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Appendix B4

Construction Soil and Water Management Sub-plan

M12 Motorway

June 2024

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Document control

File Name	M12PPW-ADAP-ALL-EN-000024_M_S3_CSWMP
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Approval and authorisation

Plan reviewed by:	Plan reviewed by:
Tracey Austin	Deanne Forrest
TfNSW Environment and Sustainability Manager	TfNSW Project Director, M12
Date 28.06.2024	Date 28/6/2024
Signed [redacted]	Signed [redacted]

Revision history

Revision	Date	Description
A	15/10/2020	First draft for TfNSW review
B	3/11/2020	Response to TfNSW comments
C	24/11/2020	Response to TfNSW comments
D	09/08/2021	Updated with Final NSW and Commonwealth CoA
E	08/09/2021	Response to ER and TfNSW comments
F	18/11/2021	Response to comments received during consultation
G	10/12/2021	Update in response to DPIE review
H	17/11/2022	Additional design changes updates
I	13/02/2023	Response to TfNSW comments
J	19/03/2023	Response to ER comments
K	18/01/2024	Updated to reflect additional CAs

Revision	Date	Description
L	09/04/2024	Updated to reflect comments from TfNSW, ER and Construction Contractors
M	05/06/2024	Updated to reflect comments from TfNSW, ER and Construction Contractors

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Glossary/ Abbreviations

Abbreviations	Expanded text
ANZECC	Australian and New Zealand Environment and Conservation Council
AR	Amendment Report
ARSR	Amendment Report 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
CCS	Community Communication Strategy
CFFMP	Construction Flora and Flora Management Plan
CFMP	Construction Flood Management Sub-plan
CLM Act	*Contaminated Land Management Act 1997*
CoA	Conditions of Approval
Commonwealth CoA	Federal Conditions of Approval under the EPBC Act
CSWMP	Construction Soil and Water Management Sub-plan
CWRMP	Construction Waste and Resources Management Sub-plan
CSSI	Critical State Significant Infrastructure
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water

Abbreviations	Expanded text
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	Former NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DPIE	Former Department of Planning, Industry and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI, with all planning functions falling to DPHI)
EAD	Environmental Assessment Documentation
EC	Electrical conductivity
EDC	Elizabeth Drive Connection
EIS	Environmental Impact Statement
EES	Former Environment, Energy and Science Group (now Environment and Heritage Group)
EHG	Environment and Heritage Group (a part of NSW DCCEEW)

Environmental Assessment Documentation	The set of documents that comprise the Division 5.2 Approval: • Roads and Maritime Services (October, 2019) M12 Motorway, Environmental Impact Statement (EIS) • Transport for NSW (October, 2020) M12 Motorway, Submissions Report (the Submissions Report) • Transport for NSW (October, 2020) M12 Motorway, Amendment Report (AR) • Transport for NSW (December, 2020) M12 Motorway, Amendment Report submissions report (ARSR) • Transport for NSW (March, 2021) The M12 Motorway Amendment Report Submissions Report – Amendment (ARSR amendment) • WSP (October, 2021) M12 Motorway – West Package Detailed Design Consistency Assessment • GHD (October, 2021) M12 Motorway – Central Package Detailed Design Consistency Assessment • Arcadis (June, 2022) M12 Motorway – Sydney Water Crossings Consistency Assessment • Arcadis (July, 2022) M12 Motorway – Design Boundary Changes Consistency Assessment • Arcadis (August, 2022) M12 Motorway Minor Consistency Assessment for Proposed Change to the M12 Motorway Project (M12 Central) • Arcadis (September, 2023) M12 Motorway – Devonshire Road Temporary Roundabout Consistency Assessment • WSP (September, 2023) M12 Motorway – Elizabeth Drive Connections Consistency Assessment • TfNSW (September, 2023) M12 Motorway – Minor Consistency Assessment M12 West demolition of structures as 752 Luddenham Road • TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East AF9 Power Supply • TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Cecil Road Laydown Area • TfNSW (October, 2023) M12 Motorway – Minor Consistency Assessment M12 East Temporary Construction Signage • Arcadis (December, 2023) M12 Motorway – East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment • Arcadis (January, 2024) M12 Motorway – Minor Consistency Assessment M12 Central Water Tower Access Road The documents that comprise the EPBC referral: • Submission #3486 – The M12 Motorway Project between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham, NSW

Abbreviations	Expanded text
	• Notification of referral decision and designated proponent - controlled action; date of decision 19 October 2018; ID: 2018-8286.
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EMS	Environmental Management System
EPL	Environment Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESM	Transport for New South Wales Environment and Sustainability Manager
ESR	Construction Contractor Environmental Site Representative
EWMS	Environmental Work Method Statements
FCC	Fairfield City Council
Federal Approval	Approval (EPBC 2018/8286) for carrying out the M12 Project under Part 8 of the *Environmental Protection and Biodiversity Conservation Act 1999* subject to specific CoA as detailed in Annexure A of the approval.
Final construction footprint	The area shown in the map(s) submitted under Commonwealth CoA 2, determined by TfNSW in accordance with a consistency assessment(s) or a modification assessment under the NSW *Environmental Planning and Assessment Act 1979* where no new significant impacts to protected matters are identified.
GDE	Groundwater Dependent Ecosystem
HRC	Healthy Rivers Commission
Infrastructure Approval	Approval (SSI 9364) for carrying out of the M12 Project under Section 5.19 of the *Environmental Planning and Assessment Act 1979* subject to specific CoA as detailed in Schedule 2 of the approval.
LCC	Liverpool City Council
LEP	Local Environment Plan

Abbreviations	Expanded text
M7 Motorway (MOD 6 Widening)	Refers to the State Significant Infrastructure project (SSI-663-MOD 6) to construct and operate an additional lane in both directions within the existing median of the M7 Motorway, south of the Kurrajong Road overhead bridge at Prestons to the M7 Motorway bridge at Richmond. This project interacts with the M12 East stage at the M7 interchange.
M7 Widening	Shorthand term for M7 Motorway (MOD 6 Widening)
M7-M12 Integration Project	The M7-M12 Integration project incorporates the following: • M7 Motorway (Mod 6 Widening) (SSI 663 Mod 6) – modification (mod) to the M7 Motorway approved on 17 February 2023 under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) • M12 Motorway (CSSI 9364) – approved on 23 April 2021 under Division 5.2 of the EP&A Act and split into separate stages or packages of work (West, Central (main construction), Central (temporary roundabout) and East). The M12 Motorway is also subject to a federal approval under the Environment Protection and Biodiversity Conversation Act 1999. The M7-M12 Integration project incorporates the M12 East package only.
NSW CoA	NSW Conditions of Approval
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
NRAR	Natural Resources Access Regulator
OCEMP	Overarching Construction Environmental Management Plan
OCS	Overarching Communication Strategy
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PCC	Penrith City Council
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

Abbreviations	Expanded text
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
Secondary CoA/ REMM	CoA or REMM that is related to, but not specific to, the development of this Plan
SEPP	State Environmental Planning Policy
SRE	Sensitive Receiving Environment
TN	Total nitrogen
TP	Total phosphorus
TfNSW	Transport for New South Wales (formerly NSW Roads and Maritime Services)
WHS Act	*Work Health and Safety Act 2011*
WSIA	Western Sydney International Airport
WSP	Western Sydney Parklands

1 Introduction

1.1 Context

This Construction Soil and Water Management Sub-plan (CSWMP or Plan) forms part of the Overarching Construction Environmental Management Plan (OCEMP) for the M12 Motorway (the Project).

This CSWMP has been prepared 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) specifications.

