, sediment and chemicals outside of that permitted by the EPL and/or ANZECC guidelines
- Provide training on best practice soil and water management to all construction personnel through site inductions
- Minimise impacts on, and complaints from, the community and stakeholders.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation and regulations relevant to soil and water quality management include:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Environmental Planning and Assessment Regulation 2000*
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Water Management Act 2000*
- *Fisheries Management Act 1994*
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*
- *Work Health and Safety Act 2011* (WHS Act)
- *Contaminated Land Management Act 1997* (CLM Act)
- *Water Act 1912.*

Relevant provisions of the above legislation are identified in the register of legal requirements included in Appendix A1 of the CEMP.

3.1.2 Guidelines and standards

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

- Acid Sulfate Soil Manual (ASSMAC 1998).
- Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009
- Approved Methods for Sampling and Analysis of Water Pollutants in NSW (EPA, 2022)
- AS/NZS 5667.1.1988 (R2016) Water quality -Sampling Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000)
- Bunding and Spill Management Guidelines contained within EPA Environmental Protection Manual for Authorised Officers (EPA, 1995)
- Code of Practice for Water Management - Road Development and Management (RTA, 1999)
- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu" November 1997
- Environmental Best Management Practice Guideline for Concreting Contractors, DEC (2004)
- Environmental Direction: Management of Tannins from Vegetation Mulch, Roads and Maritime Services: Sydney (RMS, 2012)
- Erosion and Sediment Management Procedure – RTA Procedures PN 143P (RTA, 2009)
- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries
- *Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings* (Ref: NSWF – 1181) (NSW Fisheries, November 2003)
- Guideline for Construction Water Quality Monitoring (RTA, 2003)
- Guidelines for controlled activities on waterfront land (DPI, 2012)
- Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (RTA 2005)
- Managing Urban Stormwater: Soils and Construction Volume 1, Landcom, (4th Edition) March 2004 (reprinted 2006) (the “Blue Book”).
- Managing Urban Stormwater: Soils and Construction Volume 2A Installation of Services (DECCW 2008).

- Managing Urban Stormwater: Soils and Construction Volume 2C Unsealed Roads (DECCW 2008)
- Managing Urban Stormwater: Soils and Construction Volume 2D Main Roads Construction (DECCW 2008)
- NSW Aquifer Interference Policy (NSW DPI - Office of Water, 2012)
- Roads and salinity (Department of Infrastructure, Planning and Natural Resources (DIPNR), 2003)
- Roads and Maritime Environment Direction Management of Tannins from Vegetation Mulch (RMS, 2012)
- Roads and Maritime Management of Wastes on Roads and Maritime Services Land (RMS, 2014)
- Stockpile Site Management Guideline (RMS, 2011)
- Stockpile Site Management Procedures (RTA, 2011)
- Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005)
- Technical Guideline – Environmental Management of Construction Site De-watering (RMS, 2011)
- Technical Guideline: Temporary Stormwater Drainage for Road Construction (RMS, 2011)
- TfNSW Code of Practice for Water Management
- TfNSW Water Discharge and Reuse Guideline (TfNSW, 2016)
- TfNSW QA Specification G1 – Job Specific Requirements for The M12 Motorway
- TfNSW QA Specification G36 – Environmental Protection (Management System)
- TfNSW QA Specification G38 – Soil and Water Management
- TfNSW QA Specification G40 – Clearing and Grubbing
- PS311 – Environmental Design and Compliance, specifically:
  - M12 Motorway Surface Water Monitoring Second Report 2 – April 2019 to March 2020 (GHD, 2020)
  - M12 Motorway Surface Water Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2020)
  - M12 Motorway Groundwater Monitoring Second Report 2– April 2019 to March 2020 (GHD, 2021)
  - M12 Motorway Groundwater Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)
  - M12 Motorway Package 1 – West, Erosion and Sediment Management Report (WSP, 2020)
  - M12 Motorway West Package Detailed Design Erosion and Sediment Management Report (GHD, 2020)

TfNSW specifications are a key source of environmental protection management processes relevant to this CSWMP. The specifications set out environmental protection requirements, including Hold Points that must be complied with during construction of the Project. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from TfNSW. Refer to CEMP Table 3-6 for a list of Environmental Hold points (G36, G38 and G40)

3.2 Minister's Conditions of Approval

The primary NSW CoA relevant to the development of this CSWMP are listed in Table 3-1. The primary NSW CoA relevant to the Construction Soil and Water Monitoring Program are included below. Secondary CoA relevant to this Plan have been listed in Appendix G. A cross reference is also included to indicate where the CoA is addressed in this CSWMP or other project management documents.

Table 3-1 Primary NSW CoA

CoA No.	Condition Requirement	Document reference
A5	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken and submitted to the Planning Secretary, and the terms of this approval require the document, monitoring program or review to be prepared/undertaken in consultation with identified parties, evidence of the consultation must be submitted to the Planning Secretary with the relevant document, monitoring program or review. The evidence must include:	OCEMP, OCSWMP Section 1.5.1
	(a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval;	
	(b) a log of the dates of engagement or attempted engagement with the identified party	
	(c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations;	
	(d) outline of the issues raised by the identified party and how they have been addressed; and	
	(e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed	
C2	The CEMP must provide: (h) a list of all the CEMP Sub-plans required in respect of construction, as set out in Condition C4 Where staged construction of the Critical State Significant Infrastructure (CSSI) is proposed, the CEMP must also identify which CEMP Sub-plan applies to each of the proposed stages of construction;	OCEMP
	(k) for periodic review and update of the CEMP and all associated plans and programs.	CEMP Section 3.13
C4	The following CEMP Sub-plans must be prepared in consultation with the relevant government and other agencies identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies as required by Condition A5.	OCEMP Section 1.5
	(d) Soil and contamination - DPIE Water, Water NSW and relevant council(s)	
	(e) Surface water and groundwater - DPIE Water, Water NSW, Sydney Water (where it is proposed to discharge to Sydney Water assets) and relevant council(s) *Note: Nothing in this condition prevents the Proponent from combining any of the above CEMP Sub-plans.*	
C5	The CEMP Sub-plans must state how: (a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	Section 2.2 Section 2.3

CoA No.	Condition Requirement	Document reference
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;	Section 6
	(c) the relevant terms of this approval will be complied with; and	Section 2.2 Section 2.3
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART (Specific, Measurable, Achievable, Realistic and Timely) principles.	Section 5.2.1 Section 8
C7	The Surface Water and Groundwater CEMP Sub-Plan must be based on a detailed site investigation of contamination risk and include, but not be limited to:	
	(a) details of water pollution mitigation measures including measures to avoid and minimise discharges;	Section 6
	(b) identification of the relevant ambient water quality objectives for receiving waterways and water quality management criteria for achieving the objectives; and	Appendix C – Construction Soil and Water Quality Monitoring Program
	(c) a Trigger Action Response Protocol for potential discharge waters, identifying alternative disposal options for water with contaminant concentrations exceeding water quality management criteria.	Appendix D – Dewatering Management Plan
C9	Any of the CEMP Sub-plans may be submitted to the Planning Secretary for approval along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before the commencement of construction.	Section 1.5
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved, unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where construction of the CSSI is staged, construction of a stage must not commence until the CEMP and sub-plans for that stage have been endorsed by the ER and approved by the Planning Secretary.	Section 1.4.1

3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this CSWMP are listed in Table 3-2 below. Secondary REMMs relevant to this Plan have been listed in Appendix G. A cross reference is also included to indicate where the REMM is addressed in this CSWMP or other project management documents.

Table 3-2 Primary REMMs

ID	Measure/requirement	Timing	Document Reference
SWH01	A Construction Soil and Water Management Plan (CSWMP) will be prepared for the project. The plan will outline measures to manage soil and water impacts associated with the construction works, including contaminated land. The CSWMP will provide:	Prior to construction	This CSWMP

ID	Measure/requirement	Timing	Document Reference
	• Measures to minimise/manage erosion and sediment transport both within the construction footprint and offsite including requirements for the preparation of Erosion and Sediment Control Plans (ESCP) for all progressive stages of construction	Prior to construction	Section 6.1
	• Measures to manage waste including the classification and handling of spoil	Prior to construction	CWRMP
	• Procedures to manage unexpected contaminated finds including asbestos which would be outlined in the Contaminated Land Management Plan and asbestos management plan to be prepared for the Project	Prior to construction	CCLMP
	• Measures to manage stockpiles including locations, separation of waste types, sediment controls and stabilisation	Prior to construction	Section 6.4 CWRMP
	• Measures to manage groundwater de-watering and impacts including mitigation required	Prior to construction	Section 6.6 Section 6.7
	• Measures to manage potential tannin leachate	Prior to construction	Section 6.5
	• Measures to manage accidental spills including the requirement to maintain materials such as spill kits	Prior to construction	Section 6.12
	• Measures to manage potential saline soils	Prior to construction	Section 6.3.1
	• Details of surface water and groundwater quality monitoring to be carried out before, throughout, and following construction	Prior to construction	Appendix C – Construction Soil and Water Quality Monitoring Program
	• Controls for sensitive receiving environments including SEPP Coastal Wetlands which may include but not be limited to: ○ Designation of 'no go' zones for construction plant and equipment ○ Creation of catch/diversion drains and sediment fences at the downstream boundary of construction activities where practicable to ensure containment of sediment-laden runoff and diversion toward sediment sump treatment areas (not sediment basins) to prevent flow of runoff to the SEPP Coastal Wetland.	Prior to construction	Section 6.1
	• Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the "Blue Book", as well as relevant TfNSW Guidelines.	Prior to construction	Section 6.1

3.4 Environmental Protection Licence

The Project is subject to an EPL as a Scheduled Activity for ‘road construction. The EPL typically prescribes water quality parameters to be measured and associated discharge criteria for licensed discharge points. The EPL also details the monitoring and analytical requirements by reference to authority publications (e.g. Approved Methods for Sampling and Analysis of Water Pollutants in NSW (EPA, 2022)). The M12 Motorway West - Impact Assessment of Sediment Control Basin Discharges to Waterways (2021), CSW monitoring program (Appendix C – Construction Soil and Water Quality Monitoring Program) and the Dewatering Management Plan (Appendix D – Dewatering Management Plan) identify the EPL water discharge criteria.

4 Existing Environment

The following section summarises the existing soil and water conditions within and adjacent to the Project, based on information contained in the EIS. Baseline surface water and groundwater data is provided in the Surface Water Quality Monitoring Program (Appendix C).

The key reference documents are:

- Surface water quality and hydrology assessment (EIS Appendix I)
- Groundwater quality and hydrology assessment (EIS Appendix J)
- Soil and contamination assessment (EIS Appendix O)
- Surface water quality and hydrology supplementary technical memorandum (Amendment Report Appendix I)
- Groundwater quality and hydrology supplementary technical memorandum (Amendment Report Appendix J)
- Soils and contamination supplementary technical memorandum (Amendment Report Appendix K)
- Pre-construction surface and ground water monitoring reports including:
  - M12 Motorway Surface Water Monitoring Second Report 2 – April 2019 to March 2020 (GHD, 2020)
  - M12 Motorway Groundwater Monitoring Second Report 2– April 2019 to March 2020 (GHD, 2020)
  - M12 Motorway Surface Water Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)
  - M12 Motorway Groundwater Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)
  - M12 Motorway Surface Water Monitoring Program Report 6 – October 2021 to March 2022 (GHD, 2022)
  - M12 Motorway Groundwater Monitoring Report 6 – October 2021 to March 2022 (GHD, 2022)
  - M12 Motorway Surface Water Monitoring Program Report 7 – April to September 2022 (GHD, 2022)

4.1 Topography, Geology and Soil Characteristics

4.1.1 Topography

The topography of the West Project area is characterised into the general terrain type as detailed in Table 4-1.

Table 4-1 Summary of terrain and topography

Terrain Type	Location	Topography
Rolling hills	M12 West stage	Comprises rounded hills with slopes of five to 20 degrees.

4.1.2 Geology

Based on review of the Penrith 1:100,000 geological map (Clarke and Jones, 1991) and completed project geotechnical borehole logs, the Project intersects two surface geological units as identified in Figure 4-1 and summarised in Table 4-2.

Table 4-2 Summary of geological units

Geological unit	Characteristics
Quaternary Alluvium	• Located in the vicinity of Cosgroves Creek, Badgerys Creek, South Creek and Kemps Creek • Consists of fine to medium-grained sand, silt and clay
Bringelly Shale bedrock	• Upper member of the Wianamatta Group

	• Consists of shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff

The alluvium deposits are relatively thin, occurring between about 2.5 metres below ground level (BGL) to 7.0 metres BGL.

Project boreholes encountered siltstone, sandstone and interlaminated siltstone, and sandstone at typical depths of about one (1) metre BGL to five (5) metres BGL. Based on project boreholes and regional experience, it is expected that where Bringelly Shale is present near the surface, ground conditions would comprise one (1) metre to five (5) metres of high plasticity, low permeability residual clays over highly weathered bedrock

No igneous intrusions are shown in the geological map, however based on previous experience with rail and road route studies throughout Sydney, it is anticipated that two (2) to four (4) igneous dykes/intrusions may be present.

The Project may be crossed at two locations by faulting or folding including:

- Narellan Lineament – The overall north/south linearity of South Creek suggests that it may be structurally controlled. There are also a number of north-east trending tributaries into the South Creek channel, such as Cosgroves Creek, which may be an expression of regional faulting trends
- Rossmore Anticline – This feature is described as a structural high within the Wianamatta Group. The geological map shows this feature ending at Elizabeth Drive, just to the east of the intersection with Luddenham Road. However, this feature may extend further north, crossing the western end of the Project footprint. If this is the case, then bedrock bedding dips in the vicinity of such a feature could be altered and potentially dipping to the west on the western side of this structure.

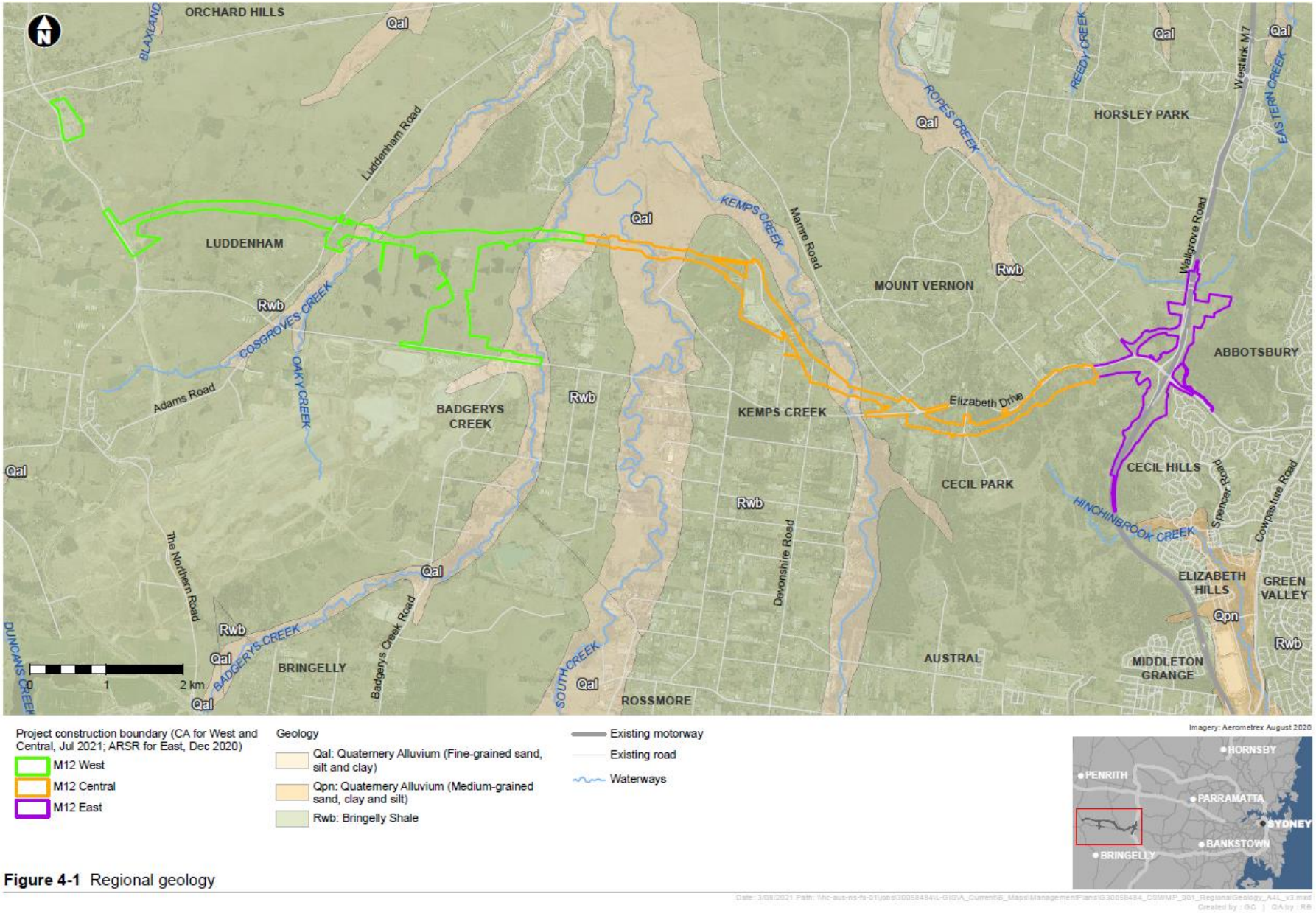


Figure 4-1 Regional geology

Figure 4-1 Regional geology

4.1.3 Soil Landscape

Based on a review of the 1:100,000 scale Soil Landscape Map for Penrith (Bannerman and Hazelton 1990), the M12 West stage Project is underlain by three soil landscapes as identified in Figure 4-2 and summarised in Table 4-3.

Table 4-3 Summary of soil landscapes

Soil Landscape	Characteristics
South Creek – fluvial deposits located along all four creek channels	• Described as Quaternary alluvium derived from Wianamatta Group shales that comprise deep sandy, sandy clay and clay soils that were deposited as part of the current active South Creek drainage network • A dynamic soil landscape with many areas of erosion and deposition • Relevant limitations for development include high erodibility, shrink-swell potential, salinity, low fertility and localised areas of permanently high-water tables or seasonal waterlogging
Blacktown – residual soils located in the flat to gently undulating terrain between creek channels	• Described as shallow to moderately deep clays and silty clays derived from the Bringelly Shales • Relevant limitations for development include strongly acidic, low fertility, high shrink-swell, low permeability potential for salinity, high erodibility
Luddenham – residual soils located on the low rolling hills at both ends of the Project footprint	• Derived from Bringelly Shales and is described shallow to moderately deep, typically comprising clays, and where Minchinbury Sandstone may be present sandy clays • Moderately inclined slopes of 10 to 20 per cent are the dominant landform • Development limitations included high erosion hazards, together with a high shrink-swell potential and low permeability and low fertility

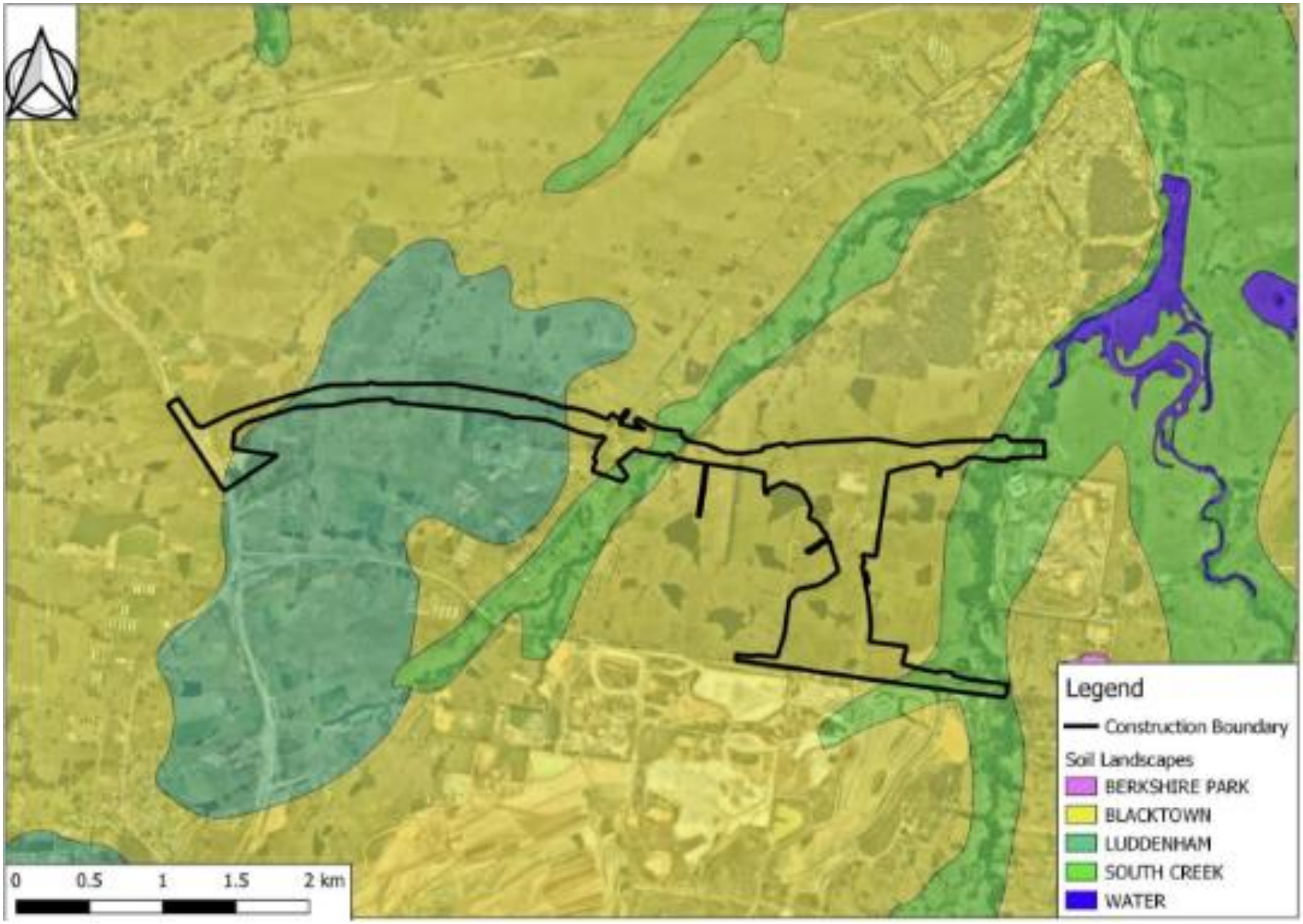


Figure 4-2 Soil landscapes (NSW Government eSpade)

4.1.4 Soil Salinity

The Salinity Potential in Western Sydney 2002 Map (DLWC, 2002b) shows the soils along the alignment have a moderate salinity potential, except for low-lying footslopes around Badgerys and Cosgroves Creek where the salinity potential is high (Figure 4-3).

Additional saline areas may be present which have not yet been identified or may occur if site conditions change adversely. Areas of current or potential soil salinity are expected along the Project footprint where there is alluvium, waterlogged ground or shallow groundwater.

4.1.5 Acid Sulfate Soils (ASS)

The Australian Soil Resource Information System's (ASRIS, 2018) online ASS risk map indicates the Project footprint is located within an area considered to have an extremely low probability of ASS occurrence. It indicates that there is no known or expected occurrence of ASS within the Project footprint.

Additionally, a search was carried out within Penrith Council (2010) and Liverpool Council (2008) LEPs for ASS risk maps for the Project footprint to determine the probability of ASS occurrence. Council ASS risk maps typically categorise ASS in terms of Class (i.e. Class 1, 2, 3 or 4). The search found no ASS risk maps exist for the construction footprint and so conclusions can be drawn that there is no known or expected occurrence of ASS within the Project footprint.

Geotechnical investigations have since been carried out as part of detailed design which have included testing for ASS. These investigations indicate that there is a moderate risk of encountering Potential Acid Sulphate Soils (PASS) during the proposed works in the vicinity of waterways and farm dams.

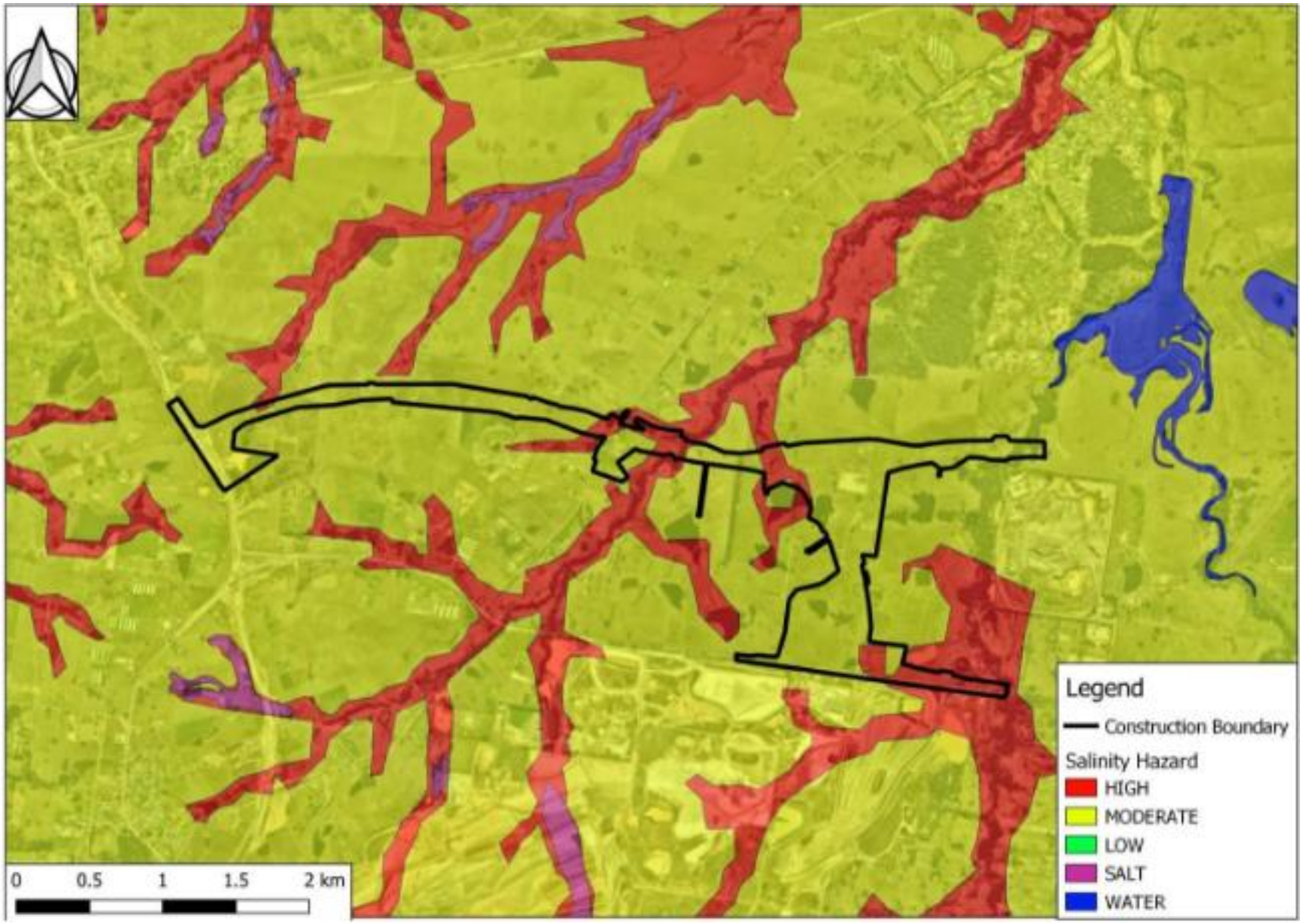


Figure 4-3 Soil salinity risk map (DIPNR 2003)

4.2 Surface Water

4.2.1 Catchments and Waterways within or adjacent to the Project

The M12 Motorway West Project is located primarily within the South Creek sub catchment in the Lower Nepean River Management Zone of the Hawkesbury-Nepean Catchment.