1.2 Background

TfNSW is planning to construct and operate the M12 Motorway 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 separate stages under separate construction contracts:

- M12 West – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- M12 Central (main construction) – between about 250 metres east of Badgerys Creek and the Western Sydney Parklands at Duff Road, Cecil Park
- M12 Central (Temporary Roundabout) – temporary roundabout installation at Elizabeth Drive and Devonshire Road, Kemps Creek
- M12 East – (as part of the M7/M12 Integration Project)
    - Elizabeth Drive Connections (EDC) – a two-kilometre section from Duff Road to about 300 metres east of the M7 Motorway
    - M7/M12 Interchange – An interchange between the M12 Motorway and M7 Motorway and tie-in works for approximately four kilometres on the M7 Motorway

The Project is subject to an approval under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act) as Critical State Significant Infrastructure (CSSI). The Project is also a controlled action under Section 75 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), requiring a separate approval from the Australian Minister for the Environment.

An EIS was prepared to describe and assess the Project and recommend management measures to address impacts. The EIS was exhibited by the NSW Department of Planning, Industry and Environment (DPIE; now split into the NSW Department of Planning, Housing and Infrastructure

and Environment (DPHI) and Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW)) for 34 days from 16 October 2019 to 18 November 2019 to give the community and stakeholders the opportunity to provide comment.

In accordance with Section 5.17 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), the Planning Secretary requested TfNSW to provide a Response to Submissions report on 29 November 2019. These were addressed within the Submissions Report. Due to design developments since the exhibition of the EIS, an Amendment Report (AR) was developed to assess the impacts of these amendments. The AR was exhibited by DPIE for 14 days from 21 October 2020 to 4 November 2020. Following exhibition of the AR, an Amendment Report Submissions Report (ARSR) was developed December 2020 to address the identified issues, followed by the ARSR – Amendment in March 2021 which addressed biodiversity matters only.

The following additional assessments have since been undertaken:

- Two Consistency Assessments (CA) for M12 West and Central addressing detailed design changes for the Project construction boundary approved in October 2021.
- Sydney Water Consistency Assessment: related to construction boundary extensions associated with Sydney Water utility crossings; approved in June 2022
- Design Boundary Change Consistency Assessment: related to design boundary changes within the M12 alignment. This required an extension of the construction footprint and operational footprint, property adjustments and the demolition of Building No.1 at McMasters Field Station; approved in July 2022. Threatened Species Surveys were also undertaken along the M12 alignment between September and December 2021 to satisfy the NSW Conditions of Approval (CoA) E4, E5 and E6; the outcomes of which captured within the Design CA.
- Minor Consistency Assessment (M12 Central) required amendments to the construction footprint as a result of utility adjustments and tie in works, property adjustments for flood alleviation and improvements to ancillary facility access due to safety concerns, temporary widening of Elizabeth Drive and signage installation; approved in August, 2022.
- Devonshire Road Temporary Roundabout Consistency Assessment required to address the requirements of REMM TT10. This has resulted in an increase to the construction footprint at the Elizabeth Drive and Devonshire Road intersection to allow for the construction of a temporary roundabout; approved in September 2023.
- Elizabeth Drive Connections Consistency Assessment addressed detailed design changes for the Elizabeth Drive Connections. This involved minor construction and operation boundary adjustments, design changes, new sediment basin locations, utility works, property access changes and property adjustments; approved in September 2023.
- M12 West Minor Consistency Assessment for the demolition of structures as 752 Luddenham Road required to address the need for the demolition of structures within Ancillary Facility 11. Whilst this ancillary facility is already located within the construction footprint and was previously assessed in the M12 Motorway Amendment Report, the demolition and disposal of structures in this location required assessment; approved in September 2023.
- M12 East AF9 Power Supply Minor Consistency Assessment required to address a minor temporary amendment to the construction footprint in order to provide permanent site power to the construction ancillary facility 9 (AF9); approved in October 2023.

- M12 East Cecil Road Laydown Area Minor Consistency Assessment required to address temporary amendment to the construction boundary to facilitate the installation of a DN150 Steel Secondary Gas main within Cecil Road; approved in October 2023.
- M12 East Temporary Construction Signage Minor Consistency Assessment required to address temporary traffic signage installed prior to the start of temporary barriers on the M7 Motorway; approved in October 2023.
- M12 East Site 48, 50 and 51 Boundary Changes Minor Consistency Assessment addressed the required amendments to the construction footprint in three locations as a result of temporary traffic control measures, pavement build up and resurfacing; approved in December 2023.
- M12 Central Water Tower Access Road Minor Consistency Assessment addressed changes to the construction boundary to facilitate the construction of concrete slabs over the Sydney Water main, the construction of a temporary access road to the existing water town and radar tower, and the subsequent reinstatement of this temporary access road to pre-construction conditions; approved in January 2024.

The Project must be carried out generally in accordance with the EIS, Submissions Report, AR, ARSR and the ARSR - Amendment, M12 West and Central CA, Sydney Water CA, Design Boundary Change CA, Minor CA, Devonshire Road Temporary Roundabout CA, Elizabeth Drive Connections CA, M12 West Demolition of Structures as 752 Luddenham Road CA, M12 East AF9 Power Supply CA, M12 East Cecil Road Laydown Area CA, M12 East Temporary Construction Signage CA, M12 East Sites 48, 50 and 51 CA and M12 Central Water Tower Access Road CA in accordance with NSW CoA A1. These documents are collectively referred to as the Environmental Assessment Documentation (EAD). The CSSI must also be carried out in accordance with all procedures, commitments, preventative actions, performance outcomes and mitigation measures set out in the EAD as required by NSW CoA A2.

Approval for the Project under the EP&A Act was granted by the Minister for Planning on 23 April 2021 (SSI 9364). Approval for the Project under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted by the Federal Minister for the Environment on 3 June 2021 (EPBC 2018/8286). The Project must be carried out in accordance with the terms of the NSW and Federal Approvals.

Additionally, the M12 East Stage is being delivered as part of the M7-M12 Integration Project which includes the M7 Motorway Widening Project (MOD 6 Widening (SSI-663-MOD 6)) (referred to herein as M7 Widening) delivered by Western Sydney Orbital Company (WSO Co). Additional assessments were undertaken as a part of the EAD for this project.

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. 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. 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 2 of the OCEMP.

1.3 Scope of the Plan

The OCEMP and Sub-plans are related to the construction phase only. Early Works, as defined in the EIS Section 5.24.4 and OCEMP Section 2.4 are not within the scope of the OCEMP and Sub-plans. Notwithstanding, where Early Works activities are undertaken during the construction phase, they will be governed by the approved OCEMP and Sub-plans.

The scope of this CSWMP is to describe how the Construction Contractors propose to manage potential soil and water impacts during construction of the Project. The Construction Contractor responsible for each stage of the Project; M12 West, M12 Central (main construction), M12 Central (temporary roundabout), M12 East (Elizabeth Drive connections) and M12 East (M7/M12 interchange) must use this CSWMP as the basis for their stage-specific CSWMP.

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.

1.4 Environmental management systems overview

The overarching Environmental Management System (EMS) for the Project is described in Section 3 of the OCEMP. The Construction Contractor delivering the Project will have an EMS consistent with the overarching EMS described in the OCEMP. The Construction Contractor will develop stage-specific CSWMPs in accordance with the OCEMP, Environmental Protection Licence (EPL) and their EMS.

This overarching CSWMP forms part of the environmental management framework for the Project, as described in Section 3 of the OCEMP.

The Construction Contractor will be required to develop, as part of their stage-specific CSWMPs, detailed stage-specific procedures and plans to address specific requirements of the CoA and REMMs identified in this overarching CSWMP.

Where appropriate, the Construction Contractor 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 Construction Contractors documentation to confirm consistency with the requirements of this CSWMP and specifications.

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.

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 Construction Contractors environmental risk workshops.

EWMS will be prepared by the Construction Contractor 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 Construction Contractor 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 OCEMP, strategies, procedures, EWMS and ESCP form management guides that clearly identify required environmental management actions for reference by TfNSW and its Construction Contractor.

The review and document control processes for this CSWMP are described in Section 6.4.2 and Section 6.6 of the OCEMP.

1.4.1 CSWMP preparation, endorsement and approval

This overarching CSWMP has been prepared to satisfy the NSW and Commonwealth CoA in relation to soil and water management during construction of the Project. In accordance with NSW CoA C4, this Plan has combined NSW CoA C4(e) surface water and groundwater with soil from NSW CoA C4(d). This CSWMP includes a Construction Soil and Water Monitoring Program (Appendix C) to satisfy the requirements of NSW CoA C7, C11(b) and C11(c).

This CSWMP and Construction Soil and Water Monitoring Program was reviewed by the TfNSW Senior Project Manager and the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and endorsed by the ER prior to submission to the Secretary of the former Department of Planning and Environment (DPE; now DPHI) for approval, which was received on 21st December 2021. This CSWMP was submitted for the approval of the Secretary no later than one month prior to commencement of construction of the Project in accordance with NSW CoA C9.

In accordance with NSW CoA C10 and C16, construction of the Project did not commence prior to approval by the Secretary of the CSWMP and the Construction Soil and Water Monitoring Program, and all relevant water, soil and contamination baseline data for the Project has been collected.

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)
- Emergency response protocols and procedures are addressed in the Overarching Construction Environmental Management Plan (OCEMP)
- The Construction Contaminated Land Management Sub-plan (CCLMP) addresses the management of contaminated lands and unexpected contaminated finds
- The Construction Air Quality Management Sub-plan (CAQMP) addresses the management of dust and odour
- The Construction Flora and Fauna Management Sub-plan (CFFMP) addresses the management of flora and fauna including aquatic and riparian habitats and vegetation rehabilitation
- The Construction Waste and Resources Management Sub-plan (CWRMP) addresses the management of waste and resources including the classification and handling of spoil and water reuse.

1.5 Consultation

1.5.1 Consultation for preparation of the CSWMP

The following government agencies and stakeholders were consulted with during the development of this CSWMP and Construction Soil and Water Monitoring Program in accordance with NSW CoA C4(e), C7, C11(b) and C11(c):

- DPE Water ((Natural Resources Access Regulator) (NRAR) as delegate)
- Water NSW
- Sydney Water (where 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).

It is noted that although CoA C4(e), C7, C11(b) and C11(c) requires consultation with DPE Water, consultation has been completed through NRAR. This is deemed appropriate, as NRAR formed part of the NSW Government's reform of water management and is considered an independent regulator for compliance and enforcement of water management legalisation in NSW.

In accordance with NSW CoA A5 (b), Table 1-1 provides a log of engagement or attempted engagement with the identified government agencies and stakeholders.

Table 1-1: Log of engagement with government agencies and stakeholders

Agency	Date	Person Contacted	Comment	Consultation Status
DPE Water (NRAR)	21 October 2021	NRAR Representative	TfNSW emailed CSWMP to NRAR requesting comment.	Open
	27 October 2021	NRAR Representative	TfNSW followed up the NRAR Representative via phone and received no response.	Open
	17 November 2021	NRAR Representative	NRAR Representative notified that consultation has been closed.	Closed
Water NSW	21 October 2021	Water NSW Representative	TfNSW emailed CSWMP to Water NSW requesting comment.	Open
	01 November 2021	TfNSW Representative	Response received from Water NSW via email (See Appendix A) accepting the CSWMP. Consultation closed.	Closed
Sydney Water	21 October 2021	Sydney Water Representative	TfNSW emailed CSWMP to Sydney Water requesting comment.	Open
	04 November 2021	TfNSW Representative	Response received from Sydney Water via email (See Appendix A) accepting the CSWMP. Consultation closed.	Closed
Penrith City Council	21 October 2021	PCC Representative	TfNSW emailed CSWMP to PCC requesting comment.	Open

Agency	Date	Person Contacted	Comment	Consultation Status
	27 October 2021	PCC Representative	TfNSW followed up the PCC Representative via phone and received no response.	Open
	17 November 2021	PCC Representative	PCC Representative notified that consultation has been closed.	Closed
Liverpool City Council	21 October 2021	LCC Representative	TfNSW emailed CSWMP to LCC requesting comment.	Open
	2 November 2021	LCC Representative	TfNSW followed up the LCC Representative via email and received no response.	Open
	17 November 2021	LCC Representative	LCC Representative notified that consultation has been closed.	Closed
Fairfield City Council	6 October 2021	FCC Representative	TfNSW emailed CSWMP to FCC requesting comment.	Open
	25 October 2021	TfNSW Representative	Response received from FCC requesting an extension for review of the CSWMP.	Open
	25 October 2021	FCC Representative	TfNSW accepted the request for an extended consultation period until the 19 November 2021.	Open
	11 November 2021	TfNSW Representative	Response received from FCC via email on 11 November 2021 (See Appendix A) accepting the CSWMP. Consultation closed	Closed

In accordance with NSW CoA A5 and C12, the consolidated evidence of the consultation undertaken for the preparation of this CSWMP will be submitted to the Planning Secretary as part the CSWMP submission. The consolidated evidence is provided in Appendix A and includes:

- Documentation of the engagement with the parties identified above that occurred prior to submitting the document to the Secretary for approval
- A log of the dates of engagement or attempted engagement with the identified parties and a summary of the issues raised by them
- Documentation of the follow-up with the identified parties where feedback has not been provided to confirm that they have no feedback or have failed to provide feedback after repeated requests
- An outline of the issues raised by the identified parties, a summary of how they have bee

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- n addressed and a cross reference to the section or Sub-plan of the OCEMP where the issue has been addressed
- A description of the outstanding issues raised by the identified parties and the reasons why they have not been addressed.

1.5.2 Ongoing consultation during construction

Ongoing consultation between TfNSW and its Construction Contractors, 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 Communication Strategy (CCS).

As required by NSW CoA E108, Environment and Heritage Group (EHG) and DPI Fisheries were consulted for the permanent watercourse crossings during detailed design.

The Construction Contractor will notify NSW Department of Primary Industries (DPI) Fisheries in accordance with the *Fisheries Management Act 1994* of any dredging or reclamation works (i.e. temporary watercourse crossings). Temporary creek crossings will be required for the construction of bridges at Cosgroves Creek, Badgerys Creek, South Creek and Kemps Creek.

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 CoA, REMMs 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 relevant to each delivery package
- TfNSW 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:

- Full compliance with relevant legislative requirements, CoA and REMMs
- Full compliance with EPL water quality discharge parameters for all planned basin discharges
- Manage potential downstream water quality impacts during the construction of the Project through the implementation of feasible and reasonable water quality management measures, such as those detailed in Section 6.16
- All construction personnel to undergo site induction training which will include detail on soil and water management during construction.

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 A2 of the OCEMP.

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 the Sampling and Analysis of Water Pollutants in NSW (DECC, 2008)
- 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 watercourse crossings on waterfront land (NSW Office of Water, 2012)
- Guidelines for controlled activities on waterfront land – Riparian Corridors (NRAR, 2018)
- 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)
- Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013)
- 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 Specification G1 – Job Specific Requirements for The M12 Motorway
- TfNSW Specification G36 – Environmental Protection (Management System)
- TfNSW Specification G38 – Soil and Water Management
- TfNSW Specification G40 – Clearing and Grubbing
- TfNSW Specification R272 - Automatic Weather Stations
- PS311 – Environmental Design and Compliance

M12 Motorway West and Central Section Consistency Assessments – Groundwater Technical Memorandum. 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 by the Construction Contractors 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.