The Project intersects a number of waterways, ephemeral drainage lines and their associated catchments:

- Cosgroves Creek catchment - land use within the Cosgroves Creek catchment is largely rural with some residential estates (Twin Creek Golf and Country Club)
- Badgerys Creek catchment - land use within the Badgerys Creek catchment consists of agricultural (grazing of naturalised and modified pastures) and rural residential
- South Creek catchment - shale-based catchment that encompasses most of the Cumberland Plain of western Sydney and is regarded as degraded, largely due to long term clearing of vegetation and increased impervious areas due to urbanisation

These creeks drain into South Creek which then flow north to join the Hawkesbury River at Windsor. There are also numerous farm dams in the area.

The major hydrological features in the Project area are shown on Figure 4-4.

4.2.2 Geomorphology and river style

A description of the key watercourses and their geomorphological features at the point where the M12 Motorway West Project intersects is provided in Table 4-4.

Table 4-4 Summary of watercourse geomorphology

Watercourse	Watercourse description	Geomorphological description
Cosgroves Creek	Cosgroves Creek is an ephemeral fourth order stream with a series of disconnected pools and named and unnamed tributaries including Oaky Creek	Cosgroves Creek is a discontinuous channel with steep channel gradient, a depth of about two (2) metres and an average channel width of about five (5) metres. The substrate consists of silty clay. Significant undercutting occurs at meander bends, suggesting a high potential for erosion at this site.
Badgerys Creek	Badgerys Creek is the largest tributary of South Creek in the study area. Badgerys Creek is a fourth order stream originating near Bringelly	Badgerys Creek is an incised meandering channel with irregular bank morphology due to abundant riparian vegetation and woody debris. Significant undercutting occurs along the length of the channel. The channel has a steep gradient with a channel depth greater than three (3) metres and average channel width of about five (5) metres
South Creek	South Creek is a major fifth order tributary of the Hawkesbury-Nepean River. South Creek is tidal in its lower reaches. South Creek is joined by 17 tributaries including Badgerys, Cosgroves, Kemps, Ropes and Eastern Creek	South Creek has a moderate gradient and a discontinuous channel which lies within a largely un-vegetated floodplain. Some bank undercutting occurs along the exposed right bank. The depth of the channel appears shallow and channel width is about seven (7) metres.

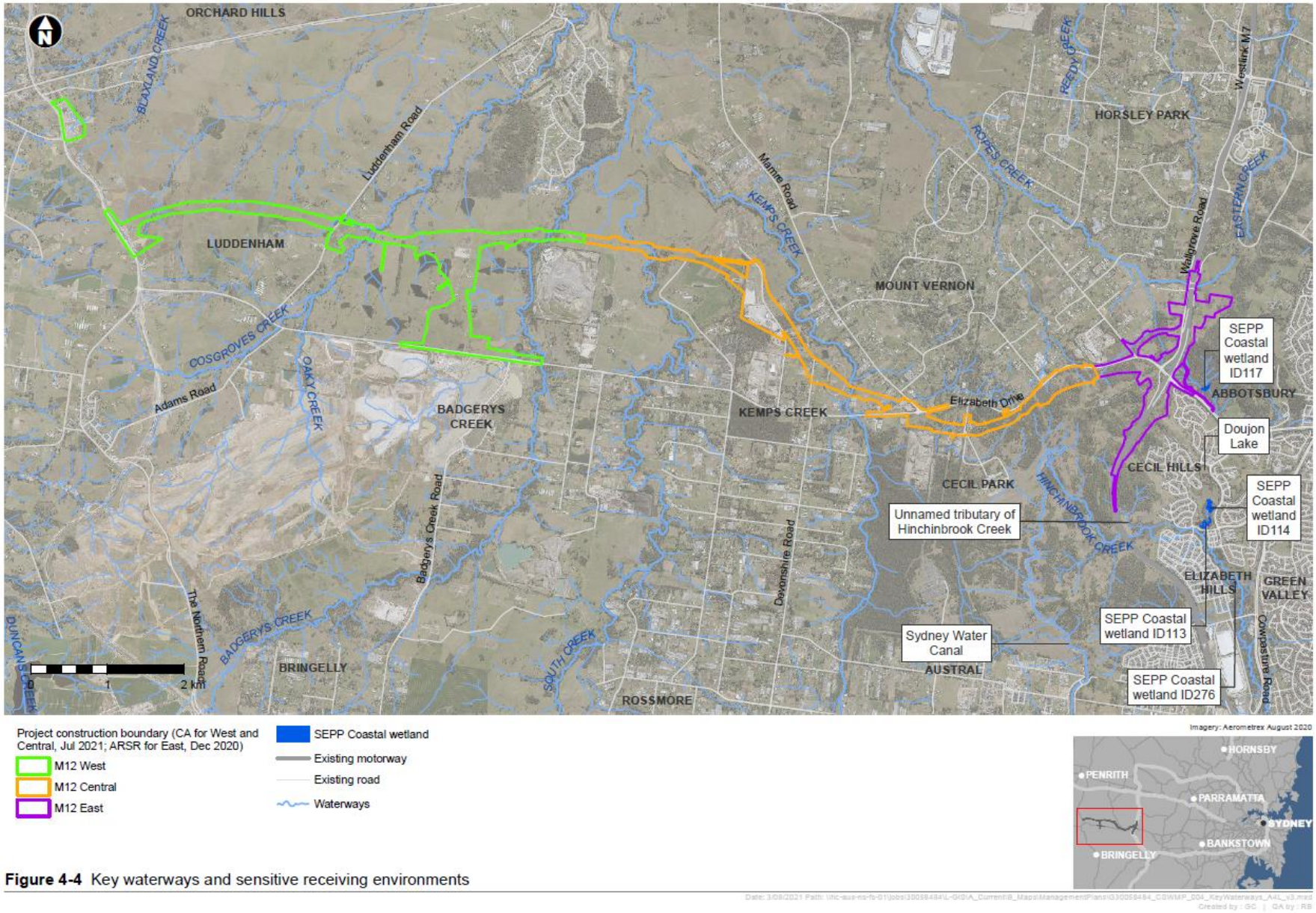


Figure 4-4 Key waterways and sensitive receiving environments

Figure 4-4 Key waterways and sensitive receiving environments (Source: Overarching SWMP)

4.2.3 Sensitive Receiving Environments

A Sensitive Receiving Environment (SRE) is defined as having a high conservation or community value and/or supports ecosystems or human uses of water that are particularly sensitive to pollution or degradation of water quality.

Waterways and other surface water features within the vicinity of the Project considered to be SREs are mapped on Figure 4 4 and include:

- Cosgroves Creek
- Badgerys Creek
- South Creek

4.2.4 Surface water quality

TfNSW has conducted monthly pre-construction surface water baseline monitoring since April 2019 at twelve (12) surface water sites located upstream and downstream of the M12 Project in its entirety. These include locations in Badgerys Creek, South Creek and Kemps Creek.

The monitoring data confirms that the creeks exhibit poor water quality, primarily due to elevated nutrients, turbidity and some heavy metals.

4.3 Groundwater

Two groundwater systems have potential to interact with the Project area:

- Alluvial groundwater systems
- Semi confined groundwater systems within the bedrock.

Alluvial groundwater systems are unconfined (not under pressure) to semi confined (partially pressurised) alluvial groundwater systems associated with Cosgroves Creek, Badgerys Creek and South Creek.

Bedrock groundwater systems are semi-confined groundwater systems within the bedrock (Wianamatta Group Shale and Hawkesbury Sandstone).

4.3.1 Groundwater Users

A review of the Bureau of Meteorology (BoM) Australian Groundwater Explorer identified 38 registered groundwater bores in the vicinity of the Project. Five (5) of the 38 bores have a purpose relating to water supply (i.e. irrigation, stock and domestic, water supply or commercial/industrial) and based on reported bore depth, three (3) of these five (5) bores are inferred to be accessing Hawkesbury Sandstone groundwater systems. The closest of these five (5) bores is located about 400 metres away from the construction footprint.

4.3.2 Groundwater Levels

Groundwater levels monitored during 2018 and 2019 for the EIS identified that groundwater levels have been generally stable with some locations showing slightly declining trends. Groundwater level responses to individual rainfall events have been negligible. The monitored water table depth in the area of the alluvial deposits range from about two (2) metres BGL to five (5) metres BGL whilst groundwater levels in the Bringelly Shale (including associated overlying residual clay) ranged from about one (1) metre BGL to 19 metres BGL.

Based on the generally stable monitored groundwater levels at Project groundwater monitoring bores and lack of obvious groundwater level response to individual rainfall events, the Project groundwater monitoring bores are considered to generally respond slowly to rainfall. Therefore, monitored groundwater levels, particularly in bedrock groundwater systems, whilst coinciding with below average rainfall, are expected to be influenced by the period of pronounced groundwater recharge from 2007 to March 2017. As a result, monitored groundwater levels during the Project's monitoring period are considered likely to be similar to or above long-term average levels and not uncharacteristically low.

4.3.3 Groundwater Quality

TfNSW has conducted monthly pre-construction groundwater baseline monitoring at four (4) boreholes since April 2019. Three (3) boreholes (BH104, BH107 and BH112BH) are located in M12 West and one (1) borehole (BH145) is located in M12 East.

The monitoring data and statistical summaries indicate that field water quality parameters, (including electrical conductivity (EC), redox (Reduction-oxidation), dissolved oxygen (DO), pH and temperature) vary throughout the year. The western clustered wells (BH104, BH107 and BH112) show generally similar trends, with the eastern well (BH145) showing inverse trends, particularly for DO and EC. The reported concentration of analytes in the monitoring period (October 2021 to March 2022) are broadly consistent with those reported in previous monitoring rounds. No data was available at BH145 after April 2021 due to the well experiencing insufficient levels of groundwater.

4.3.4 Groundwater Dependent Ecosystems

A review of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011 indicated that no High Priority Groundwater Dependent Ecosystems (GDEs) (karst and wetlands) are mapped within 10 kilometres of the Project.

A review of the BOM GDE Atlas (Australian Government BOM, 2018c) identified several areas that a moderate to high potential to be dependent on groundwater including:

- South Creek – mapped as a high potential aquatic GDE
- In the region of the Cosgroves, Badgerys and South Creek crossings – mapped as moderate to high potential terrestrial GDEs
- Several isolated areas away from the creeks – mapped as low to high potential terrestrial GDEs.

The potential terrestrial GDEs within the Project's construction footprint are described as either Cumberland Shale Hills Woodland or Cumberland River Flat Forest. The location of the GDEs are shown in Figure 4-5.

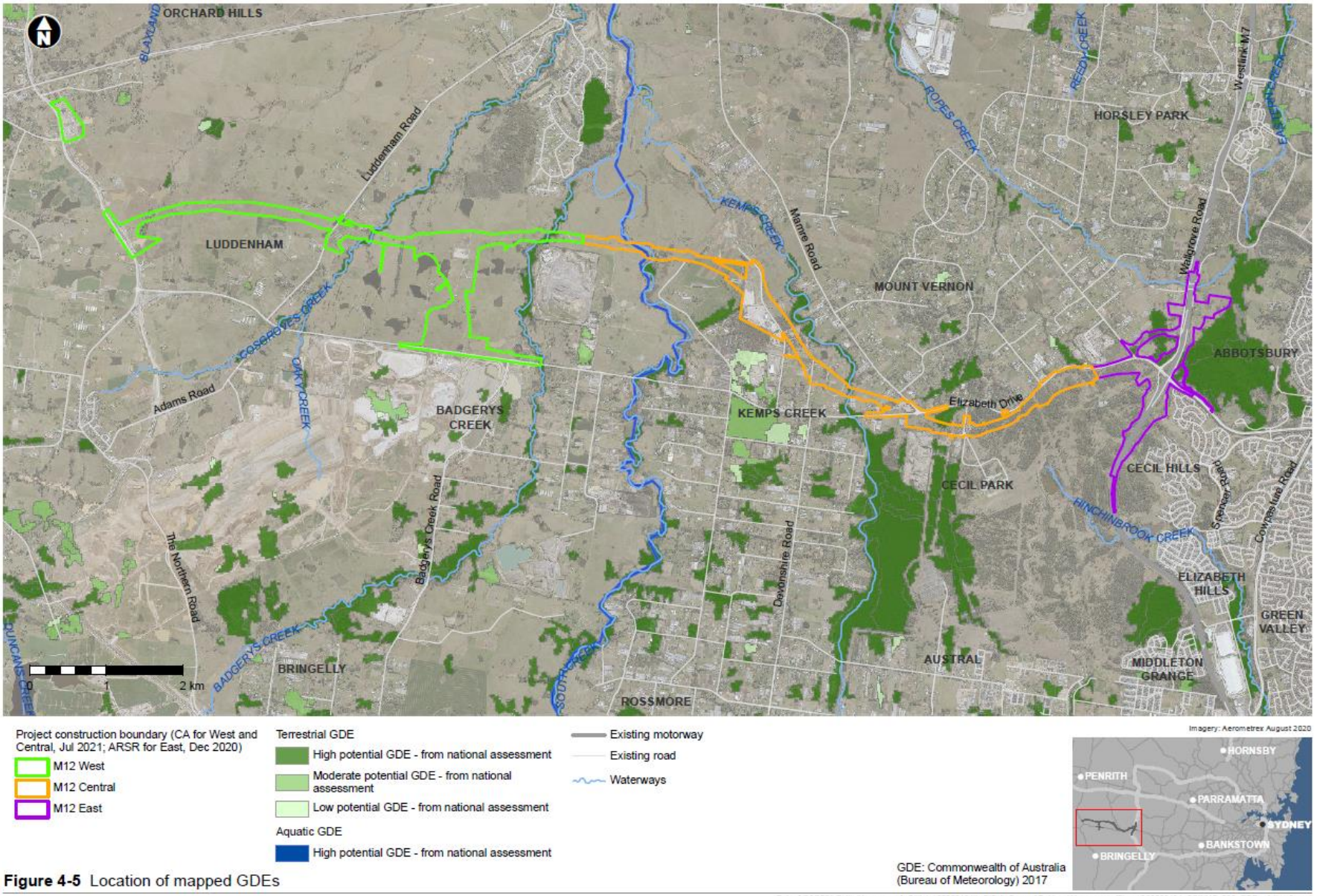


Figure 4-5 Location of mapped GDEs

Figure 4-5 Location of mapped GDEs (Source: Overarching SWMP)

4.4 Rainfall and Climate

The average yearly rainfall in the vicinity of the Project, based on data collected at the Badgerys Creek Automatic Weather Station (AWS) and averaged from 2014 to 2018, is 680.9 mm. The wettest month is February, with an average rainfall of 98.5 mm, while the driest month is July with an average of 23.6 mm (BOM, 2018).

Average maximum temperatures at the Badgerys Creek AWS, averaged from 2014 to 2018 are lowest in June at 21.2 ºC and highest in January at 41.2 ºC. Average minimum temperatures were lowest in July at 13.7 ºC, and highest in December at 21.1 ºC (BOM, 2018).

4.5 Rainfall Erosivity and Erosion Hazard

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

The Project rainfall erosivity factor and other RUSLE parameters for the sizing of temporary sediment basins are summarised in Table 4-5.

Table 4-5 Design criteria for sizing the temporary sediment basins (sourced from the M12 West 100% Erosion and Sediment Management Report

Parameter	Value
Rainfall parameter	
Rainfall depth duration (days)	5 day
Rainfall percentile	85th
Rainfall depth (mm) – 5 day	35.0mm (Penrith)
Volumetric Runoff Coefficient, cv	0.64
Rainfall intensity for 2 year ARI, 6 hr duration	The BoM reports the 2-year, 6-hour rainfall event as 8.91 mm/hr for Kemps Creek.
Revised Universal Soil Loss Equation (RULSE) Parameter	
Soil/Sediment Type	D or F
Erodibility, k	0.046
Rainfall Erosivity, R	2500
Hydrologic Soil Group	D
Soil Cover, C	1
Soil Conservation Practices P	1.3
Length Slope Factors, LS	Variable

4.6 Flooding

Flood modelling was carried out to assess the existing flood conditions during stormwater events (TfNSW M12 Motorway EIS, 2018). Table 4-6 provides an overview of the flood behaviour associated with major waterways for the M12 Project. Flood extent mapping is contained in the CFMP.

Table 4-6 Existing flood conditions along the M12 Motorway during the 100-year ARI flood event

Catchment	Flood conditions during the 100 year ARI flood event
Badgerys Creek	Badgerys Creek catchment generates a peak 100 year ARI runoff of 130 cubic metres per second along a flow-path about 170 metres wide. The Project crosses this floodplain at a substantial angle. The effective floodplain is about 300 metres wide as it crosses the operational footprint.
South Creek	South Creek catchment generates a peak 100 year ARI runoff of 490 cubic metres per second along a flow-path about 500 metres wide. The low-flow channel of the creek crosses under the operational footprint at an angle and runs virtually parallel for several hundred

Catchment	Flood conditions during the 100 year ARI flood event
	metres. During a 100 year ARI flood the creek fills the wider floodplain and flows almost perpendicular to the Project.
Kemps Creek	Kemps Creek catchment generates a peak 100 year ARI runoff of 260 cubic metres per second along a flow-path heavily influenced by a large, oval embankment on its western side. The embankment confines the width of the flow but is built at a height that results in some overtopping in large floods. The 100 year ARI flow-path width is therefore variable, ranging from about 170 metres to about 310 metres across, or wider if the secondary flow-path inside the oval is considered.

5 Environmental Aspects and Impacts

5.1 Construction Activities

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

- Site establishment
- Vegetation clearing and topsoil stripping
- Site access
- Earthworks
- Demolition
- Transportation of cut or fill materials
- Removal of riparian vegetation
- Construction in areas of highly erodible soil, contaminated land or acid sulphate soils
- Culvert and drainage works
- Adjustment of waterways
- Temporary watercourse crossings
- Bridge construction
- Material stockpiles
- Concrete activities
- Water use / extraction
- Construction discharges including surface water runoff and dewatering of sediment basins and farm dams
- Ancillary facility operation including fuel and chemical storage, refuelling and chemical handling
- Noxious weed treatment including herbicide spraying.

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

5.2 Impacts

Potential for impacts on soil and water depend primarily on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Potential impacts attributable to construction include:

- Exposure of soils during vegetation clearing and earthworks, creating the potential for offsite transport of eroded sediments and pollutants
- Decline in water quality and generation of turbidity due to disturbance of sediments during in-stream or riparian zone works
- Scour in the receiving drainage lines at the downstream limit of the drainage works
- Damage to ancillary facilities (including flood damage) that could result in an export of pollutants to receiving waters
- Disturbance of asbestos-containing material from imported fill sites, historical dump sites or during demolition of structures
- Contamination of soils, and surface and groundwater from accidental spills or oil leaks that could pollute receiving waterbodies
- Contamination of surface and groundwater from disturbance of unknown in-situ contaminated soils (such as asbestos, hydrocarbons or chemical impacted soils)
- Disturbance of acid sulphate soils, creating the potential for oxidation of these soils and subsequent generation of acidic runoff
- Changes to hydrology have the potential to impact on artificial wetlands (farm dams, roadside drains, effluent treatment systems)

- Contamination or other impacts to underlying aquifers from dewatering associated with piling and utility relocation activities that occur in areas where the perched shallow water table is present and close to the ground surface
- A reduction in groundwater levels and flows, and off-site discharge of water containing sediment from dewatering activities
- Removal of riparian vegetation resulting in sediment release to adjoining watercourses, reducing water quality and affecting the health of aquatic ecosystems
- Soil loss from the erosion of spoil and topsoil stockpiles.

Some impacts on soil and water attributable to the Project are anticipated. Relevant aspects and the potential for related impacts have been considered in a risk assessment in Appendix A2 of the CEMP. Section 6 provides a suite of mitigation measures that will be implemented to avoid or minimise those impacts.

5.2.1 Cumulative impacts

The concurrent construction of various projects within the vicinity of the M12 West Project gives rise to the potential for cumulative soil and water impacts. Projects within the vicinity of the M12 West Project include, but are not limited to:

- M12 Central Project
- Western Sydney International Airport
- Sydney Metro – Western Sydney Airport
- The Northern Road upgrade
- Western Sydney Aerotropolis
- Other potential road projects such as Elizabeth Drive upgrade, Mamre Road upgrade and Outer Sydney Orbital
- Development land releases such as Southwest Growth Area and Western Sydney Employment Area.

It is noted that the scale of impact is dependent upon timing, location and type of construction activities. Although impacts are likely to be associated with soil erosion, soil management, salinity waterway contamination and spills, it is anticipated that these impacts will be short-term and minor as they will be limited to the construction phase and will be minimised through the implementation of management measures identified in Section 6.

Interagency communication between government departments undertaking work in the area is required to manage cumulative impacts with the aim of combining messages when possible and minimising impacts to the local community.

Consultation will be undertaken with neighbouring properties and with personnel who will be undertaking work on other projects within the vicinity of the M12 West Motorway construction to ensure they are aware of any exclusion zones or sensitive areas identified for the Project.

6 Environmental mitigation and management measures

6.1 Erosion and Sediment Control

A Concept Erosion and Sediment Control Plan has been prepared to document the erosion and sediment primary controls to be employed during construction of the proposed works (refer Appendix E). This Concept ECSP will be reviewed by the CPBGG JV Soil Conservationist and any amendments are to be updated in Appendix E of this SWMP. This is a framework document intended to be used as a guideline by the CPBGG JV in their preparation of the Progressive Erosion and Sediment Control Plans (PESCPs) used during construction.

The CPBGG JV will provide details of location, design and maintenance of erosion and sediment control measures in the PESCPs. The PESCPs will be prepared by a suitably qualified person in consultation with construction personal and reviewed by the Contractor Soil Conservationist. The PESCPs will be developed using A3 sized drainage drawings of the Works as a base with contours on these drawings and include an assessment of risk. They will implemented prior to commencing activities. The relevant PESCPs will be available at each fortnightly environmental inspection with TfNSW.

The PESCPs will identify erosion and sediment control risks and describe how these will be addressed during construction. The PESCP will include details of the following where relevant:

- Erosion and sediment control measures required as construction progresses including:
  - Before clearing and grubbing
  - Before removal of topsoil and commencement of earthworks within a given catchment area
- How clean upstream water will be managed and diverted around disturbed areas, so it is not polluted by the construction activities and to minimise potential discharges of dirty construction water
- Method of tree removal in intermittent watercourses, leaving grasses and small understorey species undisturbed wherever possible
- Scour protection measures for haul roads and access tracks when these are an erosion hazard due to either their steepness, soil erodibility or potential for concentrating runoff flow
- Measures for promptly stabilising disturbed areas and temporary drains
- Measures to minimise erosion during construction of embankments
- Measures to minimise erosion and control sedimentation from stockpiles
- Methods of constructing batters to assist the retention of topsoil on the batter slopes
- Measures to temporarily trap sediment in median areas at regular intervals
- Controls in runoff flow paths to reduce flow velocities and minimise the potential for erosion
- Measures for controlling wastewater discharge on or around the site from dewatering, surface washing, grit blasting, saw cutting, drilling, washing vehicles and plant and any other activities which add pollutants to water
- the estimate peak flows and other parameters needed to design drains and drainage structures using the methods described in Australian Rainfall and Runoff
- the Average Recurrence Interval (ARI) shown in Annexure G38/E for the design of erosion and sediment control measures, unless site conditions or risks to life, property or the environment suggest that other values are applicable
- immediately after forming swales and catch drains and any temporary drains, installing and maintaining temporary lining to the satisfaction of the Principal in the swales and catch drains and temporary drains until permanent lining or vegetation is applied
- Measures to be put in place during an extended shut-down of the site or predicted rainfall event above 22mm/ 24hr
- Maintenance of erosion and sediment control structures including measures to restore their capacity
- Inspection and auditing program for all erosion and sediment controls to ensure that no disturbed area is left without adequate erosion and sediment controls.

The PESCPs will include drawings showing all controls required to avoid erosion and sedimentation of the site, surrounding areas, watercourses, drainage systems, water bodies and wetlands. The drawings will be regularly updated as the site conditions change during construction.

The drawings will include all ancillary activities and/or areas and activities that may impact on water quality, such as:

- Access and haulage tracks
- Borrow pits
- Stockpile and storage areas
- Temporary work areas
- Materials processing areas
- Compound areas
- Concrete and asphalt batching areas and location(s) of concrete washouts
- Known (or discovered areas) of contamination.

The ESR will progressively modify and revise the PESCPs due to changes in the construction program, change in work methods, or whenever the work methods and control structures are found to be ineffective or are no longer required. Each revision of the ESCP will be reviewed by the Soil Conservationist. CPBGG JV will incorporate all soil conservationist recommendations or justify decisions for not incorporating recommendations. The PESCPs will reflect the site conditions at the time of construction and a register will be maintained of all drawings with the;

- approval date under G38 HP 3.3.1,
- Applicable section of works
- Commencement of work on the section
- Revision history

6.2 Sediment Basin Management

The Blue Book notes that a sediment basin should be included in catchments where the erosion hazard exceeds 200 T/year of soil loss. It is standard practice that each affected catchment in road construction be assessed against this requirement.

An assessment of all catchments for both the clearing and earthworks cases has been undertaken in the M12 West 100% Erosion and Sediment Management Report. Sediment basins were identified in 33 locations throughout the proposed works. However, for up to three (3) of these basins it was identified that they would not be able to be constructed due to site constraints. There may be opportunities to adjust the sizing and location of these basins in the catchments and further review will occur on the ground with the project soil conservationist prior to construction. If changes are made these will be updated on the PESCPs and on the EPL Premises maps.

The basins have been sized based on the criteria identified in Table 4-5;

- Design rainfall depth: 35 mm (5-day, 85th percentile for Penrith);
- Basins designed for Type F/D (dispersible) sediment;
- Volumetric runoff coefficient (Cv): 0.64 (Hydrologic Group D) for all areas.

A summary of the conceptual sizing and locations of these basins is included in Table 6-1 below. The basins are also shown in the Concept ESCP in Appendix E – Concept Erosion and Sediment Control Plan.

Table 6-1 Sediment Basins Sizing

Basin	Catchment Area (Ha)	Sediment Basin Storage Volume (m^3)	Sediment Basin Total Volume (m^3)
10925W	1.31	47	340
10975E	2.83	119	753
11150E	2.76	144	762

Basin	Catchment Area (Ha)	Sediment Basin Storage Volume (m^3)	Sediment Basin Total Volume (m^3)
11700W	0.91	48	252
11750E	0.86	53	246
11800E	1.87	107	526
12100E	0.88	48	229
12150E	3.76	197	1039
12200E	1.26	78	360
12500E	0.91	65	269
12525E	1.69	88	467
13355E	8.49	463	2365
13355W	3.55	219	1014
13800E	3.11	307	1004
13850W	1.72	90	475
14050E	3.77	270	1114
14450E	2.99	107	727
14600E	1.15	60	318
14625E	10.5	547	2899
14650E	1.25	65	345
14650W	13.61	693	3742
15800W	11.11	989	3478
15850E	3.07	79	787
16100W	0.62	26	165
16150E	7.02	555	2127
16400E	2.04	141	598
AC1550S	1.79	128	529
AC1700S	1.79	112	513
AC250N	29.3	691	7254
AC200S	5.31	121	1310
ED650W	1.13	84	337
ED1250W	0.99	112	334
ED1600E	11.19	545	3052

Temporary sediment basins will be cleaned out whenever the accumulated sediment exceeds 60% of the sediment storage zone capacity. A marker will be installed in the basin to indicate the sediment storage zone. Accumulated sediment from sediment basins and traps will be removed in such a manner as not to damage the structures.

Temporary sediment basins will remain in place until upstream areas have been vegetated or otherwise stabilised in accordance with the Blue Book (Landcom, 2004). Areas not directed to sediment basins will comply with the requirements of the Blue Book to ensure potential sediment load is less than 150m3 per year.