3.2 Minister's Conditions of Approval

The primary NSW CoA relevant to the development of this CSWMP are listed in Table 3-1. Secondary CoA relevant to this Plan have been listed in Appendix B. The primary NSW CoA relevant to the Construction Soil and Water Monitoring Program are included in Appendix C. 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	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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:	✓	✓	✓	Section 1.5.1 Appendix A
	(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.	✓	✓	✓	

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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 This CSWMP
	(k) for periodic review and update of the CEMP and all associated plans and programs.	✓	✓	✓	OCEMP Section 8
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.	✓	✓	✓	Section 1.4.1 Section 1.5.1 Appendix A CCLMP
	(d) Soil and contamination - DPIE Water, Water NSW and relevant council(s)	✓	✓	✓	
	(e) Surface water and groundwater - DPIE Water, Water NSW, Sydney Water (if there are discharges to its 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	Applicability			Document reference
		M12 West	M12 Central	M12 East	
	(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 3.2
	(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 5.3
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
	(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
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 1.4.1 Appendix A
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-	✓	✓	✓	Section 1.4.1

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
	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.				
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 there are any discharges to their assets), relevant councils	✓	✓	✓	Section 1.5 of Appendix C Appendix A
	(c) Groundwater Monitoring Program - DPIE Water	✓	✓	✓	Section 1.5 of Appendix C Appendix A

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 CSWMP are listed in Appendix B. The primary REMMs relevant to the Construction Surface Water Quality Monitoring Program are included in Appendix C. 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	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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
	• 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

ID	Measure/requirement	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	• Measures to manage stockpiles including locations, separation of waste types, sediment controls and stabilisation	Prior to construction	✓	✓	✓	Section 6.5 CWRMP
	• Measures to manage groundwater de-watering and impacts including mitigation required	Prior to construction	✓	✓	✓	Section 6.8 Section 6.14
	• Processes for de-watering of water that has accumulated on site and from sediment basins, including relevant discharge criteria	Prior to construction	✓	✓	✓	Section 6.8 Appendix D
	• Measures to manage potential tannin leachate	Prior to construction	✓	✓	✓	Section 6.6
	• Measures to manage accidental spills including the requirement to maintain materials such as spill kits	Prior to construction	✓	✓	✓	Section 6.13
	• Measures to manage potential saline soils	Prior to construction	✓	✓	✓	Section 6.3
	• Details of surface water and groundwater quality monitoring to be carried out before, throughout, and following construction	Prior to construction	✓	✓	✓	Appendix C

ID	Measure/requirement	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	• 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 Section 6.9
	• 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 EPL/s as a Scheduled Activity for 'road construction'. The EPL/s prescribe water quality parameters to be measured and associated discharge criteria for licensed discharge points. The EPL/s also detail 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)).

In accordance with NSW CoA E105, the Project will be constructed so as to meet the water quality requirements as identified in the EPL/s.

The following EPL/s have been obtained:

- M12 West – issued to TfNSW on 21 March 2022, transferred to CPB on 17 June 2022, Licence 21595
- M12 Central – issued to Seymour Whyte Constructions Pty Ltd on 21 March 2022, Licence 21596
- M12 East – issued to John Holland Pty Ltd on 2 August 2023, Licence 21829.

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 and 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).
    - M12 Motorway Groundwater Monitoring Program Report 7 – April to September 2022 (GHD, 2022).
    - M12 Motorway Surface Water Monitoring Program Report 8 – October 2022 to March 2023 (GHD, 2023).
    - M12 Motorway Groundwater Water Monitoring Program Report 8 – October 2022 to March 2023 (GHD, 2023).
    - M12 Motorway Surface Water Monitoring Program Report 9 – April 2023 to September 2023 (GHD, 2024).

- M12 Motorway Groundwater Water Monitoring Program Report 9 – April 2023 to September 2023 (GHD, 2024).

4.1 Topography, geology and soil characteristics

4.1.1 Topography

The topography of the Project area may be characterised into three general terrain types as detailed in Table 4-1.

Table 4-1: Summary of terrain and topography

Terrain Type	Location	Topography
Flat to gently undulating	Central portion of the Project	Comprises gentle rises and undulations with broad rounded crests with slopes of zero to five degrees Dissected by the Creek Channel/Alluvial floodplain terrain type by four meandering creeks, Cosgroves Creek, Badgerys Creek, South Creek and Kemps Creek, with each creek flowing to the north.
Rolling hills	Western and eastern portions of the Project	Comprises rounded hills with slopes of five to 20 degrees.
Creek Channels/Alluvial floodplain	Dissects the flat to gently undulating terrain within the central portion of the Project	The topography of the alluvial floodplains next to the creeks comprises low slopes of around zero to two degrees, which extend from the creek channels out to a maximum distance of about 500 metres.

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 metre BGL to five 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 metre to five 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 to four 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.

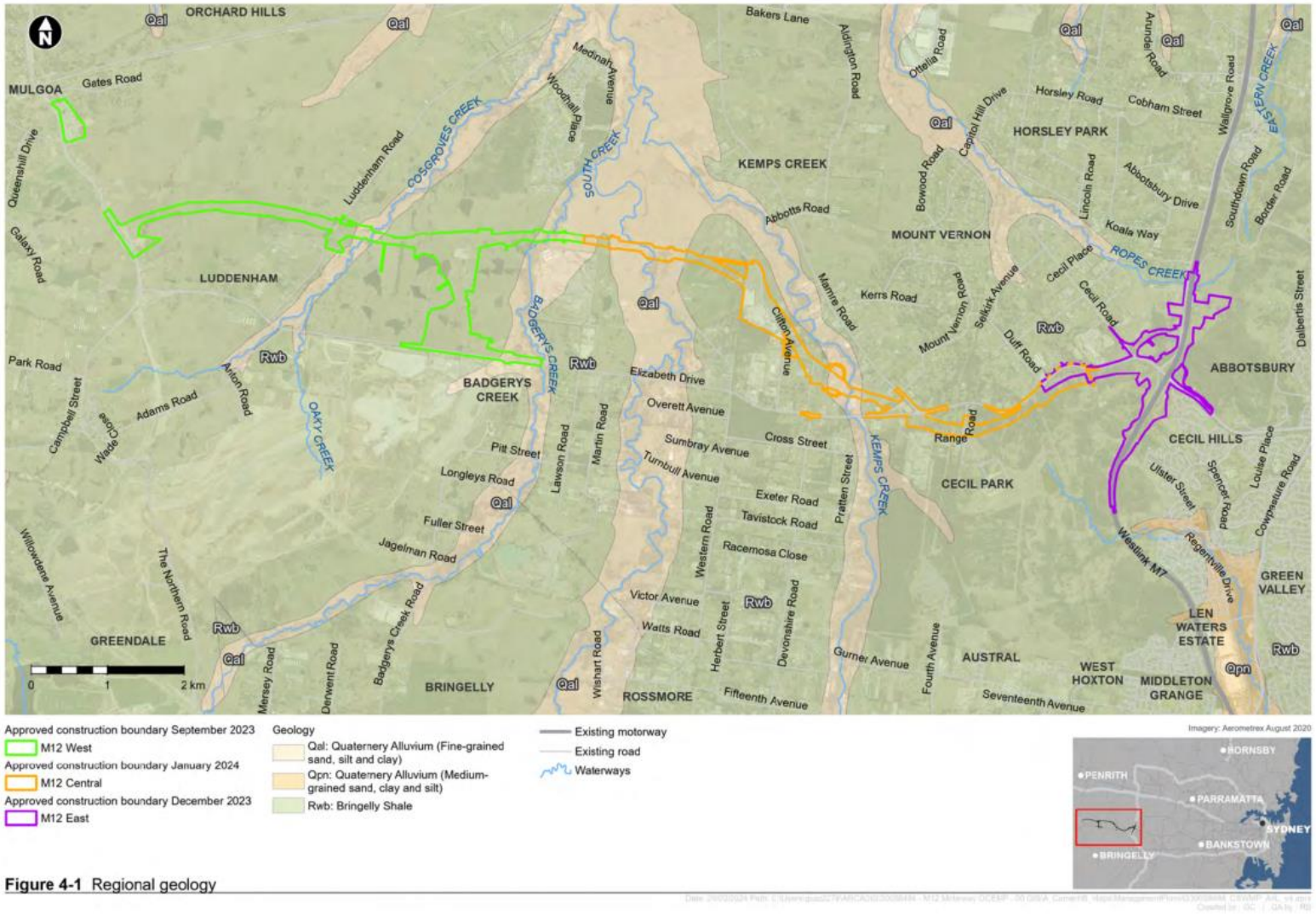

Figure 4-1 Regional geology

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 Project is underlain by four 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
Picton – residual and colluvial soils located at the eastern end of the Project footprint	• Occurs on steep sided slopes over Wianamatta Group shales usually with a southern aspect and where there are slope gradients more than 20 per cent • Described as shallow to deep residual and colluvial clays • There is potential for mass movement and slope instability (i.e. land sliding).

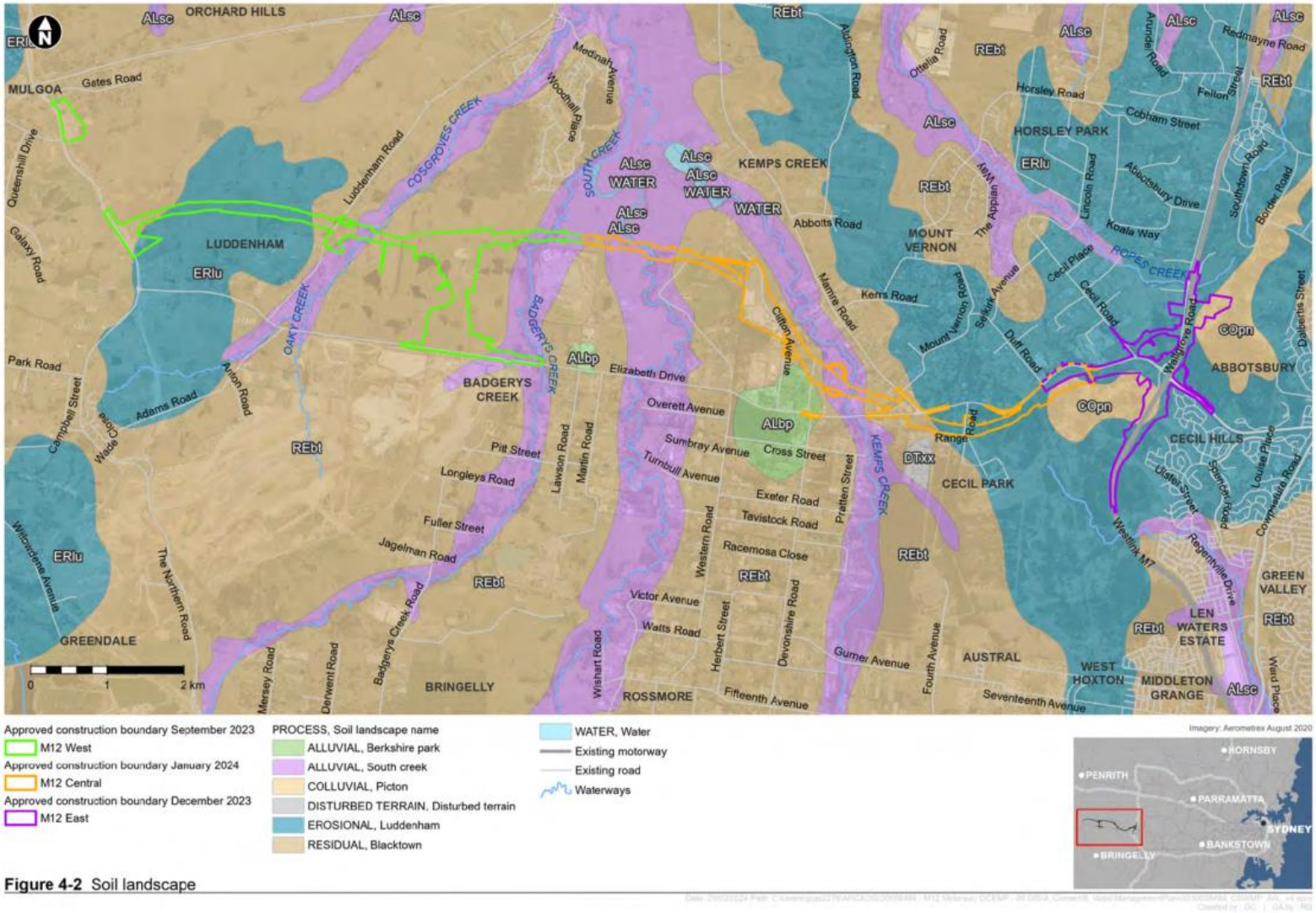

Figure 4-2 Soil landscape

Figure 4-2: Soil landscape

4.1.4 Soil salinity

The Salinity Potential in Western Sydney 2002 Map (DLWC, 2002b) indicates that soils within majority of the Project footprint have a moderate salinity potential. There are also small areas of known soil salinity to the east of Range Road. In addition, areas of high salinity potential were identified in the following areas:

- Areas of Cosgroves Creek
- Areas of low-lying land to the east and west of Cosgroves Creek
- Areas along Kemps Creek
- Small areas of known soil salinity along the Project footprint to the east of Range Road.

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

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.

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.

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 Sulfate Soils (PASS) during the proposed works in the vicinity of waterways and farm dams.