6.3 Problem Soils

6.3.1 Saline Soils

Construction within areas of moderate to high risk saline soils will include:

- Testing by TfNSW to confirm the presence of saline soils in areas of high salinity potential prior to disturbance.
- Ongoing groundwater monitoring of salinity by TfNSW as part of the OCEMP water quality monitoring program

- Identification and management of saline discharge sites
- Progressive stabilisation and revegetation of exposed areas following disturbance as soon as is practicable
- Wherever possible, avoid disturbance or exposure of saline soils.
- Consideration of ways to reduce infiltration rates (eg. lining of waterways with impervious materials)
- Measures to improve drainage and reduce infiltration (eg. installation of subsoil drains)

Soil salinity management will also be carried out in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook. In the event that moderate to high risk saline soils are identified, specialist advice will be sought to determine the appropriate management actions

6.3.2 Acid Sulfate Soils

Construction in the vicinity of waterways and farm dams where there is a moderate risk of encountering PASS and any unexpected PASS finds and will be managed in accordance with the Acid Sulfate Soil Manual (1998). The manual includes procedures for the investigation, handling, treatment and management of such soils. Management strategies will include:

- Avoid land where PASS occurs;
- Avoid disturbing PASS if present on land;
- Undertake shallow soil disturbance so as not to disturb PASS at depth;
- Cover PASS with clean fill material;
- Set aside or do not disturb PASS material.

6.3.3 Contaminated Soils

Contaminated land will be managed in accordance with the measures outlined in the Contaminated Land Management Plan (Appendix B3 of the CEMP) and if contaminated soils are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination, such as the diversion of surface runoff, capture of any contaminated runoff or temporary capping.

All other works that may impact on the contaminated area will cease until the nature of the contamination has been confirmed and any necessary site specific controls or further actions identified in consultation with TfNSW.

6.4 Stockpile Management

Stockpiles will be managed in accordance with the Stockpile Management Protocol (Appendix A) to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with the Blue Book (Landcom, 2004) (refer Section 6.1), TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015) and TfNSW QA G38. This will include:

- Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed
- Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion
- Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required
- Locating stockpiles outside of the tree protection zone of trees or native vegetation identified for retention. The tree protection zone will be delineated in accordance with AS 4970
- Locate stockpiles at least 5 m from likely areas of concentrated water flows and at least 10 m from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline “Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings”
- Keeping stockpile heights to no greater than 2 m, unless otherwise approved by TfNSW, and slopes to no steeper than 2:1

- Covering, or otherwise protecting from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile
- Keeping topsoil that is not contaminated by noxious weeds in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles.
- Separate all topsoil from other general earthworks and the like; and protect from degradation
- beneficially re-use 95% of all topsoil onsite (or near site)
- Implementing measures to prevent the growth of weeds in topsoil stockpiles.
- providing erosion and sediment controls on approach to and/or departure of entry/exits points from stockpile sites and construction areas onto public roads to minimise the tracking of soil and particulates onto public roads and reduce the generation of dust at such locations

If any stockpile site is located on private land, approval will be obtained from the landholder under s.143 of the *Protection of the Environment Operations Act 1997* prior to commencement of stockpiling. The S.143 must be provided to TfNSW under G36 Hold point cl 4.11.4. Spoil management is addressed in the CWRMP.

6.5 Tannin Management Procedure

Given the location of the proposed alignment and the amount of clearing of vegetation that would be required it is proposed that the obtained mulch material not required for future landscaping will be reused on site as an erosion or sediment control as mulch berms for filtration of site water during the clearing and topsoil stripping stages.

Mulch is very effective in controlling sediment and has the added benefits of being biodegradable, cheap (if available on site) and easy to maintain. However, as there can be problems with tannin seeping from the mulch which can make its way into waterways, its use will need to be appropriately managed by controlling widths, heights and locations such as using away from waterways and low lying areas.

Where mulch is stockpiled for future use in landscaping it will be monitored and turned over as required to avoid spontaneous combustion. Mulch stockpiles will not be located close to creeks or tributaries and will be bunded or positioned to drain into a sediment basin. Mulch stockpiles in high tannin generating vegetation will:

- Be located 50 m from waterways, for mulch stockpiles that will be in place for duration of more than 1 month
- Be located 20 m from waterways, for mulch stockpiles that will be in place for duration of less than 1 month
- Be located on elevated ground
- Be trimmed to a regular shape, with a height not exceeding 2m and batter slopes not steeper than 2:1
- Be fully bunded to ensure up-gradient water is prevented from entering the stockpile site, and to capture tannin impacted water. Bunds will be impervious and 300 mm high at a minimum.

All bunded stockpiles that are in place for a period longer than one month will include a spillway in the bund for overflow in extreme rainfall events be managed in accordance with all other requirements specified in the TfNSW Environmental Direction 25; Management of Tannins from Vegetation Mulch (Appendix B –).

6.6 Water Use

Various water sources will be used for the Project, which may include, but are not limited to the following:

- Water retained in sediment basins / traps.
- Water sourced from dams to be dewatered and filled on the Project.
- Potable water from hydrants along the existing road network.

Where possible water captured in sediment basins and other detention areas will be reused for dust suppression, compaction, or other Construction activities in preference to sourcing from potable supplies. Further details are provided in the Water Reuse Strategy (Appendix F).

CPBGG JV will not abstract water from waterways or from groundwater without obtaining all required approvals and written approval from TfNSW.

6.7 Dewatering Management

Dewatering is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location within the Project area (including from sediment basins and dams) and the subsequent reuse or discharge of that water. The CPBGG JV will plan to avoid and minimise discharges as much as practicable and undertake dewatering activities in a manner to minimise erosion and pollution of the environment.

CPBGG JV has prepared a Dewatering Management Plan (Appendix D – Dewatering Management Plan). The Dewatering Procedures have been developed in accordance with the Technical Guideline Environmental Management of Construction Site Dewatering (RTA, 2011) and CMS requirements. The Dewatering Procedures include provision for re-use of water for Construction of the Project, where possible. If groundwater inflows are observed from the cuts, the groundwater quality from the cut is to be sampled and managed in accordance with the dewatering management plan. CPBGG JV will endeavour to maximise the reuse of captured stormwater on the site. CPBGG JV will keep records of the following and make them available to TfNSW;

- dewatering procedures and permit
- date and time for each discharge at each location
- water quality test results for each discharge
- personnel approving the dewatering activities
- evidence of discharge monitoring, or risk assessment and mitigation measures used to eliminate the risks of pollution or erosion
- Any other EPL requirements were issued.

All site personnel undertaking dewatering activities during Construction of the Project will be trained and inducted in the use of the Dewatering Procedures.

Where a flocculant or coagulant is proposed to treat site water, the CPBGG JV will demonstrate that the proposed flocculant or coagulant is suitable for use and will submit the application using the TfNSW template “Alternative flocculants and coagulants – template to propose use”.

6.8 Work in Waterways

Works on waterfront land will be carried out in accordance with controlled activity guidelines.

Where work is required within waterways, an EWMS for the work(s) will be prepared. Consultation with DPI Fisheries will be undertaken as part of this EWMS development. The EWMS for work in waterways will detail the control measures to avoid or minimise erosion and any adverse impact on water quality and riparian fauna and flora, and include provision to:

- Plan work to avoid, where practicable, any activities in aquatic habitats and riparian zones
- Properly protect and signpost as environmentally sensitive areas all waterways in or adjacent to the site which are excluded from the work areas
- Minimise riparian vegetation removal where practicable, and restrict access to the waterways to the minimum amount of bank length required for the activity
- Retain stumps in riparian zones and aquatic habitats, where practicable, to reduce the potential for bank erosion
- Carry out any refueling of plant and equipment, chemical storage and decanting at least 50 m away from aquatic habitats unless otherwise approved by TfNSW.

The following measures will be carried out to manage activities within watercourses or on waterfront land:

- Implementing practices to minimise disturbance of banks

- Undertaking bank stabilisation and installing instream structures
- Existing trees, grasses and other ground cover must be retained within 15 m of rivers, creeks and watercourses and in all drainage lines until immediately before construction commences in the area.
- An access track may be constructed across these areas on an alignment that will minimise erosion. Notwithstanding the retention of the ground cover, soil erosion and sedimentation controls for the area must be installed in accordance with TfNSW G38.
- All trees in these areas must be felled manually, leaving grasses and small understorey species wherever possible.
- Maintaining minimum flows to assist in maintaining the viability of aquatic communities and preventing barriers to fish passage
- Constructing instream crossings during low flows and design so that drainage off crossing does not contribute sediment load to the stream
- All drainage feature crossings (permanent and temporary watercourse crossings and stream diversions), drainage swales and depressions will be designed by a suitably qualified and experienced professional and will be designed and constructed in accordance with relevant guidelines.
- promptly using jute mesh or similar to provide scour protection for any earthen areas of waterways that have been disturbed and that do not have a permanent vegetative or water cover and are likely to experience flows of a minimum 1:5 year flow event until long-term stabilisation measures are established as shown on the Drawings.

6.9 Temporary Waterway Crossings

Temporary waterway crossings will be required for the Project. Temporary waterway crossings and erosion and sediment controls will be managed by the ESR and designed by a suitably qualified and experienced person. They will be included in the PESCPs and reviewed by the CPBGG JV Soil Conservationist. Consultation with DPI Fisheries will be undertaken as part of the design. CPBGG JV will design, construct and maintain temporary waterway crossings consistent with;

- Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
- Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries (2003)
- *Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings* (Ref: NSWF – 1181) (NSW Fisheries, November 2003)

Temporary waterway crossings will use hard, sound, durable rock, free of fine particles and not contaminated with foreign materials to avoid erosion of fine sediment material entering the waterway. Erosion and sediment controls will be implemented at the entry and exits points of temporary waterway crossings to minimise mud tracking onto the crossing. Maintenance of the crossings will also be undertaken. All personnel must complete the training outlined in the Blue Book (Landcom, 2004) for erosion and sediment control as outlined in G38.

6.10 Refuelling, washdown and chemical storage

All fuels, chemicals, and liquids will be stored in bunded areas on relatively flat land at least 50 m away from waterways (including existing stormwater drainage systems) and flood prone areas.

The storage, handling and use of dangerous goods and hazardous substances will be in accordance with the *Work Health and Safety Act 2011*, the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005), the EPA “Bunding and Spill Management Guidelines” contained within EPA Environmental Protection Manual for Authorised Officers, the TfNSW “Code of Practice for Water Management” and all relevant legislation and Australian standards.

The CPBGG JV will obtain Safety Data Sheets (SDS) for dangerous goods and hazardous substances prior to their arrival on site. All hazardous substances will be transported in accordance with relevant legislation and codes, including the Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998 and the ‘Australian Code for the Transport of Dangerous Goods by Road and Rail’ (National Transport Commission, 2008).

The refuelling and maintenance of plant, vehicle and equipment, mixing of cutting oil with bitumen and any other activity which may result in spillage of chemical fuel or lubricant will be undertaken in a designated sealed bunded area where spill kits are available to minimise the potential for offsite discharge and mud tracking. Washdown facilities for concrete trucks and other vehicles will be designated impervious bunded areas at least 100 metres from areas prone to flash flooding or 50 metres away from other natural and built drainage lines. Refuelling will not be undertaken within 50 m of any waterway. Refuelling activities will be supervised at all times.

6.11 Pollution Incident Response Management

The CPBGG JV has prepared a Pollution Incident Response Management Plan (PIRMP) as part of the CEMP (Appendix A9) in accordance with the requirements of the POEO Act and *Environmental guidelines: Preparation of pollution incident response management plans* (EPA, 2012).

The objectives of the PIRMP are to:

- outline how pollution incidents will be communicated
- minimise and control the risk of a pollution incident by identifying risks and developing actions to minimise and manage risks
- ensure proper implementation through training personnel, identifying responsibilities, and regular testing the effectiveness of the PIRMP.

The EPA defines a pollution incident as *"an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise."*

A pollution incident must be notified if there is a risk of 'material harm to the environment', which is defined in section 147 of the POEO Act as:

a) Harm to the environment is material if:
    a. it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or
    b. it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and 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.

b) Pollution incidents must be notified immediately to the EPA, NSW Health, Fire and Rescue NSW, WorkCover NSW and the relevant local Council.

CPBGG JV's PIRMP includes a description and likelihood of hazards on site, including an inventory of potential pollutants, pre-emptive actions to be taken to minimise or prevent risk of pollution incidents and harm to site personnel, safety equipment available, a list of contact details for response or notification and community communication tools. The PIRMP also sets out detailed descriptions of the actions to be undertaken in the event of a pollution incident to reduce or control pollution, and training for staff in the use and implementation of the PIRMP.

The PIRMP will be tested at least annually to ensure that the information contained in the plan is accurate and up to date and the PIRMP can be implemented effectively. The PIRMP will also be reviewed within one month of any pollution incident in order to address any lessons learned from implementing the PIRMP.

6.12 Spill Prevention and Response

An Emergency Spill Response Sub-Plan (ESRP) has been prepared as part of the PIRMP (CEMP Appendix A9) in accordance with the Code of Practice for Water Management (RTA, 1999) and relevant EPA guidelines. The ESRP details:

- Measures to avoid spillage of fuels, chemicals and liquids, particularly near and/or into waterways.

- Prompt spill containment and clean-up procedures if any spills occur on land, in surface drains and/or in waterways.
- On-site locations of emergency wet and dry spill equipment/kits.
- Procedures for recording and notifying TfNSW of all spills.
- A clear outline of when the ESRP will be implemented and who will be responsible for its implementation.

Spill kits will be located at all ancillary facilities and main Construction work areas. All site personnel (including sub-contractors) will be made aware of the location of spill kits and trained in its use. In the instance of a spill, the TfNSW Environmental Incident Classification and Reporting Procedure will also be implemented in conjunction with the PIRMP (CEMP Appendix A9).

6.13 Impacts on Water Supply

For properties where modelling in the EIS and/or AR predicts that the Project will potentially reduce the available stormwater runoff yield to a farm dam, TfNSW engaged the Soil Conservation Service to conduct an assessment of dam impacts (August 2020). This report provides a description of the current setting and catchment, a condition assessment of dams, an estimate of the surface area and volume of each dam, a recommendation for the construction of new dams or replacement of dams in consideration of the changes in peak flows at each site post road construction and the loss of dams due to road construction.

Using the information provided in this report TfNSW will consult with the affected landowner and determine what measures will be implemented to prevent, mitigate or offset a loss in water supply. The CPBGG JV will implement the measures as directed by TfNSW for the potentially affected landowner at no cost to the landowner. The agreed measures will be implemented before and during construction of any works that may potentially affect the flow of water into the farm dams.

6.14 Wet Weather Preparation and Review

Where a wet weather event is predicted, the CPBGG JV will undertake a review of site erosion and sediment controls. Wet weather events are defined as more than a 50% chance of 10 mm of rainfall or greater triggering the requirement to prepare the site for wet weather. Wet weather sampling in accordance with monitoring program will occur when >20 mm rainfall occurs in a 24 hour period.

The erosion and sediment control review before rainfall will include:

- Inspection of the site to ensure that all erosion/sedimentation and stabilisation controls are in place and in effective working order
- the relocation of materials that could cause environmental incidents such as potential pollution incidents onto higher ground and away from flood prone areas
- Actions to be taken to prevent any environmental incidents such as potential pollution incidents
- Measures to be implemented to protect disturbed ground from erosion.

Following the wet weather event, a post wet weather inspection will be undertaken to review site performance and repair controls as required. The erosion and sediment control review post rainfall will include:

- identify dewatering requirements onsite including testing and treatment of water captured in construction sediment basins and sumps
- Identify any maintenance requirements for the erosion/sedimentation and stabilisation controls.

Review the SWMP, ESCP and Stockpile Management protocol/ procedure when erosion/sedimentation control measures, stabilisation control measures and other soil and water control measures are found to be not fully effective, including review of design parameters used for BLUE BOOK calculations.

Pre-flood response actions as identified in the CFMP will begin on receipt of BOM advice, or when other evidence leads to an expectation of flooding.

Details regarding the timing and responsibilities of all inspections relevant to this Plan are included in Section 7.4.2.

6.15 Site Stabilisation Plan

The objective of the Site Stabilisation Plan is to minimise erosion of disturbed areas through the implementation of appropriate stabilisation practices. The PESCP's and site inspection will identify areas requiring stabilisation and methods of stabilisation required during the construction process. The PESCP's will incorporate a risk assessment for disturbed areas, swales, drains and stockpiles, a monitoring program for stabilised areas and a process for determining if the controls are successful and if additional stabilisation methods / controls are required.

Clearing of vegetation and site stabilisation of disturbed areas will be undertaken progressively to limit the time disturbed areas are exposed to erosion processes. All high risk areas identified in the PESCP will be stabilised within 20 days of the area being completed to design and this will extend to established topsoil stockpiles. Staged revegetation of the site as works proceed in accordance with TfNSW R178. This includes to vegetate stockpiles, stockpile sites and other areas nominated by TfNSW to control erosion and weed invasion with the following cover crop species;

- Rye Corn (during the months of April to August) at a rate of 35 kg per hectare
- Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare
- Where directed by TfNSW, native seed will be included in accordance with the species listed in Annexure R178/A

Mulch blanket to hydroseeded areas will be comprised of any one of the following;

- Mulch as defined in TfNSW R179 Clause 2.2
- Straw as defined in TfNSW R178 Clause 2.5; or
- Cellulose Fibre Mulch as defined in TfNSW R178 Clause 2.6.

Turf used in vegetated drainage channels must comply with recommendations in AS5181:2017 "Use and installation of turf as an erosion, nutrient and sediment control measure".

Where site inspections or monitoring indicate that stabilisation has not been successful, a review will be undertaken of the stabilisation methods adopted and recommendations for improvement (which may include the use of additional or alternate stabilisation methods or techniques). This review will also seek specialist input from the CPBGG JV Soil Conservationist.

Erosion and sedimentation controls will remain in place until 70% of the disturbed area beyond the pavement is stabilised or as otherwise agreed with TfNSW.

6.16 Management measures

Specific measures and requirements to meet the objectives of this CSWMP and to address impacts on soil and water are outlined in Table 6-2.

Table 6-2 Soil and Water management and mitigation measures

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
Erosion and Sediment control					
SW01	PESCPs will be prepared and submitted for approval by TfNSW prior to the commencement of works in that area. The ESCP must be prepared by a person with demonstrated skills and experience in preparing the ESCP in accordance with the Blue Book guidelines (Landcom, 2004) and TfNSW QA G38.	ESCP Hold point release	Prior to construction	Environmental Site Representative Soil conservationist	TfNSW QA G38
SW02	PESCPs must be updated to reflect site conditions at the time of construction. The ESCP must include a procedure for updating the drawings, and keep a register of all such drawings with the dates of submission, approval, and commencement of work on that section.	ESCP	During construction	Environmental Site Representative Soil conservationist	TfNSW QA G38
SW03	Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the "Blue Book", as well as relevant TfNSW Guidelines.	Inspection records	During construction	Superintendent / Foreman/Site Supervisor	REMM SWH01 CoA E84
SW04	A soil conservation specialist will be engaged by both TfNSW and the CPBGG JV for the duration of construction of the Project to provide advice on the planning and implementation of erosion and sediment control including review of ESCPs.	Soil conservation specialist engagement	During construction	TfNSW Environmental Site Representative	REMM SWH02
SW05	Construction will be carried out in a manner so as to either maintain the NSW Water Quality Objectives where they are being achieved as 23 April 2021, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved unless an EPL is in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.	Detailed design reports EPL	Detailed design During construction and operation	TfNSW Designers Environmental Site Representative	CoA E105
SW06	Controls for sensitive receiving environments including SEPP Coastal Wetlands will include but not be limited to: • Designation of 'no go' zones for construction plant and equipment	ESCP Inspection records	During construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	• Creation of catch/diversion drains and sediment fences at the downstream boundary of construction activities where practicable to ensure containment of sediment-laden runoff and diversion toward sediment sump treatment areas (not sediment basins) to prevent flow of runoff to the SEPP Coastal Wetland.				
SW07	Sediment fencing must be woven polypropylene and cotton / geotextile thread with a flow rate > 110 litres/m2/sec to AS 3706.9.		During construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW08	Erosion and sedimentation controls must remain in place until 70% of the disturbed area beyond the pavement is stabilised or as otherwise agreed with the Principal.	Inspection records	During construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW09	Maintain a register of inspection and maintenance of erosion control and sediment capture measures, containing the information outlined in G38 Clause 3.1.2.	Inspection records	During construction	Environmental Site Representative	TfNSW QA G38
SW10	Earthworks to be protected in accordance with Clause 1.7 including installing and maintaining effective erosion and sedimentation control measures in accordance with Specifications TfNSW G36 and G38	Site Inspections	During construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	TfNSW QA R44
SW11	Construct benches at cut batters as shown on the Drawings, to provide drainage and erosion control	Construction drawings	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA R44
SW12	Shape and treat the foundations under rock fills to maintain drainage and to ensure that erosion of the foundation will not occur.	QA records	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA R44
SW13	Mulch blanket to hydroseeded areas must be comprised of any one of the following • Mulch as defined in TfNSW R179 Clause 2.2; • Straw as defined in TfNSW R178 Clause 2.5; or • Cellulose Fibre Mulch as defined in TfNSW R178 Clause 2.6.	Landscape drawings	Revegetation	Project Engineer / Superintendent / Foreman/Site Supervisor	TfNSW QA R44
SW14	Turf used in vegetated drainage channels must comply with recommendations in AS5181:2017 “Use and installation of turf as an erosion, nutrient and sediment control measure”.	Landscape drawings	Revegetation	Project Engineer / Superintendent / Foreman/Site Supervisor	TfNSW QA R179

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
SW15	Do not spray herbicide in windy weather (wind of 10 km/hr or greater) or within such distance of a watercourse which would permit the herbicide to enter the water.	FFMP – weed management procedure	During construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	TfNSW QA R179
Sediment Basins					
SW16	Sediment basins must be designed and constructed in accordance with the Blue Book (Landcom 1994) and detailed within the ESCP.	ESCP Detailed design	Pre-construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	Blue Book
SW17	Sediment basins must be cleaned out whenever the accumulated sediment exceeds 60% of the sediment storage zone. Accumulated sediment from sediment basins and traps must be removed in such a manner as not to damage the structures and disposed of, or reused, in accordance with CWRMP.	Inspection records Depth marker	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW18	Provide and maintain suitable access to sediment basins and sediment traps to allow inspection, maintenance, monitoring and cleaning out in all weather conditions.		During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW19	Re-establish stormwater capacity in sediment basins in line with the requirements of G38 Clause 3.2.4.2		Pre-construction	Environmental Site Representative Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW20	Construct construction sediment retention basins in line with the requirements of G38 Clause 3.2.2.	Survey records	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW21	Construct inlets, outlets and spillways as soon as possible using rock filled woven galvanised steel mattresses laid on a needle punched, mechanically bonded, non-woven geotextile filter fabric. The rock filled mattresses must comply with Specification TfNSW R55 and the geotextile must comply with the requirements of Specification TfNSW R63 for Application Category G4, unless shown otherwise on the Drawings.	QA records	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA G38
SW22	Remove all construction sediment retention basins and sediment traps before completion, making all areas good, but not before all upstream areas have been vegetated or otherwise stabilised in accordance with the Blue Book (Landcom, 2004)	Inspection records	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA G38
Problem Soils (Saline Soils and Acid Sulfate Soils)					

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
SW23	Construction within identified areas of moderate to high risk saline soils will be managed in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook. Specific measures will also include (but not be limited to): • Ongoing groundwater monitoring by TfNSW of salinity as part of the water quality monitoring program • Identification and management of saline discharge sites • Progressive stabilisation and revegetation of exposed areas following disturbance as soon as is practicable • Consideration of ways to reduce infiltration rates (eg. lining of waterways with impervious materials) • Investigate measures to improve drainage and reduce infiltration (eg. installation of subsoil drains) • Wherever possible, avoid disturbance or exposure of saline soils.	Inspection records Monitoring records	During construction	TfNSW Environmental Site Representative	REMM SC01 REMM SWH01
SW24	Construction in the vicinity of waterways and farm dams where there is a moderate risk of encountering PASS and any unexpected PASS finds and will be managed in accordance with the Acid Sulphate Soil Manual (1998). The manual includes procedures for the investigation, handling, treatment and management of such soils. Management strategies will include: • Avoid land where PASS occurs; • Avoid disturbing PASS if present on land; • Undertake shallow soil disturbance so as not to disturb PASS at depth; • Cover PASS with clean fill material; • Set aside or do not disturb PASS material.	Inspection records Monitoring records	During construction	TfNSW Environmental Site Representative	REMM SC01 REMM SWH01
Stockpile Management					
SW25	Stockpiles will be managed in accordance with TfNSW Technical Guideline EMS-TG-010: Stockpile Site Management and the Blue Book guidelines. Stockpiles will comply with the following: • Locate stockpiles outside of the tree protection zone of trees or native vegetation identified for retention. Delineate the tree protection zone in accordance with AS 4970.	ESCP Inspection records s143 approved notice App A Stockpile Management Protocol	During construction	Superintendent / Foreman / /Site Supervisor /Environmental Site Representative	TfNSW QA G38 REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	• Locate stockpiles at least 5 m from likely areas of concentrated water flows and at least 10 m from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline “Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings”. • Keep stockpile heights to no greater than 2 m, unless otherwise approved by the Principal, and slopes to no steeper than 2:1. • Cover, or otherwise protect from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are susceptible to wind or water erosion, within 10 days of forming each stockpile. • Keep topsoil that is not contaminated by noxious weeds in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles. • Implement measures to prevent the growth of weeds in topsoil stockpiles.				
SW26	Stockpiles will be managed to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015). This will include: • Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed • Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion • Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required.	ESCP Inspection records App A Stockpile Management Protocol	During construction	Superintendent / Foreman / /Site Supervisor / Environmental Site Representative	REMM SWH04 REMM SHW01
SW27	Use of mulch will comply with TfNSW protocols and leachate will be managed carefully to ensure it does not enter the environment off site or sediment basins in accordance with TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch.	TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch App A Stockpile Management Protocol	Prior to construction	Environmental Site Representative	TfNSW QA G38 REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	Vegetate stockpiles, stockpile sites and other areas nominated by the Principal to control erosion and weed invasion with the following cover crop species: (a) Rye Corn (during the months of April to August) at a rate of 35 kg per hectare; (b) Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare. Where directed by the Principal, include native seed in accordance with the species listed in Annexure R178/A	Site Inspections QA Records	During construction	Superintendent / Foreman / /Site Supervisor / Environmental Site Representative	TfNSW QA R178
Water Abstraction					
SW28	If the proposed water source is other than a town water supply or natural water source, regular testing will occur to ensure that the water is suitable for the purpose and is not hazardous to health and the environment. The use of reclaimed water must comply with the requirements of TfNSW Environmental Direction 19: Use of Reclaimed Water.	Water access licence	Prior to construction	Environmental Site Representative	TfNSW QA G38
SW29	A Water Reuse Strategy will be developed to reduce reliance on potable water.	Water reuse strategy	Prior to construction	Environmental Site Representative	REMM SWH03
Dewatering					
SW30	The dewatering procedure will outline the dewatering methodology, testing requirements, supervision requirements, staff responsibilities and training, and approvals required before any de-watering activity begins. The personnel responsible for approval and/or carrying out dewatering activities must be adequately trained and inducted on the use of the dewatering procedure.	Dewatering procedure Training records	Prior to construction	Environmental Site Representative	REMM SWH01 and SWH11 TfNSW QA G38
SW31	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 the level of detail commensurate with the potential water pollution risk.	Impact assessment	Prior to water discharge	Environmental Site Representative	CoA E105
SW32	Water will only be discharged under a permit to discharge. A permit will only be issued once water quality criteria (in accordance with the EPL discharge criteria) have been met.	Dewatering procedure Permit to Discharge	Prior to water discharge	Environmental Site Representative	REMM SWH01 and SWH11 TfNSW QA G38