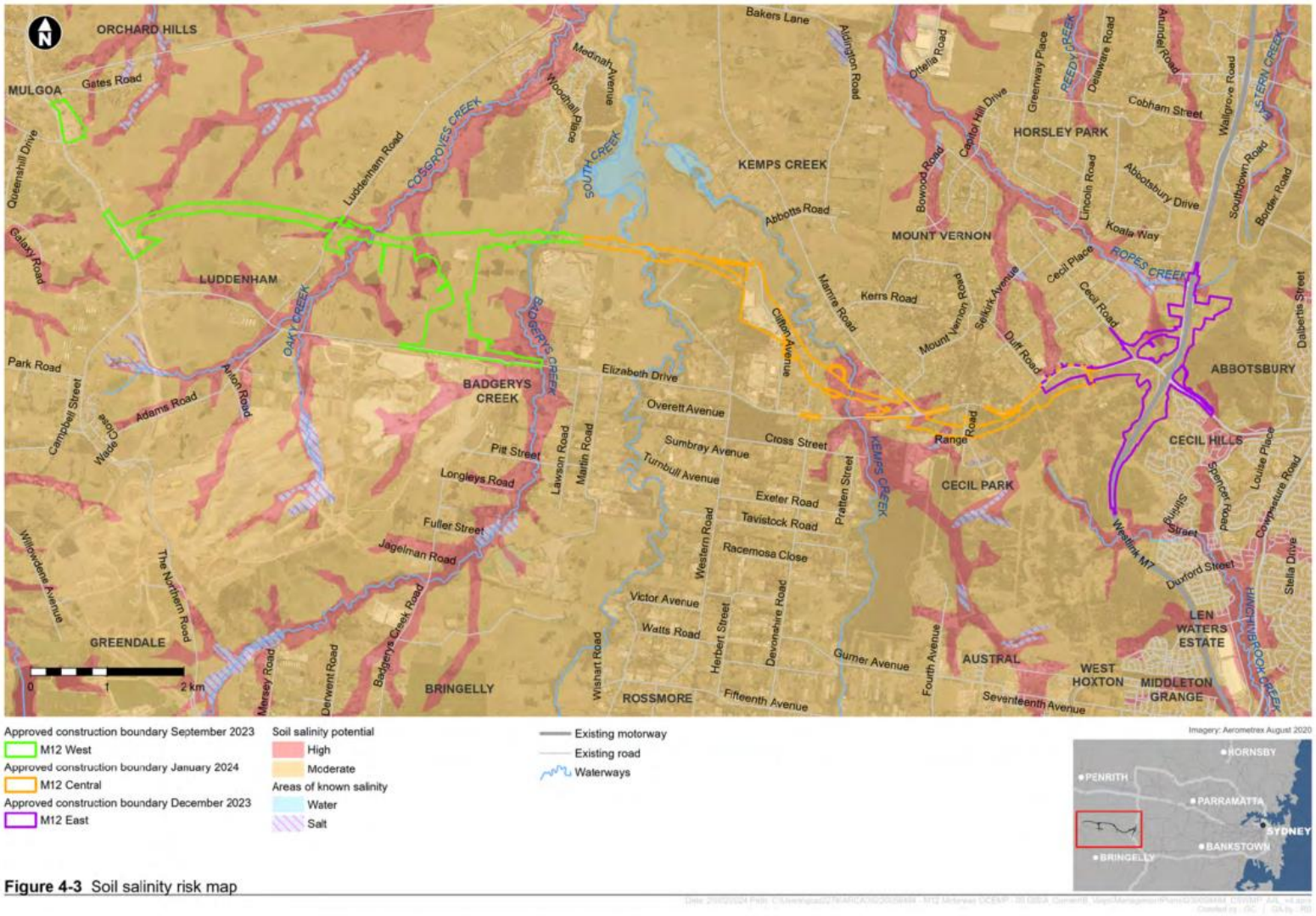

Figure 4-3 Soil salinity risk map

Figure 4-3: Soil salinity risk map

4.2 Surface water

4.2.1 Catchments and waterways within or adjacent to the Project

The Project is located primarily within the South Creek sub catchment in the Lower Nepean River Management Zone of the Hawkesbury-Nepean Catchment, while a small portion of the Project in the southeast is located within the Georges River 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
- Kemps Creek catchment - land use within the Kemps Creek sub-catchment largely includes agriculture (grazing, market gardens, poultry), residential, commercial and extractive industry. Known to suffer from flooding and associated drainage problems (e.g. overtopping of creeks), due to limited hydraulic capacity in the creek channels, filling activities on the floodplain and inadequate hydraulic capacity at culverts and bridges (LCC, 2003)
- Ropes Creek catchment - extensively cleared of vegetation, other than around the waterways, for agricultural activities to take place. The catchment has a long history of flooding (BMT WBM, 2013).

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 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 metres and an average channel width of about five 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 metres and average channel width of about five 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 metres.
Kemps Creek	Kemps Creek is a tributary of South Creek and is a fourth order stream which flows into the Hawkesbury-Nepean River	Kemps Creek has a moderate gradient and a discontinuous channel with irregular bank morphology. The creek is laterally unconfined and significant undercutting occurs at creek bends. The channel depth appears shallow with a silty clay substrate. The channel width averages about three metres.
Ropes Creek	Ropes Creek is an ephemeral first order tributary of South Creek that originates in south-western Sydney near Fairfield and confluences with South Creek	Ropes Creek is a highly modified drainage line transitioning to a laterally confined low gradient channel. The channel was completely dry upon inspection with minimal bank definition. No undercutting is apparent due to vegetation overgrowth and shallow depth.

Watercourse	Watercourse description	Geomorphological description
Hinchinbrook Creek	Hinchinbrook Creek would not be crossed by the Project however the project would drain to this creek. At its closest point to the Project, Hinchinbrook Creek is a fourth order stream	Hinchinbrook Creek is a highly modified drainage line consisting of a series of large disconnected pools. This section of the creek contains an artificial rock wall barrier downstream. The natural substrate consists of silty clays, with isolated sections of channel erosion and bank undercutting occurring at the channel meanders. The channel depth is greater than two metres.

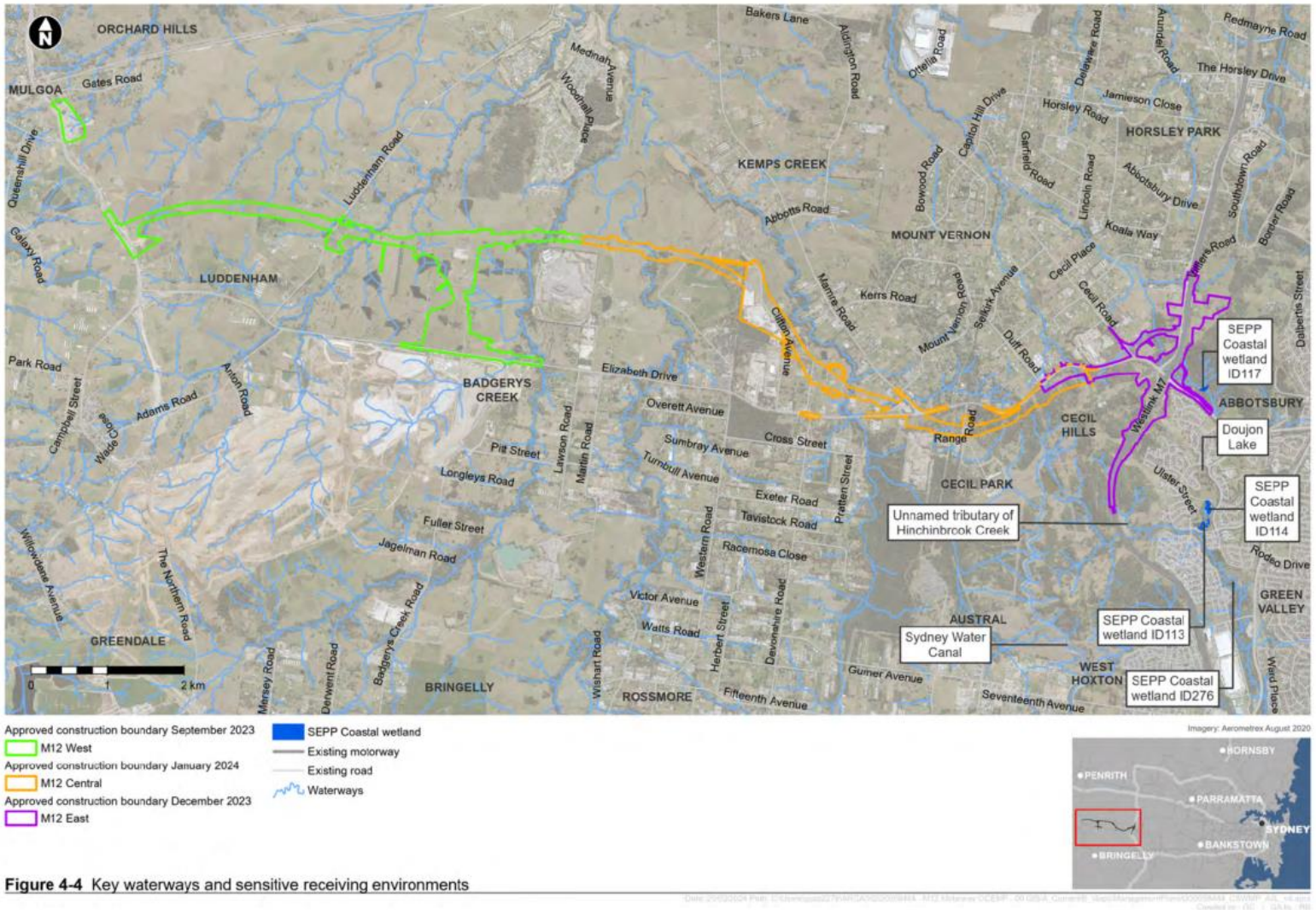

Figure 4-4 Key waterways and sensitive receiving environments

Figure 4-4: Key waterways and sensitive receiving environments

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
- Kemps Creek
- Hinchinbrook Creek
- Unnamed tributary of Hinchinbrook Creek
- Doujon Lake
- State Environmental Planning Policy (SEPP) Coastal Wetlands (ID113 and ID114)
- Hinchinbrook Creek at the downstream SEPP coastal wetland ID276
- SEPP Coastal Wetland ID117.

4.2.4 Surface water quality

Monthly pre-construction surface water baseline monitoring has occurred since April 2019 at twelve surface water sites located upstream and downstream of the Project. These are located in Cosgroves Creek, Badgerys Creek, South Creek, Kemps Creek, Ropes Creek and Hinchinbrook Creek.

The monitoring data confirms that the creeks exhibit poor water quality, primarily due to elevated nutrients, turbidity and some metals. The detailed baseline monitoring locations and results up from April 2019 through to September 2022 is provided in Appendix C.

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, South Creek and Kemps 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 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 of these five bores are inferred to be accessing

Hawkesbury Sandstone groundwater systems. The closest of these five 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 metres BGL to five metres BGL whilst groundwater levels in the Bringelly Shale (including associated overlying residual clay) ranged from about one 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.

Additional consistency assessments were undertaken for a review of design consistency against the EIS for M12 West and M12 Central by WSP (2021) and GHD (2021) respectively.

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.

The M12 Central consistency assessment identified that the groundwater levels in M12 Central range from 41.2 to 49.5 AHD (across boreholes BH622, BH623, BH908, BH909 and BH911).

The Elizabeth Drive Connections Consistency Assessment (WSP, 2023) confirmed potential localised impacts at one location (M12EDC Cut 7) due to widening activities, however, the drawdown impacts were likely to be less than one meter in depth and less than 100m in length.

4.3.3 Groundwater quality

Monthly pre-construction groundwater baseline monitoring has occurred at four boreholes since April 2019. Three boreholes (BH104, BH107 and BH112) are located in M12 West and one 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 collected at BH145 from April 2021 to May 2022 due to the well experiencing insufficient levels of groundwater.BH145 was replaced by BH145R in April 2023 to obtain more reliable data.

The baseline monitoring locations and the detailed baseline results from April 2019 through to March 2022 are provided in Appendix C.

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, South and Kemps 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.

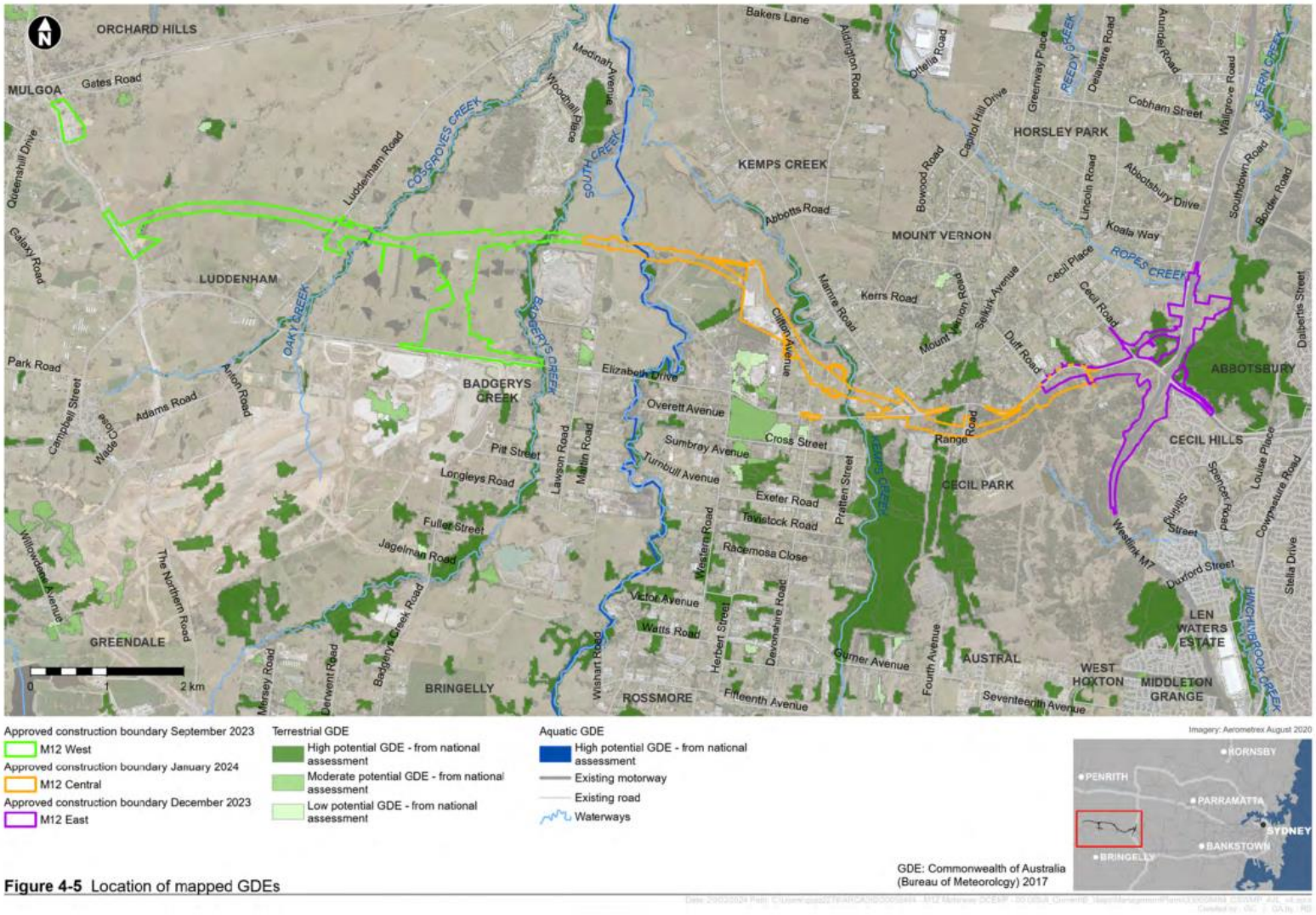

Figure 4-5 Location of mapped GDEs

Figure 4-5: Location of mapped GDEs

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 millimetres. The wettest month is February, with an average rainfall of 98.5 millimetres, while the driest month is July with an average of 23.6 millimetres (BOM, 2018).