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
SW33	Where gypsum is proposed for use to settle suspended sediments, the appropriate application rate, as well as method of applying the gypsum will be determined and noted within the permit	Dewatering procedure Permit to Discharge	Prior to construction	Environmental Site Representative	TfNSW QA G38
SW34	Where a flocculant or coagulant is proposed to treat site water, the CPBGG JV must demonstrate that the proposed flocculant or coagulant is suitable for use and submit the application using the TfNSW template "Alternative flocculants and coagulants – template to propose use"	Alternative flocculants and coagulants – template to propose use	Prior to use	Environmental Site Representative	TfNSW QA G38
SW35	Apply the flocculant or coagulant (whether gypsum or another approved material) to settle suspended sediments within 24 hours of the conclusion of each rain event causing runoff.	Post rainfall inspection	During construction	Superintendent / Foreman /Site Supervisor / Environmental Site Representative	TfNSW QA G38
SW36	Prior to the commencement of dewatering, the entire system, including intakes and outlets, pumping and discharge locations will be inspected. If the dewatering is not directly supervised, a risk assessment must be carried out and mitigation measures implemented to eliminate the risks of pollution and to prevent the occurrence of the following: • Intake suction placed within the deposited sediments resulting in discharge of sediment laden waters • Erosion at discharge locations and downstream areas • Inadvertent or intentional controlled discharge of untreated waters.	De-watering management plan	Prior to construction	Environmental Site Representative	TfNSW QA G38
SW37	The following records will be kept in relation to dewatering: • Dewatering permit • Date and time for each discharge at each location • Water quality test results for each discharge • Personnel approving the dewatering activities • Evidence of discharge monitoring, or risk assessment and mitigation measures used to eliminate the risks of pollution or erosion • Any other EPA licence requirements where issued.	Dewatering records	Prior to construction	Environmental Site Representative	TfNSW QA G38
Works in Waterways					
SW38	Work on waterfront land must have regard to the Guidelines for controlled activities on waterfront land – Riparian Corridors (NRAR,	EWMS Inspection records	Prior to construction	Superintendent / Foreman/Site Supervisor /	CoA E107

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	2018), Controlled activities on waterfront land – Guidelines for watercourse crossings on waterfront land (NSW Office of Water, 2012) and Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013).			Environmental Site Representative	
SW39	Where work is required within waterways, an EWMS will be prepared for the work(s). The EWMS for work in waterways must detail the control measures and must include the following: • Plan work to avoid, where practicable, any activities in aquatic habitats and riparian zones • Properly protect and signpost as environmentally sensitive areas, all waterways areas in or adjacent to the site which are excluded from the work areas • Minimise riparian vegetation removal where practicable, and restrict access to the waterways to the minimum amount of bank length required for the activity • Retain stumps in riparian zones and aquatic habitats, where practicable, to reduce the potential for bank erosion • Carry out any refuelling of plant and equipment, chemical storage and decanting at least 50 m away from aquatic habitats unless otherwise approved by the TfNSW.	EWMS	During construction	Environmental Site Representative	TfNSW QA G38
SW40	The following measures will be carried out to manage activities within watercourses or on waterfront land: • Implementing practices to minimise disturbance of banks • Undertaking bank stabilisation and installing instream structures • Maintaining minimum flows to assist in maintaining the viability of aquatic communities and preventing barriers to fish passage • Constructing instream crossings during low flows and design so that drainage off crossing doesn't contribute sediment load to the stream • All drainage feature crossings (permanent and temporary watercourse crossings and stream diversions), drainage swales and depressions will be designed by a suitably qualified and experienced professional and will be designed and constructed in accordance with relevant guidelines.	Inspection records	During construction	Environmental Site Representative	REMM SWH12

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
Temporary Waterway Crossings					
SW41	Temporary waterway crossings will consider the following: • Design, construct and maintain the crossing in accordance with the requirements of the Blue Book (Landcom, 2004) • Maintain fish passage in accordance with DPI Fisheries guideline "Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings" • Use material that will not result in fine sediment material entering the waterway. Rock used must be hard, sound, durable rock, free of fine particles and not contaminated with foreign materials • Provide erosion and sediment controls at entry/exits points of the crossing to minimise mudtracking on the crossing.	EWMS	During construction	Environmental Site Representative	TfNSW QA G38
SW42	Liaise with nearby residential or commercial property owners to determine any water discharge requirements (i.e. frequency of discharge, volumes, water quality criteria, etc.). Make allowances in the design and construction of the temporary waterway crossings or diversions for such requirements. Requirements for temporary waterway diversions are to be discussed at the Environmental Risk Assessment Workshop required under G36 (Clause 3.2.1).	Consultation records	During construction	Environmental Site Representative	TfNSW QA G38
SW43	Visually monitor the water quality upstream and downstream of any temporary waterway crossings or diversions to identify any water quality impacts caused by your construction activities. Maintain any records in accordance with Clause 3.1.2.	Inspection records	During construction	Environmental Site Representative	TfNSW QA G38
Chemical Storage and refuelling					
SW44	Storage, handling and use of dangerous goods and hazardous substances must be in accordance with the Work Health and Safety Act 2011 and the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005).	Inspection records	During construction	Environmental Site Representative	REMM HS04
SW45	All fuels, chemicals, and liquids must be stored on slopes less than 1:10 and at least 50 m away from waterways (including existing stormwater drainage systems) and flood prone areas. Secure, bunded areas must be provided around storage areas for oils, fuels and other hazardous liquids.	Inspection records	During construction	Environmental Site Representative	REMM HS05 TfNSW QA G36

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
SW46	SDS must be obtained for dangerous goods and hazardous substances stored onsite before their arrival.	SDS	During construction	Environmental Site Representative	REMM HS06
SW47	All hazardous substances must be transported in accordance with relevant legislation and codes, including the Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998 and the 'Australian Code for the Transport of Dangerous Goods by Road and Rail' (National Transport Commission, 2008).	CTTMP	During construction	Environmental Site Representative	REMM HS07
SW48	Spill prevention and response will comply with: • Relevant legislation and Australian Standards • EPA "Bunding and Spill Management Guidelines" contained within EPA Environmental Protection Manual for Authorised Officers" • TfNSW "Code of Practice for Water Management".	Spill response procedure PIRMP	During construction	Environmental Site Representative	TfNSW QA G36
SW49	Temporary bunding must be in place to refuel or maintain plant and equipment, undertake plant/equipment washdown, mix cutting oil with bitumen, or carry out any other activity which may result in spillage of a chemical, fuel or lubricant at any location which drains directly to waters or environmentally sensitive areas. Refuelling operations must be attended.	Inspection records Induction records	During construction	Environmental Site Representative	TfNSW QA G36
Spill Management					
SW50	A spill response procedure has been prepared as part of the PIRMP, to minimise the impact of spills. The procedure will include details on the requirements for managing, cleaning up and reporting of spills.	Spill response procedure PIRMP	Prior to construction	Environmental Site Representative	TfNSW QA G36
SW51	Spill kits will be located to allow for timely response to uncontained spills. Adequate quantities of suitable material to counteract spillage will be readily available. Site inductions will include a briefing on the use of spill kits.	Inspection records Induction records	During construction	Environmental Site Representative	REMM B20 TfNSW QA G36 REMM SWH01
SW52	Environmental Work Method statements (EWMS) will include the following activities, as a minimum, to minimise the possibility of pollution of the site: • Refuelling or maintenance and cleaning of plant and equipment including concrete agitators, bitumen spray bars and asphalt pavers • On-site batching of concrete and asphalt • Mixing of bitumen with cutting oil and additives;	EWMS	Prior to activity	Environmental Site Representative	TfNSW QA G36

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	• Application of liquid membranes, including paint and thermoplastic, resin, emulsion, precoat agent and curing compound; • Bulk fuel or chemical deliveries; • Removal and disposal of excess chemicals and water used for washing down of equipment; • Pumping out of oil and grease collection pits; • Decanting operations such as for fuel, chemicals and bitumen.				
Farm Dam Dewatering					
SW53	The CSWMP will be updated with any mitigation measures for the flow of water into the farm dams as directed by TfNSW following any agreements with the affected landowners.	Consultation	Prior to any works that may potentially affect the flow of water into farm dams	TfNSW / CPBGG JV	CoA E24
SW54	Suitably qualified and experienced independent professionals, approved by the Principal, are to advise and assist in determining the impact and relevant mitigation measures on farm dam impacts from stormwater yields during construction.	Qualifications and experience records	Prior to any works that may potentially affect the flow of water into farm dams	TfNSW / CPBGG JV	TfNSW QA G38
Monitoring and Inspection					
SW55	Onsite weather conditions will be monitored using the Badgerys Creek AWS BOM gauge (#067108) and an onsite installed AWS	Weather records / Pre-starts	During construction	Environmental Site Representative	Blue Book TfNSW QA G38 / R272
SW56	Monitor upcoming weather conditions daily using the BOM website and / or on site AWS and prepare the site for potential rain events when there is more than a 50% chance of 10 mm of rainfall or greater	Weather records / Pre-starts	During construction	Environmental Site Representative	Blue Book TfNSW QA G38
SW57	Surface water monitoring must be undertaken in accordance with the Construction Soil and Water Monitoring Program and implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Monitoring records	During construction	TfNSW / CPBGG JV	CoA C17 REMM SWH01 REMM SWH05 REMM GW01 TfNSW QA G38
SW58	Additional soil and groundwater investigations will be required in the areas of additional cut around the airport interchange northern cut	Additional soil and groundwater investigations	Prior to construction	TfNSW	REMM SC05

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source.
	and airport interchange southern cut to further assess the potential impacts to the amended Project.				
SW59	Undertake pre and post rainfall event monitoring	Inspection records	Pre, during and post rainfall	Environmental Site Representative	Best Practice Blue Book

7 Compliance management

7.1 Roles and responsibilities

The Project organisational structure and overall roles and responsibilities are outlined in Section 3.3 of the CEMP. Specific responsibilities for the implementation of soil and water management are detailed in Section 6 of this Plan.

7.1.1 Contractor Soil Conservationist

A Contractor Soil Conservationistwill be engaged by CPBGG JV for the duration of construction of the Project. The Contractor Soil Conservationist will:

- Review and advise on the CPBGG JVs' CSWMP and PESCPs
- Provide specialised training to relevant site personnel
- Conduct inspections during critical site activities like; clearing and grubbing, sediment basin establishment, works in waterways, and bulk earthworks.
- Provide advice on the planning and implementation of erosion and sediment control.

7.2 Training

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

- Existence and requirements of this CSWMP and all plans and procedures prepared under the CSWMP
- Relevant legislation, regulations and EPL conditions
- Incident response, management and reporting
- Emergency response measures in high rainfall or flood events
- The Pollution Incident Response Management Plan (PIRMP)
- Mulch and tannin management
- Stockpile location criteria
- Complaints response and reporting
- Roles and responsibilities for soil and water management
- ERSED control installation methodology
- Sediment basin construction and management
- Working near or in drainage lines and creeks
- Water quality management and protection measures
- Groundwater issues
- Spill response.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management or those undertaking an activity with a high risk of environmental impact. Site personnel will undergo Environmental Awareness refresher training at not less than six monthly intervals. The Contractor Soil Conservationist will provide assistance with training in regard to erosion and sediment control issues.

Daily pre-start meetings conducted by the CPBGG JV will inform the site workforce of any environmental issues relevant to soil and water that could potentially be impacted by, or impact on, the day's activities.

Further details regarding staff induction and training are provided in Section 3.5 of the CEMP.

7.3 Communication

The CPBGG JV will adhere to the requirements as outlined in the OCS and CSEP. The CSEP identifies opportunities and tools for providing information and consulting with the community and stakeholders during the construction of the Project.

Soil and water management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in the CSEP where required.

Further detail about the CSEP is provided in Section 3.7.3 of the CEMP.

7.4 Monitoring and inspection

7.4.1 Monitoring

A Construction Soil and Water Monitoring Program has been prepared and is provided in Appendix C.

Monitoring will include, but not be limited to:

- Daily monitoring of site weather conditions and rainfall in millimeters using the BOM website and CPBGG JV's onsite AWS
- Construction sediment basin water quality prior to discharge
- Regular visual monitoring of local water quality (i.e. for plumes of turbidity and hydrocarbon spills/slicks) to identify any potential spills or deficient controls when working in or near waterways
- Regular visual monitoring of areas that have been stabilized to evaluate the effectiveness of stabilisation methods.
- Receiving surface water quality monitoring
- Visual monitoring for groundwater ingress and groundwater quality monitoring
- Monitoring and management of spoil, fill and materials stockpile sites including details of how spoil, fill or material will be handled, stockpiled, reused and disposed
- Inspections to evaluate the effectiveness of erosion and sediment controls measures in accordance with Section 7.4.2.
- Monitoring of the effectiveness of erosion and sediment control actions and measures during construction in accordance with the PESCPs. The type, timing, frequency, assessment criteria and associated reporting requirements will be detailed in the PESCP.

7.4.2 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the Project. The ESR and Environmental Team will carry out weekly site inspections. These weekly inspections will include monitoring of all aspects of soil and water managements. Records will be maintained of these inspections.

TfNSW will also conduct independent inspections to confirm compliance with soil and water management requirements.

Other routine inspections by the TfNSW Environment and Sustainability Manager (or delegate), and the ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 3.9 of the CEMP.

TfNSW will engage a Contractor Soil Conservationist to conduct regular inspections of the Project during construction. The CPBGG JV will ensure appropriate environmental site personnel are available to induct, guide and accompany the TfNSW Contractor Soil Conservationist on the inspections and to promptly rectify any deficiencies raised.

The ESR will advise the TfNSW Environment and Sustainability Manager (or delegate) of actions being taken, in accordance with the priorities nominated in the Contractor Soil Conservationist's Environmental Inspection Report. The report will state the priority of the rectification works. The CPBGG JV will rectify the actions listed within the inspection report within the following priority timeframes:

- Immediate: on day of inspection
- High: within 24 hours of inspection
- Medium: within three working days of inspection
- Low: within three working days of inspection.

Written and photographic evidence will be provided to TfNSW of the Site's permanent and temporary erosion and sediment control works after each inspection. A register will be maintained of all inspections performed and of maintenance or repairs carried out.

Inspection and monitoring requirements relevant to soil and water are summarised in Table 7-1.

Table 7-1 Inspections and monitoring relevant to soil and water

Inspection / monitoring	Frequency	Responsibility	Requirement
Inspect all plant and equipment daily for leakages of fuel, oil or hydraulic fluid. Repair any leaks before using item of plant or equipment. Maintain records of plant inspections	Daily	Environmental Site Representative Foreman/ Site Supervisor	TfNSW QA G36
Inspection of all erosion and sediment controls, stockpiles, disturbed areas, revegetated/stabilised areas and bunded areas and undertake any works required to repair and/or maintain these controls	Weekly Prior to wet weather event* Prior to site shutdown Following rainfall events	Environmental Site Representative Foreman/ Site Supervisor TfNSW Senior Environment Officer (or delegate)	TfNSW QA G38 Blue Book Section 8.2
Inspection of sediment basins	Monthly	Soil Conservationist / Environmental Site Representative Foreman/ Site Supervisor	TfNSW QA G38
Inspection of stockpile areas (rectify any non-conformances to erosion and sediment controls immediately)	Weekly	Environmental Site Representative Foreman/ Site Supervisor	TfNSW QA G38

* Inspect all disturbed areas and revegetated/stabilised areas together with all permanent and temporary erosion and sediment control works as soon as practicable but within 3 hours (during normal work hours and days) or within 24 hours (outside normal work hours and days, including industry rostered days off and public holidays) after the start of all rainfall events exceeding 10mm and during periods of prolonged rainfall.

7.5 Licences and Permits

Prior to the activity, the CPBGG JV will provide TfNSW evidence of receipt of any approval, licence and/or permit from the relevant authority.

7.5.1 Water Access Licence

Groundwater or waterway abstraction is unlikely to be undertaken for the project. In the instance that it is, the CPBGG JV consult with Water NSW and obtain approval for the chosen source(s) before commencing abstraction.

The use of reclaimed water must comply with the requirements of TfNSW Environmental Direction 19: Use of Reclaimed Water. For any water source other than a town water supply or natural water source, baseline testing will occur prior to use and ongoing testing will continue throughout its use to ensure that the water is suitable for the purpose and is not hazardous to health and the environment.

7.6 Weather Monitoring

The CPBGG JV will measure and record rainfall at the premises. The measurements will be in millimetres per 24-hour period at the same time each day from the time that the site office associated with the activities is established.

The CPBGG JV will install AWS on site and will conform to BOM Observation Specification No. 2013.1 and TfNSW Specification R272 – Automatic Weather Stations for the design and location of such devices. AWS will be sited within the secured compound area fully protected by fencing, and any instrumentation, communication or power cabling contained within conduits buried to a depth of at least 100 mm.

7.7 Auditing

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

Audit requirements are detailed in Section 3.9.3 of the CEMP.

7.8 Reporting

Reporting requirements relevant to soil and water are summarised in Table 7-2.

The CPBGG JV will be required to maintain accurate records substantiating all construction activities associated with the Project, including measures taken to implement this CSWMP.

Table 7-2 Reporting requirements relevant to soil and water

Report	Frequency	Recipient	Responsibility	Reference
Environmental monitoring	Monthly	TfNSW	CPBGG JV	TfNSW G36, G38
Annual Return monitoring summary	Annual	EPA	CPBGG JV	EPL, POEO Act
Groundwater and surface water Monitoring Results	Bi-annual	Planning Secretary	TfNSW	CoA C18

8 Review and Improvement

8.1 Continuous Improvement

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

The continuous improvement process will be designed to:

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

The ESR will be responsible for ensuring Project environmental risks are identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the Project as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 3.2.1 of the CEMP.

8.2 Review by the Contractor Soil Conservationist

CPBGG JV has engaged John Wright from T.R.E.E.S as the Contractor Soil Conservationist. John Wright is listed on the TfNSW list of Registered Contractors for Erosion, Sedimentation and Soil Conservation Consultancy Services. His contact mobile number is 0418 434 516. The role of the Contractor Soil Conservationist includes:

- Review the development of this CSWMP including all calculations and proposed erosion and sediment controls.
- Assist with development of PESCPs, including design and location of temporary sediment basins.
- Undertake site inspections as required, but at least monthly and prepare a report detailing findings from these inspections that is to be provided to Roads and Maritime.
- a report of the site post restoration with verification that no erosion and sediment control issues are present
- Provide specialised training to relevant site personnel.

- Liaise on a regular basis with any soil conservationist appointed for the Project by Roads and Maritime.

Issues identified in the soil conservationist inspection reports will be acted on and reported to the Principal within 5 working days. TfNSW will also engage a suitably qualified CPESC for the Project to provide independent advice to TfNSW.

The CPBGG JV Contractor Soil Conservationist will liaise on a regular basis with the Contractor Soil Conservationist appointed for the Project by TfNSW.

8.3 CSWMP Update and Amendment

The processes described in Section 3.12 and 3.13 of the CEMP may result in the need to update or revise this CSWMP. This will occur as needed.

Any revisions to the CSWMP will be in accordance with the process outlined in Section 3.13 of the CEMP.

A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to section 3.1 of the CEMP.

Appendix A – Stockpile Management Protocol

Appendix A Stockpile Management Protocol

M12 Motorway West

Project number:	N00160
Document number:	M12WCO-CPBGG-ALL-EVWA-PLN-000001_App A
Revision date:	28/07/2022
Revision:	00

Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	14/07/2022	A. Zvirzdinas	Second Draft following ER review
C	22/07/2022	A. Zvirzdinas	Third Draft following TfNSWArcadis/ER review and comment on Rev B
00	28/07/2022	A. Zvirzdinas	First Controlled Issue

Document Review

Position	Name	Signature	Date
Project Director	[redacted]		28/07/2022

Distribution of controlled copies

Copy no.	Issued to	Version

Table of Contents

Acronyms and Abbreviations

Abbreviations	Expanded text
CoA	Conditions of Approval
CFFMP	Construction Flora and Fauna Management Sub-plan
CPBGG JV	CPB Contractors and Georgiou Group Joint Venture
CSWMP	Construction Soil and Water Management Plan
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESM	Environment and Sustainability Manager (TfNSW)
ESR	Environmental Site Representative (CPBGG JV)
EWMS	Environmental Work Method Statement
OCEMP	Overarching Construction Environmental Management Plan
POEO Act	*Protection of the Environment Operations Act* 1997
QA	Quality Assurance
REMM	Revised Environmental Management Measures
TfNSW	Transport for NSW
TSS	Total Suspended Solids

1 Introduction

1.1 Purpose

This Stockpile Management Protocol has been prepared to ensure that stockpiles are appropriately designed, established, operated and decommissioned to minimise impacts to the environment during Construction of the Project. This Protocol outlines the locational criteria used to guide the placement of temporary stockpiles and provides both standard and site-specific mitigation measures to be implemented to minimise impacts on the environment.

This Protocol has been developed in accordance with:

- Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
- Technical Guideline EMS-TG-010: Stockpile Site Management Guideline (RTA, 2011)
- Stockpile Management Guidelines (Roads and Maritime, 2015)
- TfNSW QA G38

1.2 Objective

The objectives of this Protocol include:

- Ensure compliance with environmental requirements of the Project
- Implement industry standard methods for stockpiling of materials
- Provide a clear methodology for the management of stockpiling
- Ensure that stockpiles are managed to minimise the potential for mobilisation and transport of dust and sediment in runoff

1.3 Scope

This protocol is relevant to the planning, placement and management of all stockpiles on or related to the Project. Stockpile sites may typically be required to store material including, but not limited to temporary storage of:

- Excavated or delivered materials to be used in fill embankments and other design features
- Excavated material unsuitable for reuse on the Project
- Excess concrete, pavement, rock, soils and aggregate stored for potential reuse in the Project or prior to removal from site
- Imported sands, soils, aggregates, recycled concrete products, topsoils, rock and engineered fills for use in the Project
- Topsoil, mulch, timber for landscaping and revegetation works

1.4 Induction / Training

Personnel involved in planning or managing stockpiles will be trained in the requirements of this Protocol. Training will also include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and Responsibilities

The CPBGG JV Environmental Site Representative (ESR) has overall responsibility for the establishment, management, monitoring and maintenance of stockpiles. The ESR will ensure this Protocol is effectively implemented and that all site personnel are aware of the requirements of this Protocol.

The CPBGG JV Soil Conservationist will advise on the location and management of stockpiles during Construction.

The CPBGG JV Superintendent will be advised of any maintenance or rectification works required for stockpiles and will be responsible for ensuring the actions are undertaken.

1.6 Review

This Plan will be reviewed by CPBGG JVs Soil Conservationist and TfNSW Environment and Sustainability Manager (ESM) (or delegate) prior to commencement of construction.

This Plan will be reviewed annually or as required in accordance with the continuous improvement process described in Section 8 of the CSWMP.

2 Environmental Requirements

2.1 Legislation and guidelines

This Plan has been developed with consideration of the following key legislation and guidelines:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- Managing Urban Stormwater Soils and Construction (Landcom, 2004)
- Technical Guideline EMS-TG-010: Stockpile Site Management Guideline (RTA, 2011)
- Stockpile Management Guidelines (Roads and Maritime, 2015)
- TfNSW QA Specification G38 – Soil and Water Management

2.2 Requirements

The applicable NSW CoA, REMMs relevant to the development of this Plan are listed in Table 2-1, as identified in the CSWMP

Table 2-1 Stockpiling requirements

Reference	Measure/Requirement	Where addressed
NSW CoA Definitions	Construction ancillary facility A temporary facility for construction of the CSSI including an office and amenities compound, construction compound, material crushing and screening plant, concrete and asphalt batching plant, materials storage compound, maintenance workshop, testing laboratory, material stockpile area, access and car parking facilities and utility connections to the facility • Note: Where an approved CEMP contains a stockpile management protocol, a material stockpile are located within the construction boundary is not considered to be an ancillary facility.	This Protocol
REMM SWH01	A Construction Soil and Water Management Plan (CSWMP) will be prepared for the project. The plan will outline measures to manage soil and water impacts associated with the construction works, including contaminated land. The CSWMP will provide: Measures to manage stockpiles including locations, separation of waste types, sediment controls and stabilisation	This Protocol

3 Protocol

3.1 Stockpile Location Criteria

Stockpiles on the Project will be located according to the following criteria:

- outside of the tree protection zone of trees or native vegetation identified for retention in accordance with requirements specified in AS4970
- on land that does not require the removal of threatened species, Endangered Ecological Communities or roosting habitat for listed threatened fauna species or native vegetation clearing beyond what is already required for the Project
- at least 5 m from likely areas of concentrated water flows
- at least 10 m from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline “Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings” and above the 20 year flood levels
- so that any slump of the stockpile will not affect erosion and sediment control measures or infringe specified minimum clearance requirements
- to ensure no cross contamination of contaminated materials with non-contaminated materials
- in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the Project
- a suitable distance from sensitive noise and vibration receivers to minimise disruption
-
- where possible, away from key views and visual receptors
- so that the appropriate erosion and sediment control measures can be installed and will operate effectively
- readily accessible via the Project or road network
- to minimise the need for heavy vehicles to travel on local roads
- on relatively level land
- outside of utility easement corridors
- Within the approved EPL boundary.

All proposed stockpiles will be assessed in accordance with the criteria listed above.

If any stockpile site is located on private land, approval will be obtained from the landholder under s.143 of the Protection of the Environment Operations Act 1997 prior to commencement of stockpiling.

3.2 Stockpile Location Approval

Prior to the establishment of any stockpile on site as part of the Project, CPBGG JV will detail how the stockpile site meets each of the criteria above. Before establishing a new stockpile site, CPBGG JV will consider whether any existing stockpile site in the vicinity can be used. CPBGG JV will undertake an advanced contamination assessment prior to disturbance of any land being or intended to be used for the location of stockpiles. The proposed locations of the proposed stockpiles will be detailed on the relevant PESCP and submitted to the TfNSW Environmental Manager (or delegate) and the TfNSW Project Manager for concurrence at least 10 working days before stockpiling is due to commence.

3.3 Stockpile Management

The type of environmental controls required for stockpile management will depend on the location, surrounding environment and material being stored at the stockpile site. The environmental controls for a particular stockpile site may change during Construction depending on the type of material being stored at any particular time. The mitigation measures will be implemented prior to establishment of stockpiles by the Superintendent in consultation with the ESR. Any change in use will be reflected where required in the PESCP and the Stockpile Register.

Site-specific mitigation measures, where they are necessary to further reduce impacts, will be detailed in the PESCP. Mitigation measures for each stockpile site will include as a minimum:

- an Erosion and Sediment Control Plan (ESCP) including:
  - delineation of the perimeter of the stockpile with a bund, fencing or barrier
  - erosion and sedimentation controls to be erected between the stockpile site and any drainage lines or down-slope areas
  - temporary sediment basins
  - covers, or other erosion protections for stockpiles that will be in place for more than 20 days as well as any temporary stockpiles that are susceptible to wind or water erosion, within 5 days of forming each stockpile
  - diversion of stockpile run-off through sediment traps and controls
- keep stockpile heights to no greater than 2 m unless otherwise approved by TfNSW and slopes to no steeper than 2:1
- dust management measures (including for vehicle movements associated with stockpiling activities) will be implemented in accordance with the requirements of the Construction Air Quality Management Plan
- monitoring of odours and odour control measures
- Notification of residents within 200 m of stockpiles, the potential impact from constructing the stockpile (including visual and odour impacts) and proposed mitigation measures. If residents are dissatisfied with the proposed mitigation measures, the stockpile location or associated mitigation measures will be reviewed
- exit points from stockpile areas will be stabilised and include rumble pads to prevent mud tracking
- progressively rehabilitate stockpile sites in accordance with Roads and Maritime Specification R178
- Avoid locating stockpile weed contaminated topsoil or other contaminated materials adjacent to areas of native vegetation.

3.4 Mulch Stockpiles

Mulch will be stockpiled and composted prior to use in order to reduce the effects of nitrogen drawdown and in order to leach tannins. Minimum stockpiling times vary depending on species from which the mulch is derived (typically six months). Mulch stockpiles will be monitored and turned over as required to avoid spontaneous combustion.

Mulch stockpiles will not be located close to creeks or tributaries and will be bunded or positioned to drain into a sediment basin. Mulch stockpiles in high tannin generating vegetation will:

- mulch stockpiles should be established on elevated ground where possible
- be located 50 m from waterways, for mulch stockpiles that will be in place for duration of more than 1 month
- be located 20 m from waterways, for mulch stockpiles that will be in place for duration of less than 1 month
- bunded to ensure up-gradient water is prevented from entering the stockpile site, and to capture tannin impacted water. Bunds will be impervious and 300 mm high at a minimum.
- Be managed in accordance with all other requirements specified in the Management of Tannins from Vegetation Mulch Procedure (refer Appendix B of the CSWMP).

3.5 Topsoil Stockpiles

CPBGG JV will comply with the following measures in regard to topsoil stockpiles:

- prior to stockpiling topsoil, the ESR will carry out a survey in accordance with TfNSW Specification G71 to determine the surface levels at each stockpile area
- stripped topsoil will be sieved and any lumps of clay, weeds and other deleterious material will be removed prior to adding to any stockpile
- Topsoil that is not contaminated by noxious weeds or asbestos will be kept in stockpiles for later spreading on fill batters and other areas. Other material may also be stockpiled but kept separated from the topsoil stockpiles

- Topsoil stockpiles will:
  - be free from weeds, subsoil, other excavated materials, contaminated materials (including asbestos), refuse, clay lumps and stones, timber or other rubbish
  - be managed to ensure no growth of weeds
  - be trimmed to a regular shape to facilitate measuring with a height not exceeding 2m, unless agreed otherwise with TfNSW, and batter slopes not steeper than 2:1
  - have their batters track rolled or stabilised by other means
  - seeded in accordance with TfNSW R178, to encourage vegetation cover

CPBGG JV will carry out tests on the stockpiled topsoil using a NATA accredited testing laboratory to ascertain its suitability for use in revegetation works and to determine soil chemistry revegetation constraints, soil amelioration and spreading requirements. CPBGG JV will use only stockpiled topsoil suitable for use in revegetation works as topsoil. Topsoil handling and stockpile contamination risk will be managed to ensure the success of the vegetation.

3.6 Sand Stockpiles

If sand is required to be imported and stockpiled in the corridor for Construction purposes, the following will be implemented:

- it will be located 50 m from waterways on high ground
- divert surface water runoff away from sand stockpile
- erosion and sedimentation controls will be erected between the stockpile site and any drainage lines or down-slope areas

3.7 Other material stockpiles

If stockpiling of other materials, such as imported quarry materials, quarried rock, DGB etc that may be susceptible to wind and water erosion. These are to be stockpiled in the catchment of erosion and sediment controls and shown on the PESCPs.

In the event that Acid Sulfate Soils are encountered. ASS stockpile management, including leachate containment, will be in accordance with the CSWMP and the Acid Sulfate Soil Manual (1998)

CPBGG JV may also be required to temporarily stockpile contaminated material. CPBGG JV will comply with the following measures in regard to stockpiles of contaminated material:

- All stockpiles containing contaminated (or suspected contaminated) materials will be covered (with geotextile or plastic as required)
- Additional downslope controls (such as bund/sandbags and/or sump depending on location of stockpile) will be installed as required
- Stockpiles will be sign posted as a warning for potential contamination present
- Contaminated material stockpiles will only be located in areas which are explicitly approved for the storage of contaminated materials

Further details of stockpiling of contaminated materials will be contained in the Remedial Action Plan.

3.8 Decommissioning of Stockpile Sites

Decommissioning of stockpile sites after use will be conducted to reinstate the stockpile site to its previous natural condition. Stockpile sites will be progressively rehabilitated in accordance with TfNSW Specification R178. Decommissioning and rehabilitation of stockpile sites will involve the following activities:

- clearing all stockpile material from the site and recycling or disposing of it at a licensed facility
- stabilising the site by planting and/or landscaping the site
- removing control measures such as erosion and sedimentation devices once the stabilisation has occurred
- undertaking an inspection of the site
- notifying the TfNSW Environmental Manager (or delegate) that the stockpile site has been removed

- updating PESCPs

4 Inspection, Monitoring and Reporting

Compliance with this Protocol will be tracked through weekly environmental inspections of stockpile sites by the ESR or Environmental Team. Inspections will monitor the effectiveness of the control measures and ensure the environmental impacts of stockpiles are minimised. The checklist of items to be inspected will include general condition of surrounding environment, erosion and sedimentation control devices, pits and catch drains, bunding, fencing, stockpile height and condition (evidence of weeds, odour, litter etc.).

In the event that ASS stockpiling is required, monitoring of the stockpiles (eg.pH) will be undertaken in accordance with the ASS Manual.

Identified non-compliances will be reported to the TfNSW Environment and Sustainability Manager (or delegate) and the appropriate management measures will be put in place to ensure ongoing compliance.

5 Records

CPBGG JV will maintain records of approved stockpile locations on PESCPs or relevant site plans. The ESR will maintain a record of stockpile locations in a Stockpile Register. The Stockpile Register will also include the purpose of the stockpile, the type of material contained, timing for establishment and removal. The ESR is responsible for developing and maintaining the register and it will be provided to TfNSW when requested.

Appendix B – Management of Tannins from Vegetation Mulch

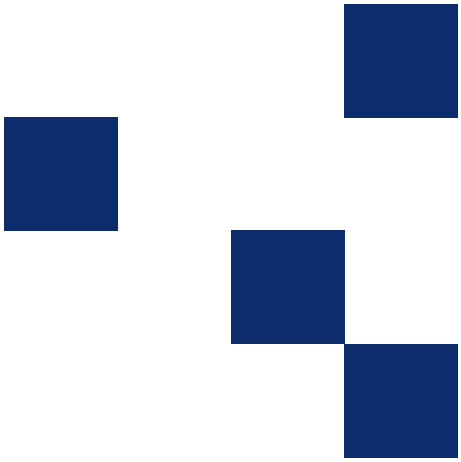
Transport Roads & Maritime Services

NSW GOVERNMENT

ENVIRONMENTAL DIRECTION

Management of Tannins from Vegetation Mulch

JANUARY 2012



ABOUT THIS RELEASE

Environmental Direction number	25
Environmental Direction title	Management of Tannins from Vegetation Mulch
Author	Environment Branch (Environmental Policy)

Issue	Date	Revision description
1	December 2011	Final draft
2	January 2012	Final

CONTENTS

1 PURPOSE

The purpose of this environmental direction is to set RMS's minimum management measures to minimise the generation and discharge of tannins from vegetation mulch on Roads and Maritime Services (RMS) construction projects. Additional background information on tannins and the use of mulch on construction sites is included in section 3 of this direction.

2 MANAGEMENT MEASURES

The primary focus must be to minimise tannin generation on construction sites.

2.1 General mulch management measures

These general mulch management measures are to be followed for all RMS construction projects.

2.1.1 Planning and works staging

The first step in planning and works staging is to identify the amount of mulch to be generated. With this information, a strategy can be prepared to manage mulch on site. Staging of chipping, tub grinding and/or mulching activities should be planned to reduce the volume of mulch to be managed at any one time. The volume of excess mulch can then be assessed and plans made to dispose of this off site.

Other general considerations at the planning and works staging phase are as follows:

- Mulch stockpile sites should be established with appropriate controls in place before the main site clearing activities commence. Limited clearing may be required earlier for establishment of stockpile areas and access.
- Stage the mulching of cleared vegetation to ensure that mulch can be progressively moved to elevated, or otherwise suitable, stockpile locations. It is preferred that mulch should be transferred to a stockpile or reused on the day of mulching.
- Plan to efficiently reuse mulch in progressive works to reduce the time that mulch is concentrated in stockpile locations.
- Excess mulch can be managed by community giveaway. This takes considerable time and mulch needs to be suitably located and managed as this occurs. The conditions for community giveaway of mulch are included as Appendix 3.
- Any other form of bulk offsite mulch disposal (eg to Council parkland or a development site) must be assessed to ensure waste management provisions are adhered to for off site disposal.

2.1.2 Stockpile location and management

- Mulch stockpile sites should be established on elevated ground where possible.
- Stockpile sites with a duration of not more than 1 month should be constructed not less than 20 metres from a watercourse, including floodplains.
- Stockpile sites with a duration of more than 1 month should be constructed not less than 50 metres from a watercourse, including floodplains.
- Mulch stockpiles should be designed and constructed to divert upgradient water to prevent it from entering the stockpile site.

2.1.3 Management measures for the use of mulch on site

- Do not use mulch for surface cover or sedimentation controls in any low lying areas of the site that remain consistently wet. Alternative controls such as geofabric (for surface protection) or sediment fence will be required in these areas.
- Do not spread surface mulch in thicker than 100mm layers. Mixing mulch with topsoil is encouraged for batters to prevent loss of topsoil during initial stabilisation. It should be noted that mulch will generally cause nitrogen draw down which may inhibit plant growth, unless mulch has been composted first.
- Care is to be taken to ensure that excessive mulch is not applied for sedimentation controls such as perimeter bunds or catch dams.

2.1.4 Monitoring and response

- Monitor the site for generation of tannins. Tannin impacts can be readily identified visually as dark coloured ponded water. Site staff should be trained to identify and report potential impacts to the site project management or environment staff.
- Review management practices where required to prevent the generation of tannins in identified problem areas.

2.2 Mulch management methods for high risk sites

2.2.1 High risk sites

High risk sites, where additional management measures may be required, include:

- where large quantities of mulch will be generated and stockpiled.
- where high tannin generating vegetation types are to be mulched (see 3.1).
- where the receiving environment is identified as sensitive (eg Marine Park, threatened aquatic species habitat).
- where tannins have been observed to be generated or discharged from an operating site with standard management controls.

2.2.2 Stockpile management measures for high risk sites

- Mulch stockpiles for high tannin generating vegetation types should incorporate an impermeable bund to capture stockpile leachate or tannin impacted water. Impervious bunds must be a minimum of 300 mm high, preferably higher to capture tannin impacted water. All bunded stockpiles that are in place for a period longer than one month must include a lined discharge point for overflow in extreme rainfall events.
- Stockpiles established on sloping sites must be designed to provide temporary stormwater containment equivalent to a 300 mm minimum height bund on a flat site.
- Tannin impacted water should be pumped out of bunded stockpiles within 5 days of the end of a rainfall event to maintain the storage capacity. This water should be used for on site purposes including dust suppression and landscape watering. These activities must be managed to prevent any pooling or runoff of tannin impacted water.
- Bunded stockpiles must be inspected within 24 hours of cessation of any rainfall event greater than 10mm to ensure tannin impacted water does not overflow.

2.3 Site management procedures

Site management procedures must be prepared for all sites where tannins are identified as a potential issue. Site management procedures should be based on the management measures provided in this Environmental Direction.

3 BACKGROUND

3.1 Tannin generation from vegetation mulch

See Plates 1 – 3 in Appendix 1.

Tannins are naturally occurring plant compounds. Tannin generation from vegetation mulch is likely to be highest from low-lying coastal floodplain areas. The species of vegetation (eg *Melaleuca*) will have a major impact on the likelihood of tannin generation.

Tannin generation is generally highest from mulched vegetation that is stockpiled in areas that are subject to inundation. Placement in wet areas will result in accelerated leaching of tannins into water, concentration of tannins in pooled water, and greater impacts on water quality.

3.2 Tannin impacts on water quality

See Plates 4 – 5 in Appendix 1.

The main concern with the discharge of water that is high in tannins is that it may increase the biological oxygen demand (BOD) of the receiving environment. Increases in BOD may result in a decrease in available dissolved oxygen. A lack of dissolved oxygen is identified as the main cause of about 80 percent of fish kills in NSW rivers and estuaries.

Tannin impacts may result in dark coloured water discharge from construction sites. This impact can be obvious and may raise the concern of the community and other stakeholders including regulatory authorities. Once discharged to the environment, tannins may reduce visibility and light penetration and change the pH of receiving waters. These impacts may affect aquatic ecosystems in receiving environments.

Tannins cannot be readily treated with standard construction site water quality controls. Once water on site is impacted with tannins it is not possible to treat effectively with currently approved flocculants. Minimisation of tannin generation in the first place is the management strategy that must be applied.

3.3 Use of mulch on construction sites

See Plates 10 – 16 in Appendix 2.

The RMS Biodiversity Guidelines provide guidance on the benefits of reusing various sizes of vegetation for different purposes. Mulch is a readily available and cheap source of material for temporary site stabilisation and sedimentation control. The re-use of mulch reduces the need to transport this material off-site and reduces handling and disposal costs for construction contracts.

Unprotected mulch sedimentation controls should not be placed in concentrated flow lines where mulch may be washed away. Mulch may be protected by wrapping it with geofabric or other materials to provide a stable control. All temporary catch dams constructed from mulch must have a stable outlet to minimise the washing away of mulch in high rainfall events, and the possible failure of the control.

4 ADDITIONAL RESOURCES

- RTA Biodiversity Guidelines- Protecting and Managing Biodiversity on RTA Projects, 2011
- Pacific Highway Mulch Protocol 2011

5 APPENDICES

Appendix 1: Plates showing tannin generation & water quality impacts

Plate 1: Melaleuca vegetation community – mulch from this vegetation type will generally produce high amounts of tannins.

Plate 2: Vegetation mulching activity – mulch should be progressively moved into prepared stockpile areas.

Plate 3: Tannin generation from recently felled and partially mulched vegetation in an area subject to localised inundation. Mulched vegetation should be progressively moved to prepared stockpiles to manage tannin impacted water.

Plate 4: Tannin impact in stormwater at the discharge point from a road construction site. The discharge of impacted water may be obvious to community and other stakeholders.

Plate 5: Tannins in a drainage line generated from very thickly applied mulch on the batter above. Note that the sedimentation fence is not effective in treating the tannins.

Appendix 2: Plates showing the use of mulch for erosion & sedimentation controls

Plate 6: Mulched vegetation stockpiled in a low-lying area subject to inundation. This is not an appropriate stockpile location and may increase the generation of tannins from stockpiled mulch.

Plate 7: Mulch being placed as batter erosion control. Mulch should not be applied in layers more than 100 mm thick for surface stabilisation.

Plate 8: Site showing recent application of a mulch/topsoil mix on batters (40% mulch to 60% topsoil). Mulch mixes are used to provide temporary stabilisation to prevent the loss of topsoil from batters in heavy rainfall events. Mulch use is also shown as a mounded sedimentation control to prevent sediment entering the median drain.

Plate 9: A mulch/topsoil mix used to provide temporary batter stabilisation and to assist cover crop establishment.

Plate 10: Successful establishment of cover crops on batters where mulch has been used with topsoil to assist temporary stabilisation.

Plate 11: Geofabric wrapped mulch bunds used for sedimentation control

Plate 12: Mulch used as a bund for a temporary sedimentation catch dam. Mulch is effective as it can provide both containment and filtering of site water. Mulch should not be used as a control in areas of concentrated flow where it may be washed away. Any mulch containment control should have a defined and lined outlet that allows discharge from the control without washing mulch away. Note that this control does not have a defined discharge outlet which should be installed to prevent failure of the control in heavy rainfall events.

Appendix 3: Minimum requirements for community mulch giveaways

The purpose of community mulch giveaways is to provide mulch for residential landscaping purposes.

The activities of a community mulch giveaway are permissible under the *Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A* (the Raw Mulch Exemption 2008). However, the activities remain subject to other relevant environmental regulations within the Act and Regulations. The Raw Mulch Exemption 2008 is subject to the following conditions:

- The raw mulch can only be applied to land for the purposes of filtration or as a soil amendment material or used either singularly or in any combination as input material(s) to a composting process.
- The consumer must land apply the raw mulch within a reasonable period of time.

Further information can be found at: www.environment.nsw.gov.au/resources/waste/ex08mulch.pdf

It is the mulch generators responsibility to ensure that the mulch is reused in an environmentally responsible manner.

A safe work method statement (SWMS) must be prepared that identifies potential OHS risks and all prevention and mitigation measures. The SWMS must apply to both the community and site workers involved in the mulch giveaway.

Each member of the community who participates in the mulch giveaway must read and understand a site specific information sheet. A template information sheet is attached as Appendix 4.

The site occupier must maintain written records for each load of mulch that is taken away and to ensure that each community participant understands the conditions of the community mulch giveaway information sheet. A suggested template to record this information is attached as Appendix 5.

Appendix 4: Community mulch giveaway information sheet

The following community mulch giveaway information sheet must be populated with site specific information.

Community Mulch Giveaway
Information Sheet

Details of Mulch Supply	
Site Occupier	<insert name of contractor / alliance etc>
Project Name	<insert project name>
Location	<insert location of mulch stockpile>
Mulch stockpile access directions	<insert adequate directions for community members to find the stockpile location>

Background

- This information sheet supports the non-commercial giveaway of mulch for local residents.
- The product is raw vegetation mulch from <insert project location / name>.

Conditions

- Any one individual may only take a maximum of 5 trailer loads from this project.
- The mulch may only be used for residential landscaping purposes.
- Mulch must not be placed in or immediately adjacent to waterways.
- The raw mulch can only be applied to land for the purposes of filtration or as a soil amendment material or used either singularly or in any combination as input material(s) to a composting process.
- The consumer must apply the raw mulch to land within a reasonable period of time.

Community Safety Requirements

- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>

Appendix 5: Records template for community mulch giveaway

The records in the following suggested template must be kept as a minimum.

Community Mulch Giveaway Record Sheet				
Date	**Car Registration**	**I have read and understand the 'Community Mulch Giveaway Information Sheet'**	**Name**	**Signature**
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		
		❑ Yes		

Appendix C – Construction Soil and Water Quality Monitoring Program

Appendix C
Construction Soil and Water Monitoring Program

M12 Motorway West

Project number:	N00160
Document number:	M12WCO-CPBGG-ALL-EVWA-PLN-000001_App C
Revision date:	03/04/2023
Revision:	01

Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	06/05/2022	G. Bolton	Second Draft to address Arcadis/TfNSW review comments
C	17/06/2022	A. Zvirzdinas	Third Draft to address TfNSW/Arcadis comments on Rev B
D	14/07/2022	A. Zvirzdinas	Fourth Draft to address ER comments on Rev C
E	22/07/2022	A. Zvirzdinas	Minor updates to Appendix A and D as per ER and TfNSW comments on Rev D
00	28/07/2022	A. Zvirzdinas	First Controlled Issue
F	25/01/2023	J. Ibrahim	Six Monthly review and additional design change update
01	03/04/2023	J. Ibrahim	Second Controlled Issue

Document Review

Position	Name	Signature	Date
Project Director	[redacted]		

Distribution of controlled copies

Copy no.	Issued to	Version

Table of Contents

Acronyms and Abbreviations

Abbreviations	Expanded text
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
AIP	NSW Aquifer Interference Policy
ANZECC	Australian and New Zealand Environment Conservation Council
ANZG	Australia New Zealand Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
As	Arsenic
AWS	Automatic Weather Station
BAD	Badgerys Creek
BH	Borehole
BoM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene Xylene and Naphthalene
CAQMP	Construction Air Quality Management Sub-plan
CoA	Conditions of Approval
CCLMP	Construction Contaminated Land Management Sub-plan
Cd	Cadmium
CoC	Chain of Custody
COS	Cosgrove Creek
CPBGG JV	CPB Georgiou Joint Venture
CSWMP	Construction Soil and Water Management Sub-plan
CSW – Monitoring Program	Construction Soil and Water Monitoring Program
Cu	Copper
CWRMP	Construction Waste and Resource Management Sub-plan
DPE	NSW Department of Planning and Environment (formerly DPIE)
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESM	Environment and Sustainability Manager
EWMS	Environmental Work Method Statement

Abbreviations	Expanded text
Fe	Iron
HIN	Hinchinbrook Creek
HRC	Healthy Rivers Commission
HSL	Health screening levels
KEM	Kemps Creek
Mn	Manganese
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NH_3	Ammonia
NHMRC	National Health and Medical Research Council
Ni	Nickel
NO_2	Nitrite
NO_3	Nitrate
NOx	Oxidised Nitrogen
NRMMC	Natural Resource Management Ministerial Council
OC	Organochlorine
OCEMP	Overarching Construction Environmental Management Plan
OP	Organo-phosphorus
PAH	Poly-cyclic Aromatic Hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyls
POEO Act	*Protection of the Environment Operations Act* 1997
QA	Quality Assurance
RAP	Remedial Action Plan
REMM	Revised Environmental Management Measures
ROP	Ropes Creek
SOP	Standard operating procedures
SOU	South Creek
SRP	Soluble Reactive Phosphorus
SWL	Standing Water Level
TDS	Total dissolved solids
TfNSW	Transport for NSW
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen

Abbreviations	Expanded text
TP	Total Phosphorus
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
WSIA	Western Sydney International Airport
WQ	Water Quality
Zn	Zinc

1 Introduction

1.1 Background and Project description

Transport for New South Wales (TfNSW) is planning to construct and operate the M12 Motorway (the Project) to provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network. The M12 Motorway would run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres and is expected to be opened to traffic prior to opening of WSIA.

The Project will be constructed in three separate stages under four separate construction contracts. The CPB Contractors and Georgiou Group Joint Venture (CPBGG JV) has been awarded the M12 West stage which is a construct only contract between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek.

1.2 Purpose and Scope

TfNSW has developed an overarching Construction Soil and Water Monitoring Program as part of the Overarching CEMP (OCEMP) to satisfy NSW Condition of Approval (CoA) C11(b), C11(c) and Revised Environmental Management Measure (REMM) SWH05 and GW01. It describes soil, surface water, and groundwater monitoring activities to be undertaken for the Project. This monitoring program was approved by DPIE on 21/12/2021.

CPBGG JV has developed this Construction Soil and Water Monitoring (CSW-Monitoring Program) as part of the Construction Environmental Management Plan (CEMP) and in accordance with the OCEMP developed by TfNSW

The purpose of this CSW-Monitoring Program is to:

- Provide procedures to monitor soil, surface water and groundwater impacts during construction of the Project
- Align with the OCEMP developed by TfNSW and meet the requirements of the relevant conditions of approval for the Project
- Meet any relevant legal and other requirements and Environment Protection Licence (EPL) requirements for the Project.

The SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered in the preparation of this Monitoring Program. Refer to Section 4 for further details on how the monitoring procedures will be undertaken.

TfNSW appointed consultants have been engaged to undertake pre-construction monitoring of the receiving surface water and groundwater for the Project. TfNSW appointed consultants will be appointed for the construction and operational stages of the Project to address surface and groundwater receiving water monitoring in accordance with the OCEMP.

This CSW-Monitoring Program will not include the monitoring covered by the separate TfNSW appointed consultants undertaking the surface and groundwater receiving water monitoring.

1.3 Responsibilities

Site personnel or sub-contractors with suitable experience and qualifications will undertake the monitoring outlined in this CSW-Monitoring Program. An overview of monitoring aspects and responsibilities in provided in Table 1-1.

Table 1-1 Monitoring responsibilities

Monitoring Aspect	Responsibility
Routine receiving surface water quality monitoring	TfNSW appointed consultant
Routine receiving groundwater quality monitoring	TfNSW appointed consultant
Discharge monitoring	CPBGG JV ESR
Climate and weather monitoring	CPBGG JV ESR

The TfNSW appointed consultant will undertake receiving surface water and groundwater monitoring. Receiving surface water and groundwater data collected by the TfNSW appointed consultant will be provided to CPBGG JV, who will be responsible for implementing any actions required in response to any exceedances identified in the TfNSW appointed consultant monitoring results. The CPBGG JV will support the surface water and groundwater monitoring as required including by providing the TfNSW appointed consultant with access to monitoring locations where construction is occurring.

CPBGG JV responsibilities include monitoring of water discharges, climate data and for ensuring that EPL conditions relevant to the discharge of water are met.

1.4 Approval, Review and Modification

TfNSW will review the CPBGG JV's management plans to confirm consistency with the requirements of the OCEMP and TfNSW specifications. The OCEMP has been approved by the Secretary on 21/12/2021.

This CPBGG JV MP will be submitted to the ER for endorsement and consistency with the approved plan by TfNSW and ER. Construction will not commence until this plan has been approved. This MP will be implemented for the duration of Construction and for any longer period set out in this plan or specified by the Secretary, whichever is greater

This plan will be available for annual review by TfNSW in consultation with CPBGG JV Contractors. Minor amendments may be approved by the ER. Any amendments to the CSW-Monitoring Program will be documented in subsequent revisions. A copy of the updated CSW-Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with Section 3.1 of the CEMP.

1.5 Consultation

TfNSW undertook consultation with the following government agencies and stakeholders during the development of the OCEMP CSW-Monitoring Program in accordance with NSW CoA C11(b), C11(c) and C12:

- DPE Water
- Sydney Water (if Sydney Water's assets are affected or where it is proposed to discharge groundwater into Sydney Water assets)
- Penrith City Council (PCC)
- Liverpool City Council (LCC)
- Fairfield City Council (FCC)
- EPA.

This Monitoring program has been developed in accordance with the OCEMP CSW-Monitoring Program.

2 Environmental Requirements

2.1 Minister's Conditions of approval

The NSW CoA relevant to this CSW-Monitoring Program are listed in Table 2-1. A cross reference is also included to indicate where the condition is addressed in this CSW-Monitoring Program or other project management documents.

Table 2-1 CoA relevant to the CSW-Monitoring Program

CoA No.	Condition Requirement	Document reference
C7	The Surface Water and Groundwater CEMP Sub-Plan must be based on a detailed site investigation of contamination risk and include, but not be limited to: (b) identification of the relevant ambient water quality objectives for receiving waterways and water quality management criteria for achieving the objectives; and	Section 3 Section 4 Section 5
C11	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP:	Section 1.5
	(b) Surface Water Monitoring Program - DPIE Water, Sydney Water (if any Sydney Water assets are affected), relevant councils	
	(c) Groundwater Monitoring Program - DPIE Water	
C12	Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	Section 1.5
C13	Each Construction Monitoring Program must provide:	
	(a) details of baseline data available	Section 5
	(b) details of baseline data to be obtained and when	Section 5
	(c) details of all monitoring of the CSSI to be undertaken	Section 4
	(d) the parameters of the CSSI to be monitored	Section 4
	(e) the frequency of monitoring to be undertaken	Section 4
	(f) the location of monitoring	Section 4
	(g) the reporting of monitoring results and analysis of results against the relevant criteria	Section 6
	(h) details of methods that will be used to analyse monitoring data	Section 4
	(i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts;	Section 6.3
	(j) a consideration of SMART principles	Section 4
	(k) any consultation to be undertaken in relation to the monitoring programs.	Section 1.5
C15	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one month (1) before the commencement of construction.	Section 1.4

CoA No.	Condition Requirement	Document reference
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	Section 1.4
C17	The Construction Monitoring Programs, as approved by the Planning Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 1.4
C18	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant government agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 6.2

2.2 Revised Environmental Management Measures

The REMMs relevant to this CSW-Monitoring Program are listed in Table 2-2. A cross reference is also included to indicate where the condition is addressed in this CSW-Monitoring Program or other project management documents.

Table 2-2 REMMs relevant to the Construction Soil and Water Monitoring Program.

ID	Revised environmental management measure	Timing	Document Reference
SWH05	A construction water quality monitoring program will be developed and included in the CSWMP for the project to establish baseline conditions, observe any changes in surface water and groundwater during construction, and inform appropriate management responses. The program will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations identified in the Surface water and hydrology assessment report (Appendix M of the EIS) and supplementary memo (Appendix I of this amendment report), and Groundwater quality and hydrology assessment report (Appendix N of the EIS) and supplementary memo (Appendix J of this amendment report). Baseline monitoring will be carried out monthly for a minimum of 12 months before the start of construction. As a minimum this will include three wet weather sampling events over six months where feasible. Sampling locations and monitoring methodology to be carried out during construction will be further developed in detailed design in accordance with the Guideline for Construction Water Quality Monitoring (RTA 2003) and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). It will include collection of samples for analysis from sedimentation basin discharge points, visual monitoring of other points of release of construction waters and monitoring of downstream waterways.	Prior to construction and during construction and operation	The Overarching CSW-Monitoring Program This CPBGG JV plan has been written to align with the Overarching CSW-Monitoring Program
GW01	Groundwater monitoring will be carried out as part of the construction water quality monitoring program for the Project. The groundwater monitoring will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations shown in Appendix N of the EIS and Table 7-1 in the groundwater supplementary technical memorandum (Appendix J of this amendment report). Baseline groundwater monitoring will be carried out at least monthly for at least six months before construction. Monitoring will also be carried out at least monthly during construction and will continue for at	Prior to construction and during construction	The Overarching CSW-Monitoring Program This CPBGG JV plan has been written to align with the

ID	Revised environmental management measure	Timing	Document Reference
	least six months of operation to verify that there are no groundwater impacts, and that management measures are adequate.		Overarching CSW-Monitoring Program
GW04	Groundwater will be monitored at the airport interchange northern and southern cuts and the western cut during the construction phase and operational phase as outlined in Table 7-1 in the groundwater supplementary technical memorandum (Appendix J). The groundwater indicators to be monitored will be as per Section 7.2.5 of Appendix N of the EIS. Groundwater inflows to the airport interchange northern and southern cuts and the western cut are to be observed by the groundwater monitoring contractor during the construction and operational phases at monthly intervals. As part of observing the airport interchange northern and southern cuts and the western cut groundwater inflows, the groundwater monitoring contractor is to estimate the groundwater inflow rates and note the areas where groundwater inflow is occurring. During construction, if groundwater inflows are observed from the airport interchange northern and southern cuts and the western cut, the groundwater quality from the cut is to be sampled.	During construction and operation	The Overarching CSW-Monitoring Program This CPBGG JV plan has been written to align with the Overarching CSW-Monitoring Program
GW06	M12 Motorway – West Package Monitoring The Construction Contractor will estimate the potential groundwater inflows that are expected in the first year of construction in order to confirm if evaporation will sufficiently mitigate potentially higher inflows likely to be expected early during construction. The estimate of groundwater inflows is to be undertaken for Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2 AAR. The estimate is to include groundwater inflow from both the walls and base of the cuts and will consider the construction methodology and staging for each cut. In addition, the estimate will utilise the maximum observed groundwater levels (as sourced from M12 West groundwater monitoring data). If evaporation is determined not to be a sufficient control measure, the Construction Contractor will identify and implement additional mitigation measures. The additional mitigation measures are to be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.	During construction and operation	Section 4.2

2.3 Environmental Protection Licence

The Project is subject to EPL as a Scheduled Activity for 'road construction. The EPL prescribes water quality parameters to be measured and associated discharge criteria for licensed discharge points. The EPL also details the monitoring and analytical requirements by reference to authority publications (e.g. Approved Methods for Sampling and Analysis of Water Pollutants in NSW (EPA, 2004)). The EPL 21595 conditions relevant to the monitoring of soil and water are outlined below in Table 2-3.

Table 2-3 EPL conditions relevant to soil and water

Ref.	Relevant requirement
2	**Discharges to air and water and applications to land**
P1	**Location of monitoring/discharge points and areas**
P1.1	The following points referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.
P1.2	The licensed monitoring and discharge points referred to in condition P1.1 and all sediment basins, must be identified in the map(s) most recently submitted and approved in writing by the EPA. Note: The maps are maintained on electronic file EF21/13233
P1.3	All sediments basins on the premises must be identified in a schedule submitted to the EPA. The schedule, including any proposed updates, must: a) be submitted to the EPA in electronic format no less than 10 business days prior to the planned commissioning or decommissioning of a sediment basin; b) include the following information: i. unique identifiers consistent with the map(s) required by condition P1.2; ii. size, type, and discharge criteria, if permitted under condition L2.1, for each sediment basin; iii the design rainfall depth value, water storage capacity and sediment storage capacity for each sediment basin; iv. criteria for desilting and dewatering that maintains the design storage capacity for each sediment basin; v. the catchment details and receiving waters of each sediment basin; and vi. easting and northing coordinates for each sediment basin. Note: The schedule is maintained on electronic file EF21/13233
3	**Limit conditions**
L2	**Concentration limits**
L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.
L2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.
L2.3	To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.
L2.4	Water and/or Land Concentration Limits Pollutant: • pH - 6.5 – 8.5 • Oil and grease – not visible • NTU - 50
L2.5	Exceeding the limits specified in Condition L2.4 of this licence for discharges from the discharge point(s) identified by conditions P1.1 is only permitted if: a) the discharge occurs solely as a result of rainfall measured at the premises exceeding the design rainfall depth value for the corresponding discharge point as described in condition P1.3; and b) The sediment basins and other erosion and sediment controls corresponding to the discharge point(s) have been designed, constructed, operated and maintained in accordance with condition 0 4.2 of this licence.
L2.6	The 5 day rainfall depth value as described in Condition L2.5(a) is 32.2mm (85%ile 5 day rainfall event).
4	**Operating conditions**
O4	**Processes and management**

Ref.	Relevant requirement
O4.1	The licensee must implement all feasible and reasonable erosion and sediment controls as may be necessary throughout the life of works and activities to minimise sediment leaving the premises.
O4.2	The licensee must ensure erosion and sediment controls are designed (stability, location, type and size), constructed, operated and maintained in accordance with Managing Urban Stormwater - Soils and Construction, Volume 2D, Main Road Construction (DECC, 2008), to be read and used in conjunction with Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom, 2004). Note: The licensee may consider guidance from other industry best practice documents if it can demonstrate the guidance will provide improved or equivalent outcomes for the environment and meet the requirements of condition L1.1 of this licence.
O4.3	The licensee must maximise the reuse of captured stormwater on the premises as much as is reasonably practicable.
O4.4	The licensee must ensure that all erosion and sediment control measures installed on the premises are inspected and works undertaken to repair and/or maintain these controls as soon as reasonably practicable.
O4.5	The licensee must record all inspections required by condition 04.4, including observations and works undertaken to repair and/or maintain erosion and sediment controls and provide these records to an authorised officer upon request.
O4.6	The licensee must: a) ensure the design storage capacity of any sediment basin installed on the premises is reinstated within the design management period following the cessation of a rainfall event that causes runoff to occur on or from the premises; and b) keep records of the available water and sediment storage capacities in each sediment basin and provide to an authorised officer upon request.
O4.7	The licensee must ensure that sampling point(s) for water discharged from the sediment basin(s) are provided and maintained in an appropriate condition to permit: a) the clear identification of each sediment basin and discharge point; b) the collection of representative samples of the water discharged from the sediment basin(s); and c) access to the sampling point(s) at all times by an authorised officer of the EPA.
O4.8	The licensee must ensure: a) all vehicular access points to the premises are designed, constructed, maintained and stabilised to minimise vehicles tracking materials onto public roads and roads outside the premises as much as is reasonable and feasible; b) vehicle, motorised plant and equipment movements onto or off the premises minimise the deposition of any material onto the surface of roads outside of the premises; c) mud, splatter, dust and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer, motorised plant and equipment leaving the premises, is removed to the greatest extent practicable before it leaves the premises; and d) road surfaces subject to any tracking of material by vehicles leaving the premises must be cleaned as required to ensure compliance with a) and b) of this condition and condition L1.1 of this licence.
5	**Monitoring and recording conditions**
M2	**Requirement to monitor concentration of pollutants discharged**
M2.1	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:
M2.2	Water and/ or Land Monitoring Requirements Pollutant: • pH – Probe – special frequency 1 • Oil and grease – visual inspection – special frequency 1 • NTU – grab sample – special frequency 1
M2.3	For the purposes of Condition M2.2 and the Table thereto, 'Special Frequency 1' means: a) less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge, when it is safe to do so; and b) when rainfall causes a discharge from a sediment basin which has not been emptied within the design management period following cessation of a rainfall event, when it is safe to do so.
M3	**Testing methods - concentration limits**

Ref.	Relevant requirement
M3.1	Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.
M5	**Weather Monitoring**
M5.1	The licensee must monitor and record temperature, humidity, wind direction, wind velocity and rainfall at either the project weather station, or through analysis of equivalent weather information obtained from the Australian Bureau of Meteorology. Monitoring must: a) be representative of each catchment area; b) commence prior to any works that may cause sediment to leave the premises; and c) continue to be operated until soil disturbance activities cease at the premises and the site has been stabilised. Note: The rainfall monitoring data collected in compliance with this condition can be used to determine compliance with condition L2.5.
M6	**Recording of Pollution Complaints**
M6.1	The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies
M6.2	The record must include details of the following: a) the date and time of the complaint; b) the method by which the complaint was made; c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; d) the nature of the complaint ; e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant ; and f) if no action was taken by the licensee, the reasons why no action was taken.
M6.3	The record of a complaint must be kept for at least 4 years after the complaint was made.
M6.4	The record must be produced to any authorised officer of the EPA who asks to see them.
M8	**Other Monitoring and Recording Conditions**
M8.1	The licensee must undertake monitoring, sampling, video recording and/or take photographs: a) if the EPA or licensee reasonably suspects that an event has occurred at the premises or in connection with the carrying out of the activities that has caused, is causing, is likely to cause or has the potential to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies) ; b) as soon as practicable; and c) as directed by an authorised officer.
R2	**Notification of Environmental Harm**
R2.1	Notifications must be made by telephoning the Environment Line service on 131 555. Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.
R2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

3 Monitoring Criteria

3.1 Receiving Surface Water

TfNSW have engaged an independent environmental consultant to undertake receiving surface water and groundwater monitoring. Ongoing monitoring will be carried out monthly during duration of Construction to detect changes in water quality compared to baseline conditions. As surface and groundwater monitoring requirements are outside of the CPBGG JV scope of works, further details have not been included in this MP.

Results of surface water and groundwater monitoring conducted by TfNSW consultants will be provided to CPBGG JV, who will be responsible for implementing actions in response to any exceedances identified in the monitoring results.

Support will be provided by CPBGG JV for surface and groundwater monitoring such as providing TfNSW consultants with access to monitoring locations where construction is occurring.

3.2 Site Discharge

TfNSW have had an Construction Water Quality Assessment Methodology (WSP 2021) prepared to identify, assess and manage the potential impacts of road construction water discharges from the M12 West section on the environmental values of the receiving environment. This assessment has been used to support the EPL application.

The EPL will prescribe the water quality parameters for the purposes of the monitoring and the setting of limits for discharges of pollutants to water for the Project. It will also detail the monitoring and analytical requirements.

Licenced Discharge Points (LDP), are the locations approved by the EPA for discharge to the environment. The locations are identified in the EPL in condition P1.2 and are shown on the Premises Maps. Water quality discharge criteria from the EPL is identified in Table 3-1.

Table 3-1 Discharge water quality criteria

Parameter	Criteria	Sampling method	Analytical method
pH*	6.5 – 8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Turbidity*	50NTU	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Oil and Grease*	No visible	Visual observation	Field analysis and confirmed as required with laboratory assessment

*Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000).

3.3 Soil and Contamination Criteria

If required, criteria for contaminated soil will be provided in Remedial Action Plans (RAPs) (refer the Construction Contaminated Land Management Plan (CCLMP) (Appendix B3 of the CEMP)).

Criteria for the classification and disposal of soil are provided in the Construction Waste and Resource Management Plan (CWRMP) (Appendix B5 of the CEMP).

4 Monitoring methodology and procedures

4.1 Site Discharge

CPBGG JV will undertake treatment and water sampling of captured stormwater prior to water being discharged in accordance with the EPL requirements and the Dewatering Management Plan.

Sampling of water to be discharged will be carried out at the frequency specified in the EPL, in accordance with Condition M2.2:

- less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge; and
- when rainfall causes a discharge from a basin which has not been emptied within five business days of the cessation of a rainfall event.

The concentration of a pollutant discharged at each LDP shown on the Premises Map must not exceed the concentration limits specified for that pollutant in Table 3-1. Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

Exceeding the limits specified in Table 3-1 for pH and Turbidity (NTU) for discharges from any sediment basins identified on the Premises Maps is only permitted when the discharge occurs solely as a result of rainfall measured at the premises. The rainfall must exceed the design rainfall depth value for the corresponding discharge point. The design rainfall depth at each location is to be shown on the Premises Maps.

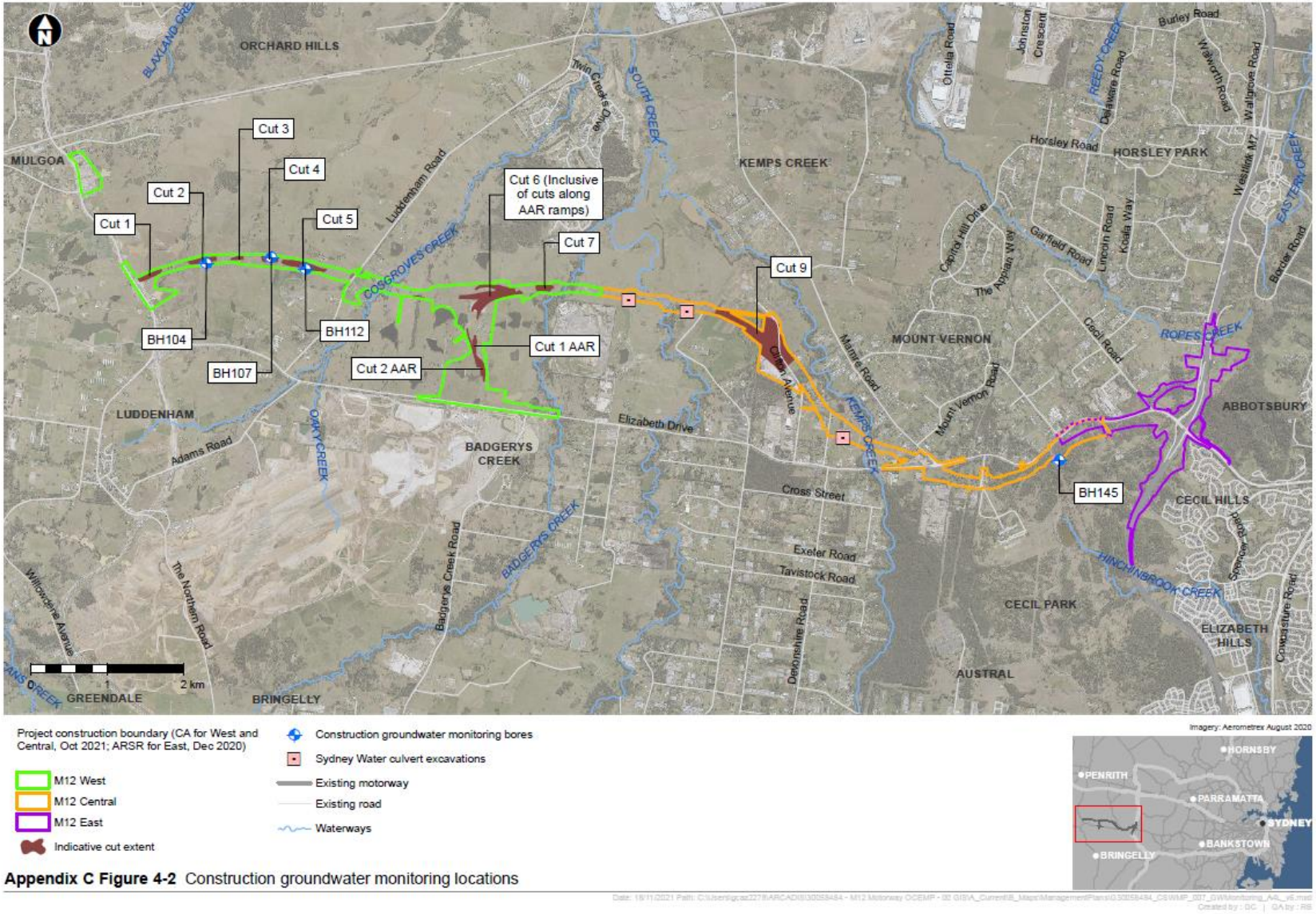
CPBGG JV will undertake all sampling in accordance with Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA, 2004) unless another method has been approved by the EPA in writing before any tests are conducted.

4.2 Groundwater

The Project groundwater monitoring sites that are to be monitored during construction are listed in Table 4-1 and their locations shown on Figure 4-1, noting the West package is outlined in green.

Groundwater boreholes BH104, BH107 and BH112 will be monitored by TfNSW appointed contractor during construction whilst CPBGG JV will monitor groundwater Cut 6, Cut 2-AAR, Cut 2, Cut 1, Cut 3, Cut 4, Cut 5, Cut 7, and Cut 1-AAR during construction. Groundwater inflows to Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2 AAR are also to be observed by CPBGG JV.

In accordance with REMM GW06 CPBGG JV will estimate the potential groundwater in flows that are expected in the first year of construction in order to confirm if evaporation will sufficiently mitigate potentially higher inflows. If upon assessment it is determined that evaporation will not be sufficient to manage inflows, the Construction Contractor will identify and implement additional mitigation measures which will be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.



Appendix C Figure 4-2 Construction groundwater monitoring locations

Figure 4-1 Groundwater Monitoring Locations (OCSWMP Appendix C)

Table 4-1 Groundwater Monitoring Locations

Site ID*	Sampling type	Frequency
Cut 1	Groundwater quality and level	Monthly
Cut 1 – AAR	Groundwater quality and level	Monthly
Western cut (Cut 2)	Groundwater inflows and quality^	Monthly
Airport interchange southern cut (Cut 2-AAR)	Groundwater inflows and quality^	Monthly
Cut 4	Groundwater inflows and quality^	Monthly
Cut 5	Groundwater inflows and quality^	Monthly
Airport interchange northern cut (Cut 6)	Groundwater inflows and quality^	Monthly
Cut 7	Groundwater inflows and quality^	Monthly

^ If groundwater inflows are observed groundwater quality from the cut will be sampled.

4.2.1 Sampling methodology

4.2.1.1 Technical guidance

Where required for the collection of groundwater quality samples, groundwater within the monitoring program will be sampled in accordance with:

- Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998)
- Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwaters (AS 566.11:1998) and

4.2.1.2 Groundwater level

Manual groundwater level monitoring by dip meter will be undertaken by the TfNSW appointed contractor concurrently with the monthly data logger downloading.

4.2.1.3 Groundwater inflows

As stated above in Table 4-1, groundwater inflows to the Cut 2, Cut 2 AAR, Cut 4, Cut 5, Cut 6 and Cut 7 will be observed by the CPBGG JV at monthly intervals. As part of observing the groundwater inflows, an estimate of the groundwater inflow rates will be made and the areas where groundwater inflow is occurring noted.

If groundwater inflows are observed, the groundwater quality from the cut will be sampled.

4.2.1.4 Sampling

Where groundwater quality samples are required to be obtained, they will be collected in laboratory supplied containers made of the appropriate material and suitably preserved for the required analytes, according to well-established analytical standards.

All sample containers will be clearly labelled with:

- Sample ID
- Job number
- Sampler name

- Date and time.

All samples will be placed in an insulated storage container (esky) containing ice for transport to the laboratory, along with a chain of custody form describing the sample identification details and required analysis.

4.2.1.5 Analytical suite

All quality samples will be analysed by a NATA accredited laboratory for the following indicators:

- Field parameters (electrical conductivity, pH, turbidity, dissolved oxygen, temperature and redox conditions)
- Major cations and anions (calcium, sulphate, sodium, potassium, magnesium, carbonate and bicarbonate)
- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Nutrients (including NH3, nitrate, nitrite, total nitrogen, total phosphorus, soluble reactive phosphorus)
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN)
- Polycyclic aromatic hydrocarbons (PAH)
- Phenols
- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc).

4.3 Monitoring of Spoil Management

Weekly Environmental Inspections will monitor the effectiveness of the control measures around spoil handling, reuse, disposal and stockpiling and ensure the environmental impacts associated with spoil management are minimised. The checklist of items to be inspected will include general condition of surrounding environment, erosion and sedimentation control devices, pits and catch drains, bunding, fencing, stockpile height and condition (evidence of weeds, odour, litter etc.). The Stockpile Management Protocol – Appendix A of the CSWMP outlines further detail on the management requirements.

4.4 Monitoring of Erosion and Sediment Controls

Monitoring of the effectiveness of erosion and sediment control effectiveness will occur;

- Weekly
- Prior to wet weather event
- Prior to site shutdown
- Following rainfall events

The ESR and Environmental Team will carry out these inspections. These inspections will include monitoring of all aspects of erosion and sediment control in accordance with the requirements of the PESCPs. Records will be maintained of these inspections.

4.5 Monitoring of waterways

When working in or near waterways visual monitoring of local water quality (i.e. for plumes of turbidity and hydrocarbon spills/slicks) to identify any potential spills or deficient controls will occur. If visual monitoring suggests a change in water quality then situ field measurements of water quality will be taken using a fully calibrated multi-parameter water quality meter for:

- Temperature (°C)
- pH (pH units)
- Electrical Conductivity (µS/cm)
- Dissolved Oxygen (mg/L and % saturation) and
- Turbidity (NTU).

Photos will be taken to record the visual appearance of each water quality sample site at the time of sampling. Where appropriate, photos of the stream bank will be taken to provide a record of bank stability, geomorphology and riparian vegetation condition.

4.6 Climate Monitoring

CPBGG JV will measure and record rainfall at the construction sites in millimetres per 24-hour period at 9 am each day from the time that the site office is established. CPBGG JV will install Automatic Weather Stations (AWS) and manual rainfall gauges at representative locations throughout the Project area. The AWS will record hourly rainfall, temperature, relative humidity, wind speed, wind direction and bathometric pressure. Manual rainfall gauges will also be used across the Project to assist with assessment of rainfall data accuracy.

The data collected from the AWS and rainfall gauges will:

- Provide a more detailed early understanding of potential rainfall and other adverse weather impacts
- Provide a proactive and early inspection and maintenance regime response to erosion and sedimentation and the effects of other adverse climatic conditions before pollution occurs
- Trigger weather alarms and messages to relevant site personnel to take action where appropriate
- Assess and validate the performance of installed erosion and sediment control measures against the design performance criteria
- Provide compliance data for statutory monitoring on-site (eg. EPL condition M5.1).

The AWS will conform to Bureau of Meteorology Observation Specification No. 2013.1 and TfNSW Specification R272 – Automatic Weather Stations for the design and location of such devices. AWS will be sited within a secured compound area fully protected by fencing, likely to be at major site compounds, and any instrumentation, communication or power cabling contained within conduits buried to a depth of at least 100 mm.

Prior to establishment of AWS, the CPBGG JV will prepare a report identifying suitable locations for AWS and other weather gauges in consultation with a suitably qualified person with experience installing and operating AWS, and any relevant stakeholders. The TfNSW Environment and Sustainability Manager (or delegate) will review the proposed locations for climate monitoring devices for consistency with the TfNSW specification and this CSW-Monitoring Program.

Data from the AWS will be accessible via SMS alarms or queries to a mobile phone and be fully downloadable. SMS queries and alarms will be sent to the TfNSW Environment and Sustainability Manager (or delegate) and TfNSW Project Manager, as necessary. Data will be accessible at all times by the TfNSW Environment and Sustainability Manager (or delegate) and TfNSW Project Manager. Data will be downloaded to the TfNSW online weather station page to allow live views of weather data by authorised users.

In accordance with normal standard construction practices, weather forecasts will be used to guide work activities undertaken on-site. CPBGG JV will review the weather forecasts at the start of each day and prior to undertaking new work activities that may be affected by rainfall or adverse weather. Where weather forecasts predict conditions that may pose an environmental risk, site environmental controls will be inspected and secured to reduce erosion and sediment control impacts. Contingency planning to prevent spills will also involve monitoring for predicted flood events and the removal of fuels and chemicals from flood prone areas.

4.7 Adaptive Management

Should soil, water or contamination monitoring results directly attributable to the Project exceed the criteria set out in Section 3 of this CSW-Monitoring Program, the following steps will be undertaken:

- Analysis of the results by the ESR, in consultation with the TfNSW appointed consultant and TfNSW, in more detail with a view of determining possible causes for the exceedance, including identifying the Project stage (or stages) responsible for the issue
- Site inspection by the ESR
- Advising relevant personnel of the problem

- Identifying and agreeing on actions and/or additional mitigation measures to resolve or mitigate the exceedance
- Implementing actions to rectify or mitigate the exceedance, including stop work arrangements where necessary or if directed by the ER
- Identifying and implementing additional mitigation measures.

Where criteria are exceeded, CPBGG JV (in consultation with the TfNSW appointed consultant and TfNSW if applicable) will identify the source of the exceedance and implement any additional measures available to reduce the impacts on the receiving environment. Mitigation measures and preventative / corrective actions will be developed in accordance with TfNSW specifications and the procedure for dealing with non-compliance with environmental management controls outlined in Section 3.10 of the CEMP. CPBGG JV will verify and document the effectiveness of any management measures or preventative / corrective actions implemented to avoid further exceedances.

CPBGG JV will communicate regularly to ensure plans are co-ordinated and cumulative soil and water quality impacts are minimised. The OCS provides details on the requirements for coordination and communication between the contractors working on the other Project stages. The timing for any improvement will be agreed between the CPBGG JV Project Engineer / Superintendent and TfNSW Project Manager and Environment and Sustainability Manager (or delegate) based on the level of risk or reoccurrence.

5 Baseline Data

5.1 Surface Water Quality

Pre-construction baseline data has been collected by TfNSW monthly since April 2019. The sampling locations for surface water sites are shown in Figure 4 1 of the Overarching CSWMP. These sites are located upstream and downstream on Cosgrove Creek (COS), Badgerys Creek (BAD), South Creek (SOU), Kemps Creek (KEM), Ropes Creek (ROP) and Hinchinbrook Creek (HIN). The baseline data has been compiled into the following reports:

- M12 Motorway Surface Water Monitoring Second Report – April 2019 to March 2020 (GHD, 2020)
- M12 Motorway Surface Water Monitoring Report for monitoring period of April 2020 to September 2020 (GHD, 2020)
- M12 Motorway Surface Water Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)
- M12 Motorway Surface Water Monitoring Program Report 6 – October 2021 to March 2022 (GHD, 2022)
- M12 Motorway Surface Water Monitoring Program Report 7 – April to September 2022 (GHD, 2022).

General observations on the baseline water quality in the vicinity of the Project are summarised in Table 5-1.

Table 5-1 Baseline surface water quality

Monitoring Report	General observations
M12 Motorway Surface Water Monitoring Second Report – April 2019 to March 2020 (GHD, 2020)	• The data obtained indicates that various urban pollutants affect the water quality of the selected sites, most of which are poor in water quality. • Two outstanding characteristics of all of the sites are elevated electrical conductivity (EC), and nutrient enrichment, which are both closely related to landuse • Nutrient enrichment of both standing pools and flowing waterways is common, indicated particularly by highly elevated concentrations of total phosphorus (TP), total nitrogen (TN), nitrate and nitrite (NOx) and ammonia. • Some metals were detected frequently at most sites, however only copper and zinc were frequently recorded at concentrations greater than ANZECC ecosystem protection guidelines • Oil and grease were infrequently detected between October 2019 and February 2020, with six positive samples from five sites, • Chlorophyll-a measurements indicated that most sites have highly productive water bodies, dominated by algal growth, which is a direct outcome of nutrient enrichment. • Broad-spectrum systemic insecticide were detected at concentrations above the ANZECC 95% ecosystem protection guidelines at several sites, and most frequently at the South Creek and Kemps Creek sites
M12 Motorway Surface Water Monitoring Report for monitoring period of April 2020 to September 2020 (GHD, 2020)	• Surface water pH was largely within the ANZECC guideline range during the current monitoring period (April to September 2020) • EC concentrations at the studied sites were generally in the 1000-2000 µS/cm range. 25 samples reported concentrations of EC in exceedance of the ANZECC criteria, 10 from ROPUS and 5 from HINUS alone • The majority of samples reported concentrations of DO outside of the ANZECC guideline range. • Almost half of all samples (95 out of 189) reported concentrations of turbidity above the outside of the ANZECC guideline range. • Almost all samples reported concentrations of ammonia and total nitrogen oxides, total nitrogen and total phosphorus above the laboratory limit of reporting, many of which exceeded the ecological criteria, with some exceeding the human health criteria. • All samples reported concentration of arsenic, cadmium, mercury below the adopted criteria. • The concentration of chromium, copper, lead, zinc, iron and nickel was detected above the adopted ecological criteria in majority of samples.
M12 Motorway Surface Water Monitoring Biannual	• Majority of samples reported total suspended solid (TDS) concentrations above ANZECC & ARMCANZ (2000) ecological criteria during monitoring events.

Monitoring Report	General observations
Report 4 – October 2020 to March 2021 (GHD, 2021)	• Majority of samples reported total dissolved solid (TDS) concentrations above ADWG (NHMRC & NRMMC, 2011) recommendations. Hinchinbrook Creek locations reported sample concentrations remaining below these recommendations for TDS during all monitoring events. • Majority of sampling locations reported nutrient concentrations (ammonia, oxidised nitrogen, total nitrogen, soluble reactive phosphorus, total phosphorus and chlorophyll-a) above adopted ANZECC & ARMCANZ (2000) ecological criteria. • Exceedances of ANZG (2018) 95% freshwater criteria and/or ADWG (NHMRC & NRMMC, 2011) criteria were reported for arsenic, chromium, copper, iron, lead, manganese, nickel and zinc during sampling events. • Hardness-modified trigger values (HMTV) were not exceeded for analysed heavy metals, indicating that the toxicity of metals within surface water is being reduced due to the presence of hard water.
M12 Motorway Surface Water Monitoring Program Report 6 – October 2021 to March 2022 (GHD, 2022)	• Majority of samples reported total suspended solid concentrations above The Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand ANZECC & ARMCANZ (2000) ecological criteria during monitoring events. • Majority of samples reported total dissolved solid (TDS) concentrations above Australian Drinking Water Guidelines (ADWG) (NHMRC & NRMMC, 2011) recommendations. Locations BADDS, BADUS, HINDS, HINUS and ROPUS reported sample concentrations remaining below these recommendations for TDS during all monitoring events. • All sampling locations reported nutrient concentrations (oxidised nitrogen, total nitrogen, soluble reactive phosphorus, total phosphorus and chlorophyll-a) above adopted ANZECC & ARMCANZ (2000) ecological criteria. • Exceedances of ANZG (2018) 95% freshwater criteria and/or ADWG (NHMRC & NRMMC, 2011) criteria were reported for cadmium, chromium, copper, iron, manganese, nickel and zinc during sampling events. • Five of the 13 samples collected in December 2021 reported thermotolerant coliform concentrations above adopted ANZECC stock watering criteria (BADUS, COSUS, ROPDS, SOUDS and SOUUS).
M12 Motorway Surface Water Monitoring Program Report 7 – April to September 2022 (GHD, 2022)	• Most samples reported total suspended solid concentrations above ANZECC & ARMCANZ (2000) ecological criteria during monitoring events. • All sampling locations except for HINDS and HINUS recorded 20th and 80th percentile values above the Australian Drinking Water Guidelines (ADWG) (NHMRC & NRMMC, 2011) recommendations. • All sampling locations reported multiple nutrient concentrations (oxidised nitrogen, total nitrogen, soluble reactive phosphorus, total phosphorus and chlorophyll-a) above adopted ANZECC & ARMCANZ (2000) ecological criteria. • Exceedances of ANZG (2018) 95% freshwater criteria and/or ADWG (NHMRC & NRMMC, 2011) criteria were reported for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel and zinc during baseline sampling events • 5 out of 18 samples reported thermotolerant coliform concentrations above the adopted ANZECC stock watering criteria.

5.2 Groundwater

5.2.1 Groundwater Quality

Pre-construction baseline data has been collected by TfNSW monthly since April 2019. The sampling locations for groundwater include four boreholes (BH) located within the vicinity of the Project.

The baseline data has been compiled into the following reports:

- M12 Motorway Groundwater Monitoring Report 2 – April 2019 to March 2020 (GHD, 2020)
- M12 Motorway Groundwater Monitoring Six Monthly Report 3 - April 2020 to September 2020 (GHD, 2020)
- M12 Motorway Groundwater Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)
- M12 Motorway Groundwater Monitoring Report 6 – October 2021 to March 2022 (GHD, 2022)

General observations on the baseline groundwater quality in the vicinity of the Project (BH104, BH107, BH112 and BH145) are summarised in Table 5-2.

Table 5-2 Baseline groundwater quality

Monitoring Report	General observations
M12 Motorway Groundwater Monitoring Report 2 – April 2019 to March 2020 (GHD, 2020)	• Demonstration of seasonable variability in some groundwater quality parameters. • Elevated background concentrations of some metals (copper, nickel, zinc) were observed in all monitoring wells, with substantial variation in concentrations recorded between the wells. • Highly elevated concentrations of nutrients in BH145, particularly nitrogenous nutrients; and elevated nutrients in BH112. • No detection of hydrocarbons or pesticides in the monitored wells.
M12 Motorway Groundwater Monitoring Six Monthly Report 3 - April 2020 to September 2020 (GHD, 2020)	• Statistical summaries show that field water quality parameters, including electrical conductivity, redox, dissolved oxygen, pH and temperature vary throughout the year, with western clustered wells BH104, BH107 and BH112 showing generally similar trends to each other, and eastern well BH145 showing inverse trends, particularly for electrical conductivity. • Exceedances of ADWG (NHMRC & NRMMC, 2018) criteria for dissolved sulfate in western monitoring wells BH104, BH107 and BH112; • Exceedances of ADWG (NHMRC & NRMMC, 2018) criteria for nitrate and nitrite in eastern monitoring well BH145; • Exceedances of ANZG (2018) 95% freshwater criteria for ammonia in BH112 and BH145; and • Exceedances of ANZG (2018) 95% freshwater criteria and/or ADWG (NHMRC & NRMMC, 2018) for dissolved metals cadmium, copper, iron, lead, manganese, nickel and zinc. • BTEXN and TRH were not detected in any of the four wells during any of the monitoring events (April 2019 – September 2020).
M12 Motorway Groundwater Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)	• Exceedances of ADWG (NHMRC & NRMMC, 2011) criteria for dissolved sulfate in western monitoring wells BH104 and BH112; • Exceedances of ADWG (NHMRC & NRMMC, 2011) criteria for nitrate and nitrite in eastern monitoring well BH145; • Exceedances of ANZG (2018) 95% freshwater criteria for ammonia in BH112 and BH145; • Exceedances of ANZECC & ARMCANZ (2000) ecological criteria for total nitrogen, NOx and total phosphorous in all groundwater wells during majority of sampling events; • Exceedances of ANZG (2018) 95% freshwater criteria and/or ADWG (NHMRC & NRMMC, 2011) for dissolved metals cadmium, chromium, copper, iron, lead, manganese, nickel and zinc. • Majority of exceedances of hardness-modified trigger values (HMTV) for heavy metals were within the same order of magnitude as the hardness-corrected trigger values, indicating that the toxicity of metals within groundwater wells is being reduced due to the presence of hard water.
M12 Motorway Groundwater Monitoring Report 6 – October 2021 to March 2022	• Sulfate concentrations in BH104 and BH112 exceeded Australian Drinking Water Guidelines {ADWG} 6 Health and Recreation criteria (NHMRC & NRMMC, 2011) in the majority of monitoring events. Sulfate concentrations in BH107 and BH145 remained below criteria. • All groundwater samples reported concentrations of metals, benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN), total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH) and phenols below the laboratory LOR and adopted human health criteria, with the exception of: - BH145; which exceeded ADWG (NHMRC & NRMMC, 2011) criterion for nitrate and nitrite in all samples except October 2021. - BH107 in November 2021 and BH112 in February 2022 exceeded ANZG freshwater criterion for nitrate • All samples reported total dissolved solids (TDS) concentrations above the laboratory LOR (10 mg/L). Human health criteria are generally not applied to total dissolved solids as it is an aesthetic issue; however, the ADWG (NHMRC & NRMMC, 2011) states that concentrations exceeding 1200 mg/L are regarded as unacceptable drinking water. All samples exceeded this limit. • The majority of groundwater samples exceeded adopted ANZECC ecological criterion for ammonia, total oxidised nitrogen, total nitrogen and total phosphorous. • The majority of groundwater samples collected during the current monitoring period reported heavy metal concentrations below the limit of reporting (LOR) and/or adopted ANZG and ANZECC ecological assessment criteria, with the exception of exceedances

Monitoring Report	General observations
	reported at all wells for arsenic, cadmium, chromium, copper, lead, manganese, nickel and zinc. However, exceedances of adopted ecological criteria were mostly eliminated following the application of hardness modified trigger values (HMTVs), with the exception of some periodic copper, nickel and zinc exceedances. • All groundwater samples reported concentrations of BTEXN, TRH, PAH and phenols below the laboratory LOR and adopted ecological criteria. • All groundwater samples exceeded the laboratory LOR of 5 mg/L for total suspended solids (TSS) and the adopted lowland river criteria (ANZECC, 2000). • Groundwater levels in the western wells (BH104, BH107 and BH112) increased by approximately 2 m between February and March 2022. This is likely in response to the large increase in rainfall over the monitoring period (1120.6 mm for October 2021 to March 2022). • The water level meters (WLM) in BH145 became disconnected from the well cap during the February 2022 monitoring event and therefore only manual groundwater level readings were available beyond February 2022. The manual groundwater level readings recorded from BH145 increased by approximately 1 metre throughout the course of monitoring period

5.2.2 Groundwater Level

Groundwater levels monitored during 2018 and 2019 for the EIS identified that groundwater levels have been generally stable with some locations showing slightly declining trends. Groundwater level responses to individual rainfall events have been negligible.

Based on the generally stable monitored groundwater levels at Project groundwater monitoring bores and lack of obvious groundwater level response to individual rainfall events, the Project groundwater monitoring bores are considered to generally respond slowly to rainfall. Therefore, monitored groundwater levels, particularly in bedrock groundwater systems, whilst coinciding with below average rainfall, are expected to be influenced by the period of pronounced groundwater recharge from 2007 to March 2017. As a result, monitored groundwater levels during the Project's monitoring period are considered likely to be similar to or above long-term average levels and not uncharacteristically low.

Additional assessments were undertaken for a review of design consistency against the EIS for M12 West by WSP (2021). The M12 West consistency assessment identified that additional groundwater monitoring locations have been implemented as a result of the design changes of the construction boundary. Groundwater levels in M12 West range from 36.3 to 93.9 AHD across all boreholes.

6 Reporting

6.1 Monthly Environmental Report

The ESR will prepare a Monthly Environmental Report for the duration of the Project for incorporation in the Project Monthly Report and submission to the TfNSW Environment and Sustainability Manager (or delegate) and TfNSW Project Manager for review. Information to be detailed in the reports includes:

- Results summary and analysis of the environmental monitoring for soil and contamination
- Performance of the applicable aspects of this CSW-Monitoring Program and the Construction Contractor's CSW-Monitoring Program
- Summary of monthly rainfall data and/or significant rainfall and storm events
- Summary of any complaints received that are related to water, soils or contamination.

Reporting on receiving surface water and groundwater quality monitoring will be undertaken by the TfNSW appointed consultant on behalf of TfNSW, as outlined in Section 6.2 below.

6.2 Bi-annual Surface Water and Groundwater Monitoring Reporting

In accordance with NSW CoA C18, the construction Surface Water and Groundwater Monitoring Program Report will be provided to the Planning Secretary for information bi-annually (twice a year).

This report will be submitted by TfNSW and include the surface and groundwater data analysed by the TfNSW appointed consultant in accordance with the Overarching Surface Water and Groundwater Monitoring Program.

6.3 Reporting on Non-Conformances and Exceedances

In the event that the criteria identified in Section 3 are exceeded, the ESR will report the exceedance to the TfNSW Project Manager, Senior Environment Officer (or delegate) and ER within seven days of identification of the exceedance. Details of exceedances will be provided in the Monthly Environmental Reports.

Where an exceedance has caused, is causing or is likely to cause, material harm to the environment, the environmental incident notification and reporting procedures detailed in Section 3.8 of the CEMP and the Environmental Incident Classification and Reporting Procedure (refer to Appendix A7 of the CEMP) will apply. The CPBGG JV Environmental Site Representatives are responsible for reporting on incidents.

CPBGG JV will immediately notify the TfNSW Project Manager, Environment and Sustainability Manager (or delegate), ER and the EPA (via the EPA environmental line) of any exceedance that has caused, is causing or is likely to cause, material harm to the environment. TfNSW will provide the Secretary with a record of any such notification immediately after becoming aware of an incident, as required by NSW CoA A44. Written notification will be given to the Secretary in accordance with Appendix A of the NSW CoA.

CPBGG JV will provide a written report of the event to the EPA within seven days of the date on which the event occurred. The report will identify:

- The cause, time and duration of the event
- The type, volume and concentration of every pollutant discharged as a result of the event
- The name, address and business hours telephone number of the Construction Contractor's personnel who witnessed the event
- The name, address and business hours telephone number of other witnesses to the event
- Action taken by the CPBGG JV in relation to the event, including any follow-up contact with any complainants
- Details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event and
- Any other relevant matters.

The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided. CPBGG JV will provide such further details to the EPA within the time specified in the request. CPBGG JV will also complete an incident form for submission to the TfNSW

Project Manager and Environment and Sustainability Manager (or delegate) within three business days of the occurrence of the event.

6.4 EPL Reporting

Results of all monitoring of sediment basins prior to discharge will be recorded on the Dewatering Permit. All monitoring results from these permits will be used to compile the EPL monthly monitoring summary for upload onto the Project website.

The ESR will prepare a summary of site discharge water quality monitoring results, including a statement of compliance with the relevant EPL conditions, and a summary of complaints received related to water quality issues, for inclusion in the annual EPL annual return.

EPL annual returns will be prepared and submitted to the EPA within 60 days of the anniversary of the EPL for the duration of construction.

All records shall be:

a) in a legible form, or in a form that can readily be reduced to a legible form;

b) kept for at least 4 years after the monitoring or event to which they relate took place; and

c) produced in a legible form to any authorised officer of the EPA who asks to see them.

The following records shall be kept in respect of any samples required to be collected for the purposes of the environmental protection licence:

a) the date(s) on which the sample was taken;

b) the time(s) at which the sample was collected;

c) the point at which the sample was taken; and

d) the name of the person who collected the sample.

Appendix D – Dewatering Management Plan

Appendix D
Dewatering Management Plan

M12 Motorway West

Project number:	N00160
Document number:	M12WCO-CPBGG-ALL-EVWA-PLN-000001_App D
Revision date:	03/04/2023
Revision:	01

Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	02/05/2022	G. Bolton	Second draft to address Arcadis/TfNSW review comments
C	25/06/2022	A. Zvirzdinas	Third draft to address Arcadis/TfNSW review comments on Rev B
D	14/07/2022	A. Zvirzdinas	Fourth draft to address ER review comments on Rev C
E	22/07/2022	A. Zvirzdinas	Minor updates to Appendix A and D as per ER and TfNSW comments on Rev D
00	28/07/2022	A. Zvirzdinas	First Controlled Issue
F	25/01/2023	J. Ibrahim	Six monthly review and additional design change updates
01	03/04/2023	J. Ibrahim	Second Controlled Issue

Document Review

Position	Name	Signature	Date
Project Director	[redacted]		

Distribution of controlled copies

Copy no.	Issued to	Version

Table of Contents

Acronyms and Abbreviations

Abbreviations	Expanded text
CoA	Conditions of Approval
CFFMP	Construction Flora and Fauna Management Sub-plan
CSWMP	Construction Soil and Water Management Plan
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESM	Environment and Sustainability Manager (TfNSW)
ESR	Environmental Site Representative (CPBGG JV)
EWMS	Environmental Work Method Statement
OCEMP	Overarching Construction Environmental Management Plan
POEO Act	*Protection of the Environment Operations Act* 1997
QA	Quality Assurance
REMM	Revised Environmental Management Measures
TARP	Trigger Action Response Protocol
TfNSW	Transport for NSW
TSS	Total Suspended Solids

1 Introduction

1.1 Purpose

This Dewatering Management Plan (DMP) provides guidance to ensure that site dewatering activities are completed in a manner that does not cause harm to the environment. Construction of the M12 Motorway West Project (the Project) will involve dewatering of ponded stormwater or infiltrated groundwater.

This DMP has been prepared in accordance with the Overarching CEMP (OCEMP), Overarching CSWMP Appendix D, Revised Environmental Mitigation Measures (REMMs) SWH11, the TfNSW Quality Assurance (QA) specifications and the NSW Conditions of Approval (CoA).

This DMP provides the management of dewatering for ponded stormwater or infiltrated groundwater only, and the management of dewatering, so far as water quality, for farm dams. With specific regards to the dewatering of farm dams, this DMP is to be read in conjunction with the Farm Dam Dewatering Procedure that is included as Appendix F of the Construction Flora and Fauna Management Sub-plan (CFFMP).

1.2 Objective

The objectives of this DMP includes:

- Ensure compliance with environmental requirements of the Project
- Implement industry standard methods for dewatering
- Provide a clear methodology for the management of water discharges from the site
- Ensure that water discharges from site are compliant with the:
  - Project Environmental Protection Licence (EPL) – EPL Number 21595
  - CSWMP.

1.3 Scope

This DMP is applicable to all activities conducted by site personnel (including sub-contractors) that have the potential to require dewatering during construction of the Project.

1.4 Induction / Training

All site personnel involved in the dewatering activities will be trained and inducted on the requirements of this DMP.

CPBGG JV will prepare Environmental Work Method Statement (EWMS) to manage and control dewatering activities in a manner that does not cause harm to the environment, including where construction water may be discharged into natural waterways. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and Responsibilities

The Environmental Site Representative (ESR) is responsible for ensuring this Plan is effectively implemented, and all site personnel are aware of the requirements of this Plan.

The ESR is responsible for ensuring that water quality criteria for discharge waters are met prior to discharge.

1.6 Review

This DMP will be reviewed by CPBGG JVs Soil Conservationist and TfNSW Environment and Sustainability Manager (ESM) (or delegate) prior to commencement of construction.

This Plan will be reviewed annually or as required in accordance with the continuous improvement process described in Section 8 of the CSWMP.

2 Environmental Requirements

2.1 Legislation and guidelines

This DMP has been developed with consideration of the following key legislation and guidelines:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- Managing Urban Stormwater Soils and Construction (Landcom, 2004)
- TfNSW Water Discharge and Reuse Guideline (TfNSW, 2016)
- TfNSW QA Specification G38 – Soil and Water Management
- TfNSW Technical Guideline EMS-TG-011: Environmental Management of Construction Site Dewatering (RTA, 2011)

The POEO Act is the key piece of environment protection legislation in NSW, administered by the NSW Environmental Protection Authority (EPA). The Project is subject to an EPL as a Scheduled Activity for 'road construction, however, in the absence of any specific EPL provision, to avoid causing pollution and breaches of section 120 of the POEO Act, any water discharged from site must be of the same quality, or better, than the quality of the receiving waters (at the time of discharge).

2.2 Requirements

The applicable NSW CoA, REMMs and TfNSW QA Specifications relevant to the development of this Plan are listed in Table 2-1, as identified in the CSWMP.

Table 2-1 Dewatering requirements

Reference	Measure/Requirement	Where addressed
NSW CoA C7	The Surface Water and Groundwater CEMP Sub-Plan must be based on a detailed site investigation of contamination risk and include, but not be limited to: (c) a Trigger Action Response Protocol for potential discharge waters, identifying alternative disposal options for water with contaminant concentrations exceeding water quality management criteria.	CSWMP Section 3.4.7
REMM SWH01	A Construction Soil and Water Management Plan (CSWMP) will be prepared for the project. The plan will outline measures to manage soil and water impacts associated with the construction works, including contaminated land. The CSWMP will provide: • Measures to manage groundwater de-watering and impacts including mitigation required • Processes for de-watering of water that has accumulated on site and from sediment basins, including relevant discharge criteria	This Plan Section 3
REMM SWH11	A de-watering management plan will be prepared as part of the CSWMP which will outline the de-watering methodology, supervision requirements, staff responsibilities and training, and approvals required before any de-watering activity begins.	This Plan
Environmental Protection Licence/s	The Project is subject to EPL/s as a Scheduled Activity for 'road construction'. The EPL/s typically prescribes water quality parameters to be measured and associated discharge criteria for licensed discharge points.	Section 3.3.3

3 Procedure

3.1 Environmental Work Method Statement

CPBGG JV will develop a EWMS to manage and control dewatering activities in a manner that does not cause harm to the environment, including where construction water may be discharged into natural waterways.

The EWMS will be prepared by the ESR and reviewed by the TfNSW Project Manager, TfNSW ESM (or delegate) and Environmental Representative (ER) before commencement of the dewatering activity.

EWMS incorporate appropriate mitigation measures and controls, including those identified in relevant Sub-plans. The EWMS also identifies key procedures to be used concurrently with the EWMS. EWMS are specifically designed to communicate requirements, actions, processes and controls to construction personnel using plans, diagrams and simply written instructions.

3.2 Approach

The CPBGG JV approach to dewatering will generally follow the below hierarchy:

- Investigate opportunities for reuse. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation, and plant/vehicle wash-down
- Investigate opportunities of discharging water to land (within the site boundary) to allow the water to infiltrate into the ground, thus avoiding direct discharge to, or pollution of, waters
- Discharge offsite. Onsite reuse or land discharge may be limited by climatic or site conditions (i.e. saturated ground) and water may need to be discharged to meet the sediment basins requirements (i.e. reinstating capacity) identified in the Blue Book (Landcom, 2004).
- If groundwater inflows are observed from the cuts, the groundwater quality from the cut is to be sampled to determine representative water quality. Any groundwater emanating from cuts will flow in surface drains to downslope construction sediment basins. It will be tested prior to discharge in accordance with section 3.3.3.
- Sydney Water protocols may also need to be followed when it relates to dewatering of a Sydney Water Asset. Prior to dewatering a Sydney water asset consult with Sydney Water on any specific requirements.

3.3 Water quality criteria

3.3.1 Reuse

Reuse on site will only occur if:

- There is no visible oil or grease
- No erosion is caused from the discharge
- Any runoff generated by the reuse is controlled entirely within the site boundary and appropriate sediment controls are installed and maintained in accordance with the Blue Book.

In addition to the above, reuse on site for watering of landscaped areas will only occur if:

- pH levels are between 6.5 – 8.5

If all criteria above are met, then the water may be authorised for reuse by the CPBGG JV ESR (or delegate).

If the criteria are not met, treatment of water will occur in accordance with Section 3.4.

3.3.2 Discharge to Land

Discharge to land within the site boundary will only occur if:

- There is no visible oil or grease
- No surface runoff will be generated from the discharge and there is no potential for discharged water to reach any watercourse (within or outside the site)
- No erosion is caused from the discharge and appropriate erosion and sediment control are installed in accordance with the Blue Book (Landcom, 2004)

- All discharge water can be wholly contained within the site boundary.

In addition to the above, discharges to land within the site boundary over landscaped areas will only occur if:

- pH levels are between 6.5 – 8.5

Where there is a risk that runoff can leave the site boundary, agreement is to be sought from property owner/tenant. The quality of the discharge water is to comply with the discharge criteria set out in Table 3-1.

If all criteria above are met, then the water may be authorised for discharge to land by CPBGG JV ESR (or delegate).

If the criteria are not met, treatment of water will occur in accordance with Section 3.4.

3.3.3 Discharge to Waters

TfNSW have prepared a Construction Water Quality Assessment Methodology (WSP 2021) to identify, assess and manage the potential impacts of road construction water discharges from the M12 West section on the environmental values of the receiving environment. This assessment includes modelling that has been used to support the EPL application and in determining the discharge criteria set out for the project in Table 3-1.

The Project is subject to an EPL as a Scheduled Activity for 'road construction. The EPL prescribes water quality parameters to be measured and associated discharge criteria for licensed discharge points. The EPL will also details the monitoring and analytical requirements by reference to authority publications (e.g. *Approved Methods for Sampling and Analysis of Water Pollutants in NSW* (EPA, 2004)).

Before any water can be discharged offsite, it must meet the water quality parameter limits for discharges of pollutants to water set out in the EPL. The water quality discharge criteria from the EPL is identified below in Table 3-1. Water quality testing will be undertaken less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge or when rainfall causes runoff to the source of water under control discharge.

If the criteria are met, the water is suitable for discharge. If the criteria are not met, treatment of water will occur in accordance with Section 3.4.

Table 3-1 Discharge water quality criteria

Parameter	Criteria	Sampling method	Analytical method
pH	6.5 – 8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Turbidity	50NTU	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Oil and Grease	No visible	Visual observation	Field analysis and confirmed as required with laboratory assessment

3.4 Water Treatment

Methods for treating water if the water does not meet the discharge criteria are detailed below;

3.4.1 pH

1. Test water with appropriately calibrated pH meter.
2. No action if pH reading between 6.5 and 8.5.
3. Lime to be added if pH below 6.5.
4. Hydrochloric Acid (32% Muriatic) or Sulfuric Acid to be added if pH above 8.5.
5. Determine volume of water in basin or excavation.

6. Bucket Test. Determine percentage of lime or acid required by taking a 10 litre sample of basin or excavation water and adding a known amount of lime or acid (initially 0.004%). If the pH is still not acceptable, vary the amount of lime or acid until within the limits.
7. Once the required percentage has been determined, calculate the actual amount of lime or acid to be added by multiplying the volume of water in the basin or excavation by the determined percentage.
8. Add the required amount of lime or acid to the basin or excavation.
9. Mix the water in the sediment basin or excavation by pumping water to recirculate.
10. Treat for pH prior to NTU.

Note: Refer to SDS for Hydraulic or Sulfuric Acid prior to handling. The following PPE must be worn at all times when handling Hydrochloric or Sulfuric Acid:

- *Safety glasses with side shields, chemical goggles or full-face shields.*
- *Impervious PVC or butyl rubber gloves.*
- *PVC overalls/jacket/apron and butyl rubber Wellington boots.*

If handling indoors, approved respirator with replaceable vapour/mist filter.

Note: Refer to SDS for Lime prior to handling. The following PPE must be worn at all times when handling Lime:

- *Safety glasses.*
- *If handling indoors, approved P2 face mask.*

3.4.2 Turbidity (NTU)

1. Collect a sample of basin or excavation water using a laboratory supplied container (an appropriately calibrated water quality probe will be used to measure the NTU level.
2. If the NTU result is below nominated criteria dewatering can commence. If NTU is above nominated criteria, the water should treated with a flocculent.
3. If basin or excavation require flocculation, gypsum within 24 hours of the conclusion of each rain event causing runoff. It is to be applied evenly across the top of the water at a rate of 30kg per 100 cubic metres of water. Allow 36 – 48 hours for flocculation to occur.

Note: Alternative flocculants may only be used subject to approval from the TfNSW Representative in using the TfNSW Alternative flocculants procedure. Alternative flocculants must be applied at the manufacturers recommended dosage. Lime to be added if pH below 6.5.

Hydrochloric Acid (32% Muriatic) or Sulfuric Acid to be added if pH above 8.5.

Determine volume of water in basin or excavation.

4. Methods of application to include:
    - Broadcast by shovels recommended dosage is 30kg – 50kg/100 cubic meters. Spreading powder evenly and thinly (i.e. “dusting”) is recommend.
    - Mixing in a drum with water and pumping through a hose on large basins or excavations (i.e. >200m3).
    - When spraying flocculants the mixture must hit the water at between 10 to 20 degrees to increase surface areas exposure to the water column.
    - When using liquid gypsum or liquid flocculants, the solution must be mixed before use to ensure the product is evenly suspended throughout mixture. To be applied as per manufacturer instructions.
5. Basins or excavations should be monitored and recorded daily after flocculation until desired turbidity is achieved and to assist in determination of optimal dosage levels.

Note: Refer to SDS for Gypsum prior to handling. The following PPE must be worn at all times when handling Gypsum:

- *Safety glasses with side shields, chemical goggles.*
- *If handling indoors, approved P2 face mask.*

3.4.3 Oil and Grease, Metals or other pollutants

1. Examine surface of water for evidence (e.g. sheen, discoloration).
2. No action if no visual contamination.
3. Oil absorbent material to be removed if there is contamination with absorbent materials (e.g. Xtrasorb, floating booms, pads and socks) and/or an oil/water separator. Leave basins to compensate for 24 to 48 hours.
4. Where metals or other pollutants are encountered specific treatment or disposal methods must be agreed with TfNSW.

3.4.4 Testing

Before any water can be discharged, the water must meet the water quality parameter limits for discharges of pollutants to water set out in Section 3.3. Water quality testing will be undertaken less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge or when rainfall causes runoff to the source of water under control discharge. If the criteria are met, the water is suitable for discharge. If the criteria are not met, treatment of water will occur in accordance with Section 3.4. Water quality testing will be conducted in accordance with:

- Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998).
- Australian Standard 5667:1998 Water Quality – Sampling, Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6:1998)

3.4.5 Storage of Water treatment chemicals

Flocculants and other water treatment chemicals will be appropriately stored on site. Bulk powdered flocculants like Gypsum and Lime will be covered and positioned within erosion and sediment controls away from areas with the potential for water runoff. All treatment chemicals will be stored in appropriately bunded locations within secure compound areas that prevent unauthorised access. Requirements of the Safety Data Sheets will be followed.

3.4.6 Discharge, Inspection and Monitoring

Water discharge will only occur following approval by the ESR who will issue a Permit to Dewater in line with the CPB CMS.

Prior to the commencement of dewatering, the permit accepter will inspect the entire system, including intakes and outlets, pumping and discharge locations.

If the dewatering is not directly supervised, a risk assessment will be carried out and mitigation measures implemented to eliminate the risks of pollution and to prevent the occurrence of the following:

- Intake suction placed within the deposited sediments resulting in discharge of sediment laden waters
- Erosion at discharge locations and downstream areas
- Inadvertent or intentional controlled discharge of untreated waters.

Dewatering will cease immediately if any negative environmental impact such as flooding, erosion or dirty water discharge is observed.

3.4.7 Trigger Action Response Plan

In accordance with NSW CoA C7(c), the following Trigger Action Response Protocol (TARP) will be followed to manage potential discharge waters (refer to Figure 3-1 below). The TARP is based on the dewatering hierarchy identified in Section 3.2 and includes disposal options in the event that water quality criteria is exceeded.

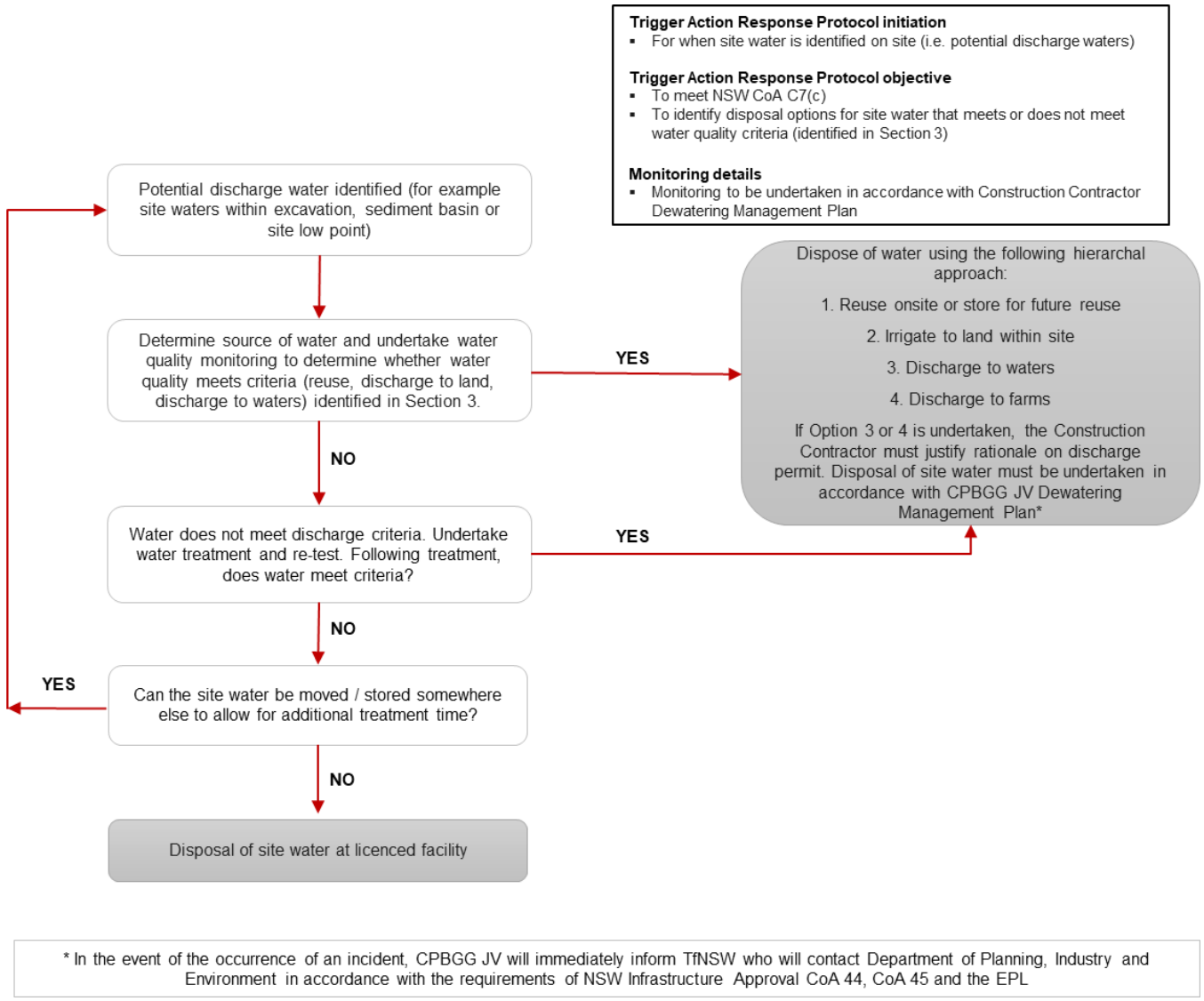


Figure 3-1 Trigger Action Response Protocol

3.5 Farm Dam Discharge

Prior to the management of water in accordance with the discharge requirements outlined in section 3.3, the discharge of waters from farm dams will require:

- Preparing the dam for dewatering
- Aquatic fauna capture
- Relocation of captured aquatic fauna
- Management of pest species and pathogens.

Refer to the CFFMP Appendix F (Farm Dam Dewatering Procedure) for the steps required for the management of aquatic flora and fauna for farm dam discharge. The reuse of farm dam water onsite or discharge of farm dam water will be authorised by the ESR.

3.6 Sydney Water Infrastructure Dewatering

In addition to the discharge requirements outlined in Section 3.5 for the discharge of water, if dewatering of Sydney Water infrastructure (i.e. decommissioning and dewatering of pipes, followed by commissioning) is required, it must be undertaken in accordance with Sydney Water discharge protocols.

4 Records

CPBGG JV will maintain records of relevant data, including records of water quality management and water discharge.

A record will be maintained for each discharge that will include:

- Date and time for each discharge at each location
- Water quality test results for each discharge
- Personnel approving the dewatering activities
- Evidence of discharge monitoring, or risk assessment and mitigation measures used to eliminate the risks of pollution or erosion
- Details of aquatic fauna captured and relocated after dam dewatering has occurred
- Any other EPA licence requirements.

CPBGG JV will report on site discharge monitoring results in the Monthly Reports to be prepared for the Project. Details of the reporting are outlined in the Construction Soil and Water Monitoring Program (refer Appendix C of the CSWMP).

Appendix E – Concept Erosion and Sediment Control Plan

Appendix F – Water Reuse Strategy

Appendix F
Water Reuse Strategy

M12 Motorway West

Project number:	N00160
Document number:	M12WCO-CPBGG-ALL-EVWA-PLN-000001_App F
Revision date:	28/07/2022
Revision:	00

Details of Revision Amendments

Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

Rev	Date	Reviewed By	Details
A	18/02/2022	G. Bolton	First Draft
B	29/04/2022	G. Bolton	Second Draft to address Arcadis/TfNSW review comments
C	25/06/2022	A. Zvirzdinas	Third Draft to address TfNSW/Arcadis comments on Rev B
D	14/07/2022	A. Zvirzdinas	New document number added
00	28/07/2022	A. Zvirzdinas	First Controlled Issue

Document Review

Position	Name	Signature	Date
Project Director	[redacted]		28/07/2022

Distribution of controlled copies

Copy no.	Issued to	Version

Table of Contents

Acronyms and Abbreviations

Abbreviations	Expanded text
CoA	Conditions of Approval
CMS	CPB Contractors Management System
CPBGG JV	CPB Contractors and Georgiou Group Joint Venture
CSWMP	Construction Soil and Water Management Plan
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESM	Environment and Sustainability Manager (TfNSW)
ESR	Environmental Site Representative (CPBGG JV)
EWMS	Environmental Work Method Statement
OCEMP	Overarching Construction Environmental Management Plan
POEO Act	*Protection of the Environment Operations Act* 1997
QA	Quality Assurance
REMM	Revised Environmental Management Measures
TfNSW	Transport for NSW
TSS	Total Suspended Solids

1 Introduction

1.1 Purpose

This Water Reuse Strategy has been prepared to detail the quantities and uses of water on the Project through the construction phase, to investigate and evaluate all feasible reuse options for stormwater and groundwater, and to identify water saving opportunities to reduce potable water use during construction.

1.2 Objective

The objectives of this Strategy include:

- Ensure compliance with environmental requirements of the Project
- Detail water use monitoring and reduction measures
- To investigate and evaluate all feasible reuse options for stormwater
- Identify water saving opportunities to reduce potable water during construction

1.3 Scope

This strategy is relevant to the planned water source and use related to the Project. Water will be needed for the project for the following uses:

- Minimise dust,
- Support landscaping,
- Clean down plant and equipment
- Achieve compaction requirements.

1.4 Induction / Training

Personnel involved in water abstraction and use will be trained in the requirements of this strategy. Training will also include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and Responsibilities

The CPBGG JV Environmental Site Representative (ESR) has overall responsibility for the implementation of this strategy. The ESR will ensure this strategy is effectively implemented and that all site personnel are aware of its requirements.

1.6 Review

This Plan will be reviewed by CPBGG JVs Soil Conservationist and TfNSW Environment and Sustainability Manager (ESM) (or delegate) prior to commencement of construction.

This Plan will be reviewed annually or as required in accordance with the continuous improvement process described in Section 8 of the CSWMP.

1.7 Requirements

The applicable NSW CoA, REMMs relevant to the development of this Plan are listed in Table 1-1, as identified in the CSWMP

Table 1-1 Water Use requirements

Reference	Measure/Requirement	Where addressed
REMM SWH03	A water reuse strategy will be developed for both construction and operational phases of the Project to reduce reliance on potable water. This strategy will be prepared during the detailed design stage and implemented throughout the Project and will outline the construction and operational water requirements and potential water sources to supply the water demand in consultation with Sydney Water. Alternative water supply options to potable water will be investigated, with the aim of reusing water using recycled water where feasible.	This Strategy

2 Strategy

2.1 Water Reuse

- Rainwater and/or stormwater will be used to provide passive irrigation to tree plots and vegetated areas that are part of the Contract.
- Water from sediment basins will be prioritized for use as dust suppression/compaction through the construction phase. Opportunities to enlarge selected sediment basins to Blue book 10 day or 20 day design criteria will be assessed with the Soil conservationist during establishment works. This will allow the storage of water for longer periods to allow reuse. Changes to basin design criteria will need to be reflected in the project EPL.
- Standpipes will be installed at selected dams to be dewatered and this water will be utilised for enabling earthworks on the project. Dams will progressively be emptied and backfilled allowing for construction of the road corridor.
- Other water saving opportunities to reduce potable water use include; the selection of native species in landscape design to reduce the establishment water requirements and the use of geobinder polymers to reduce the need for water dust suppression.
- The project will target at least 33 per cent of water use (e.g. dust suppression, fill conditioning, landscape watering) from non-potable sources and a minimum of 5% of water generated/collected during construction is reused, recycled or reclaimed
-

3 Inspection, Monitoring and Reporting

Compliance with this Strategy will be tracked through weekly environmental inspections of water use onsite. The checklist of items to be inspected will include water source and use application across the site.

Monitoring of Water Resource Use will occur during construction and reported to the Principal within the Quarterly Project Sustainability Report. Monthly Water and Waste reporting is also conducted via CPB System Synergy.

4 Records

CPBGG JV will maintain records of all water use monitoring and any required water use approvals or agreements with landholders. The ESR is responsible for developing and maintaining the records and the monitoring data will be provided to TfNSW within the Quarterly Project Sustainability Report. Synergy is also used to record water and waste data in accordance with the CPB CMS requirements.

Appendix G – Secondary CoA, REMMS requirements

Secondary CoAs

CoA No.	Condition Requirement	Document reference
A7	References in the terms of this approval to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this approval.	Section 3.1
C11	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP: (b) Surface Water Monitoring program – DPIE Water, Sydney Water (if any Sydney Water assets are affected), relevant councils (c) Groundwater Monitoring Program - DPIE Water	OCEMP, OCSWMP
C12	Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	OCEMP, OCSWMP Section 1.5.1
C13	Each Construction Monitoring Program must provide: (a) details of baseline data available (b) details of baseline data to be obtained and when (c) details of all monitoring of the CSSI to be undertaken (d) the parameters of the CSSI to be monitored (e) the frequency of monitoring to be undertaken (f) the location of monitoring (g) the reporting of monitoring results and analysis of results against the relevant criteria (h) details of methods that will be used to analyse monitoring data (i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Condition C14	OCEMP, OCSWMP

CoA No.	Condition Requirement	Document reference
C15	The Construction Monitoring Programs 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.	OCEMP, OCSWMP Section 1.4.1
C16	Unless otherwise agreed with the Planning Secretary, construction must not commence until all of the relevant Construction Monitoring Programs have been approved by the Planning Secretary, and all relevant baseline data for the specific construction activity has been collected.	OCEMP, OCSWMP Section 1.4.1
C17	The Construction Monitoring Programs, as approved by the Planning Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	OCEMP, OCSWMP Section 1.4.1
C18	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant government agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	OCEMP, OCSWMP Section 1.4.1
E24	For property/ies zoned primary production and where hydrologic modelling predicts that the CSSI will potentially reduce and adversely affect the available stormwater runoff yield to a farm dam, the Proponent must, in consultation with the affected landowner:	Section 6.13
	(a) calculate the nature and extent of impacts on water supply;	
	(b) determine what measures may be implemented to prevent, mitigate, compensate or offset a loss in water supply; and	
	(c) implement the measures agreed with the landowner at no cost to the landowner.The agreed measures must be implemented prior to undertaking any works that would directly affect the flow of water into a landowner's farm dam. In the event that the Proponent and landowner cannot agree on the measures to mitigate the impact, the Proponent shall engage a suitably qualified and experienced independent person to advise and assist in determining appropriate mitigation measures.	
E84	All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to minimise water pollution. When implementing such controls, any relevant guidance in the Managing Urban Stormwater, Soils and Construction Vol.1 (Landcom, 2004) and Vol. 2D Main Road Construction (DECC, 2008) must be considered.	Section 6

CoA No.	Condition Requirement	Document reference
E87	Should remediation be required to make land suitable for the final intended land use, a Remediation Action Plan must be prepared. Prior to commencing with the remediation, the Proponent must submit to the Planning Secretary for information, the Remediation Action Plan and an Interim Audit Advice or a Section B Site Audit Statement from a NSW EPA accredited Site Auditor that certifies that the Remediation Action Plan is appropriate and that the site can be made suitable for the proposed use	CCLMP
	The Remediation Action Plan must be implemented and any changes to the Remediation Action Plan must be endorsed in writing by the EPA-accredited Site Auditor.	
	Note: It is strongly recommended that a site auditor is engaged as early in the assessment and remediation process as possible, as early communication between parties improves the efficiency of the audit.	
E88	A Section A1 or Section A2 Site Audit Statement (accompanied by an Environmental Management Plan) and the accompanying Site Audit Report, which states that the contaminated land disturbed by the works has been made suitable for the intended land use, must be submitted to the Planning Secretary and relevant council(s) for information after remediation and no later than one (1) month before the commencement of operation. Contaminated land must not be used for the purpose approved under the terms of this approval until a Section A1 or Section A2 Site Audit Statement is obtained which states that the land is suitable for that purpose and any conditions on the Section A1 or Section A2 Site Audit Statement have been complied with. Nothing in the conditions prevents the Proponent from obtaining Section A Site Audit Statements for individual parcels of remediated land.	CCLMP
E105	The CSSI must be designed, constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with. *Note: If it is proposed to discharge construction stormwater to waterways, 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 the level of detail commensurate with the potential water pollution risk.*	Section 3.4
E106	Drainage feature crossings (permanent and temporary watercourse crossings and 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 6.9

CoA No.	Condition Requirement	Document reference
E107	Work on waterfront land must have regard to the Guidelines for controlled activities on waterfront land – Riparian Corridors (NRAR, 2018), Controlled activities on waterfront land – Guidelines for watercourse crossings on waterfront land (NSW Office of Water, 2012) and Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013).	Section 6.8
E108	The Proponent must consult DPI Fisheries and EES during the detailed design of the watercourse crossings. The consultation must include: (a) design of bridges; (b) design of scour protection; and (c) details of riparian revegetation.	Section 1.5.1

Secondary REMMs

ID	Revised environmental management measure	Timing	Document Reference
B20	Spill kits will be located to allow for timely response to uncontained spills. Site inductions will include a briefing on the use of spill kits.	During construction	Section 6.12
SWH02	A soil conservation specialist will be engaged by both TfNSW and the Construction Contractor for the duration of construction of the Project to provide advice on the planning and implementation of erosion and sediment control including review of ESCPs.	Prior to and during construction	Section 7.1.1
SWH03	A water reuse strategy will be developed for both construction and operational phases of the Project to reduce reliance on potable water. This strategy will be prepared during the detailed design stage and implemented throughout the Project and will outline the construction and operational water requirements and potential water sources to supply the water demand in consultation with Sydney Water. Alternative water supply options to potable water will be investigated, with the aim of reusing water using recycled water where feasible.	Detailed design, prior to construction and during construction and operation	Section 6.6

ID	Revised environmental management measure	Timing	Document Reference
SWH04	Stockpiles will be managed to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015). This will include: • Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed • Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion • Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required.	During construction	Section 6.4
SWH05	A construction water quality monitoring program will be developed and included in the CSWMP for the Project to establish baseline conditions, observe any changes in surface water and groundwater during construction, and inform appropriate management responses. The program will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations identified in the Surface water and hydrology assessment report (Appendix M of the EIS) and supplementary memo (Appendix I of this amendment report), and Groundwater quality and hydrology assessment report (Appendix N of the EIS) and supplementary memo (Appendix J of this amendment report). Baseline monitoring will be carried out monthly for a minimum of 12 months before the start of construction. As a minimum this will include three wet weather sampling events over six months where feasible. Sampling locations and monitoring methodology to be carried out during construction will be further developed in detailed design in accordance with the Guideline for Construction Water Quality Monitoring (RTA 2003) and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). It will include collection of samples for analysis from sedimentation basin discharge points, visual monitoring of other points of release of construction waters and monitoring of downstream waterways.	Prior to construction and during construction and operation	OCEMP, OCSWMP Appendix C
SWH11	A de-watering management plan will be prepared as part of the CSWMP which will outline the de-watering methodology, supervision requirements, staff responsibilities and training, and approvals required before any de-watering activity begins.	During construction	Section 6.7 Appendix D

ID	Revised environmental management measure	Timing	Document Reference
SWH12	The following measures will be carried out to manage activities within watercourses or on waterfront land: • Implementing practices to minimise disturbance of banks • Undertaking bank stabilisation and installing instream structures • Maintaining minimum flows to assist in maintaining the viability of aquatic communities and preventing barriers to fish passage • Constructing instream crossings during low flows and design so that drainage off crossing doesn't contribute sediment load to the stream • All drainage feature crossings (permanent and temporary watercourse crossings and stream diversions), drainage swales and depressions will be designed by a suitably qualified and experienced professional and will be designed and constructed in accordance with relevant guidelines.	Prior to construction and during construction and operation	Section 6.8
GW01	Groundwater monitoring will be carried out as part of the construction water quality monitoring program for the Project. The groundwater monitoring will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations shown in Appendix N of the EIS and Table 7-1 in the groundwater supplementary technical memorandum (Appendix J of this amendment report). Baseline groundwater monitoring will be carried out at least monthly for at least six months before construction. Monitoring will also be carried out at least monthly during construction and will continue for at least six months of operation to verify that there are no groundwater impacts, and that management measures are adequate.	Prior to construction and during construction	OCEMP, OCSWMP
GW04	Groundwater will be monitored at the airport interchange northern and southern cuts and the western cut during the construction phase and operational phase as outlined in Table 7-1 in the groundwater supplementary technical memorandum (Appendix J). The groundwater indicators to be monitored will be as per Section 7.2.5 of Appendix N of the EIS. Groundwater inflows to the airport interchange northern and southern cuts and the western cut are to be observed by the groundwater monitoring contractor during the construction and operational phases at monthly intervals. As part of observing the airport interchange northern and southern cuts and the western cut groundwater inflows, the groundwater monitoring	During construction and operation	OCEMP, OCSWMP

ID	Revised environmental management measure	Timing	Document Reference
	contractor is to estimate the groundwater inflow rates and note the areas where groundwater inflow is occurring. During construction, if groundwater inflows are observed from the airport interchange northern and southern cuts and the western cut, the groundwater quality from the cut is to be sampled.		
GW06	Prior to construction commencing, the Construction Contractor will use their earthworks methodology to estimate the potential groundwater inflows that are expected in the first year of construction in order to confirm the inflows expected and if the proposed mitigation measures are sufficient to manage higher inflows that are likely during early earthworks activity. The estimate of groundwater inflows is to be undertaken for Cut 2, Cut 4, Cut 5, Cut 6, Cut 7, Cut 2 AAR, Cut 9 and at the Sydney Water culvert excavations. The estimate is to include groundwater inflow from both the walls and base of the cuts, and will take into account the construction methodology and staging for each cut. In addition, the estimate will utilise the maximum observed groundwater levels (as sourced from M12 West groundwater monitoring data). The Construction Contractor will assess the results of the estimated groundwater inflows to confirm whether evaporation will be sufficient to mitigate the potentially higher inflows likely to be expected during early earthwork activities. If evaporation is determined not to be a sufficient mitigation measure, the Construction Contractor will identify and implement additional mitigation measures and these will be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.	Prior to construction and during construction	OCSWMP App C
GW07	Prior to construction commencing, the Construction Contractor will use their earthworks methodology to estimate the potential groundwater inflows that are expected in the first year of construction in order to confirm the inflows expected and if the proposed mitigation measures are sufficient to manage higher inflows that are likely during early earthworks activity. The estimate of groundwater inflows is to be undertaken for Cut 9 and at the Sydney Water culvert excavations. The estimate is to include groundwater inflow from both the walls and base of the cuts, and will take into account the construction methodology and staging for each cut. In addition, the estimate will utilise the maximum observed groundwater levels (as sourced from M12 West groundwater monitoring data). The Construction Contractor will assess the results of the estimated groundwater inflows to confirm whether evaporation will be sufficient to mitigate	Prior to construction and during construction	OCSWMP App C

ID	Revised environmental management measure	Timing	Document Reference
	the potentially higher inflows likely to be expected during early earthworks activities. If evaporation is determined not to be a sufficient mitigation measure, the Construction Contractor will identify and implement additional mitigation measures and these will be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.		
SC01	Construction within areas of moderate to high risk saline soils will be managed in accordance with the CSWMP. Specific measures will also include (but not be limited to): • Ongoing groundwater monitoring of salinity as part of the water quality monitoring program • Identification and management of saline discharge sites • Progressive stabilisation and revegetation of exposed areas following disturbance as soon as is practicable • Testing to confirm the presence of saline soils in areas of high salinity potential prior to disturbance. • Soil salinity management will also be carried out in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook.	Prior to construction and during construction	Section 6.3.1
SC02	Testing will be carried out to confirm the presence of saline soils in areas of high salinity potential and to confirm the presence of ASS around creeks prior to disturbance.	Prior to construction	CCLMP
SC05	Additional soil and groundwater investigations will be required in the areas of additional cut around the airport interchange northern cut and airport interchange southern cut to further assess the potential impacts to the amended Project.	Prior to construction	CCLMP
SC06	Further intrusive asbestos investigations throughout the construction footprint will be carried out to assess asbestos risks before the start of construction. The investigations are to include visual assessments and ground truthing along the length of the Project.	Prior to construction	CCLMP
HS04	Storage, handling and use of dangerous goods and hazardous substances would be in accordance with the Work Health and Safety Act 2011 and the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005).	During construction and operation	Section 6.10
HS05	Secure, bunded areas will be provided around storage areas for oils, fuels and other hazardous liquids.	During construction	Section 6.10

ID	Revised environmental management measure	Timing	Document Reference
HS06	Safety Data Sheets will be obtained for dangerous goods and hazardous substances stored onsite before their arrival.	During construction	Section 6.10
HS07	All hazardous substances will be transported in accordance with relevant legislation and codes, including the Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998 and the 'Australian Code for the Transport of Dangerous Goods by Road and Rail' (National Transport Commission, 2008).	During construction	Section 6.10

Appendix H – Soil Conservationist Review Evidence

Zvirzdinas, [redacted]

From: [redacted]
Sent: Monday, 27 June 2022 5:12 PM
To: Zvirzdinas, [redacted]
Cc: [redacted] bolton
Subject: M12W Project - Documentation Review re Erosion and Sediment Control.

CAUTION: This email originated from outside of the Organisation.

[redacted]

I refer to your attached email, and accordingly, have reviewed the following documentation:

1) Construction Soil and Water Management Sub-Plan (ie CEMP) including:
* Appendix A - Stockpile Management Protocol,
* Appendix C - Construction Soil and Water Monitoring Program,
* Appendix D - Dewatering Management Plan, and
* Appendix F - Water Reuse Strategy.

2) Erosion and Sediment Control Management Report 100 % Detailed Design - prepared for WSP & TfNSW by SEEC and which included Appendix A - Drawing List and Concept Erosion and Sediment Control Plans.

3) Planning Conditions Combined in relation to:
* MCoA SS19364,
* REMMs,
* EPBC Act, and
* EPL 21595.

4) EPL Premise Boundary Map which includes the locations of:
* Construction Water Quality Basins, and
* Discharge points.

I emphasis the following points as a result of the review:

1)The Construction Soil and Water Management Sub-Plan and Appendices are very comprehensive in all aspects, and accordingly, I have no further recommendations or comments.

2) The Erosion and Sediment Control Management Report 100% Detailed Design (including Appendix A - Drawing List and Concept Erosion and Sediment Control Plans) is a document of fundamental principles (eg separation of 'clean' from 'dirty' flows) and proposals relevant to major controls (eg sediment basins). The document addresses all the necessary issues at this pre construction stage with the proposals to be checked in the field and to form the basis for a series of more detailed Progressive Erosion and Sediment Control Plans.

In conclusion, please contact me if you have any questions or require further comment.

Regards

[redacted] Wright
Senior Soil Conservationist [redacted]

[redacted]