Average maximum temperatures at the Badgerys Creek AWS, averaged from 2014 to 2018 are lowest in June at 21.2 degrees Celsius and highest in January at 41.2 degrees Celsius. Average minimum temperatures were lowest in July at 13.7 degrees Celsius, and highest in December at 21.1 degrees Celsius (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 all three stages of 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: M12 design criteria for sizing the temporary sediment basins (sourced from the M12 Central and M12 West 100% Erosion and Sediment Management Reports)

Parameter	Value
Rainfall parameter	
Rainfall depth duration (days)	5 day
Rainfall percentile	85th
Rainfall depth (mm) – 5 day	32.2mm (Blacktown) 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 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
Luddenham Road valley	The Luddenham Road valley catchment is small compared to the catchments of the other waterways. Peak flows tend to occur with short duration, high intensity storms rather than the long duration, saturating storms that produce peak flows in the main waterways. The main flow-path along the valley floor contains numerous farm dams that intercept and capture runoff. If these dams become full during a storm, the dams overflow, and excess runoff bypasses them to their side. Luddenham Road is not raised far above the valley floor so would be susceptible to regular flooding. The peak runoff during the 100-year ARI event is 10 cubic metres per second along a flow-path about 90 metres wide.
Cosgroves Creek	Cosgroves Creek catchment generates a peak 100-year ARI runoff of 80 cubic metres per second along a flow-path about 120 metres wide.
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 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 and work platforms
- 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
- Relocation of services and utilities
- Finishing work and site restoration.

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

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
- Off-site discharge of water containing sediment from dewatering activities
- Groundwater drawdown with the potential to impact upon GDE
- 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.

5.3 Cumulative impacts

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

- M7 Widening
- 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 6.16.

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 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

Temporary erosion and sediment control measures will be installed to protect water quality on the Project. Controls and management measures will be designed (stability, location, type and size), constructed, operated and maintained in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and *Managing Urban Stormwater – Soils and Construction, Volume 2D, Main road construction* (DECC, 2008). Concept ESCPs have been prepared for each stage of the Project and will be provide to the EPA for review as part of the EPL application process.

The Construction Contractors will prepare stage-specific ESCPs, as part of the Construction Contractors' CSWMPs. which will provide details of location, design and maintenance of erosion and sediment control measures The Construction Contractors' ESCPs will be prepared by a suitably qualified person, reviewed by a Contractor Soil Conservationist and implemented prior to commencing activities.

The Construction Contractors will progressively modify and revise the ESCPs 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.

The ESCPs will identify erosion and sediment control risks and describe how these will be addressed during construction. The ESCP 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
- Measures at site access points to minimise mud tracking on roads
- 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
- Measures to be put in place during an extended shut-down of the site or where more than a 50% chance of 10 mm of rainfall or greater is predicted
- 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 ESCPs 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.

6.2 Sediment basin management

Temporary sediment basins will be required throughout the Project during construction. The number, location and size of the sediment basins will be further refined during the detailed design with consideration of the:

- Guidelines in Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
- NSW EPA relevant EPL requirements
- Environmental values of the downstream receiving waterway.

Temporary sediment basins will be cleaned out whenever the accumulated sediment exceeds 60% of 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).

6.3 Saline soils

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

- 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.

6.4 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
- If required, segregate PASS material to avoid cross contaminate with other clean material.

6.5 Stockpile management

Stockpiles will be managed 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 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
- Implementing measures to prevent the growth of weeds in topsoil stockpiles.

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.

Spoil management is addressed in the CWRMP.

6.6 Tannin management

The Construction Contractor will prepare a procedure in accordance with TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch to manage the use and stockpiling of mulch on site and to reduce the risk of tannin leachate from mulch flowing into waterways, and include this within the Construction Contractors’ CSWMPs or ESCP.

6.7 Water abstraction management

The Construction Contractor SWMP or ESCP will describe the proposed water source(s) intended for use for construction activities and obtain approval from relevant authority for the chosen source(s) before commencing abstraction.

The Construction Contractor will not abstract water from waterways or from groundwater without obtaining all required approvals and written approval from TfNSW.

If the proposed source is other than a town water supply or natural water source, the SWMP or ESCP will include procedures for regular testing to ensure that the water is suitable for the purpose and is not hazardous to health and the environment.

The use of reclaimed water will comply with the requirements of TfNSW Environmental Direction 19: Use of Reclaimed Water.

Where water abstraction from local waterway is proposed a qualified aquatic ecologist will be engaged to assess if it is suitable for water abstraction and for when pumping should cease. Any pumps used in natural waterways should be screened with mesh no greater than 5mm.

An Overarching Water Reuse Strategy has been prepared by TfNSW and the Construction Contractor will develop a stage specific water reuse strategy to reduce reliance on potable water. Water reuse is also detailed within the Construction Waste and Resources Management Plan.

6.8 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 Construction Contractors 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.

The Project is subject to EPL/s which will include discharge criteria for licensed discharge points. The specific discharge criteria will be confirmed as part of consultation and confirmation of the stage specific NSW EPA EPL (refer Section 3.4).

The Construction Contractors will prepare a stage-specific Dewatering Management Plan (refer to Appendix D) with a Trigger Action Response Protocol (TARP) to outline disposal options and Water Reuse Strategy (refer to Appendix G) for inclusion in the Construction Contractors stage specific CSWMPs.

Where a flocculant or coagulant other than gypsum is proposed to treat site water, the Construction Contractor 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”.

6.9 Work in waterways

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

- Guidelines for controlled activities on waterfront land - Riparian Corridors (NRAR, 2018)
- Guidelines for watercourse crossings on waterfront land (NSW Office of Water, 2012)
- Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013).

Where work is required within waterways, an EWMS for the work(s) will be prepared. 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 refuelling 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
- 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.

6.10 Temporary waterway crossings

Temporary waterway crossings will be required for the Project. The Construction Contractors will design, construct and maintain temporary waterway crossings and maintain fish passage consistent with the following guidelines:

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

Temporary waterway crossings and erosion and sediment controls will be managed by the Construction Contractor ESR and designed by a suitably qualified and experienced person. The temporary water crossings and erosion and sediment control plan will be reviewed by the Construction Contractors Soil Contractor.

Temporary water 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 on the crossing. All personnel must complete the training outlined in the Blue Book (Landcom, 2004) for erosion and sediment control.

6.11 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 Construction Contractors 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 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. Refuelling will not be undertaken within 50 m of any waterway. Refuelling activities will be supervised at all times.

Plant and vehicle maintenance, including washdown, will be undertaken in designated areas to minimise the potential for offsite discharge and mud tracking.

6.12 Pollution incident response management

Pollution incidents will be managed in accordance with stage specific Pollution Incident Response Management Plan (PIRMP), to be prepared by the Construction Contractors as required by the EPL and included in the Construction Contractors' CEMPs. The PIRMP will be prepared and tested in accordance with *Environmental Guidelines: Preparation of Pollution Incident Response Management Plans* (EPA, 2012).

The Construction Contractors' PIRMPs will include 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 will also set 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.

Further information is provided in Section 5.6.1 of the OCEMP.

6.13 Spill prevention and response

The OCEMP Appendix A7 details the Projects Incident Classification and Reporting Procedure including the incident (including spills) response process (Figure 2-1 of Appendix A7). The Construction Contractor will prepare Spill Response Procedures to minimise the impact of spills and will include details on the requirements for managing, cleaning up and reporting. The Plan may form part of the PIRMP.

Spill kits will be located to allow for timely response to uncontained spills. All spills will be cleaned up and reported if the spill result in an environmental incident. Site inductions will include a briefing on the use of spill kits.

The Construction Contractor will also prepare a procedure(s) for 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
- Application of liquid membranes, including paint and thermoplastic, resin, emulsion, pre-coat 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

The procedure(s) will include the following, as a minimum

- Details of the management of the bunded areas including monitoring of the bunded areas, drainage requirements and measures to ensure that bund capacities are maintained
- Details of the management associated with the removal and transportation of chemical drums from bunded areas
- Routine maintenance requirements of machinery, pumps and other equipment to prevent and/or minimise leaks
- Installation of controls for the capture and filtering of all chemicals that may runoff in storm events, for example wax and hydrocarbon curing compounds, bitumen tack coat and saw cutting material.

6.14 Impacts on water supply

In accordance with NSW CoA E24, properties where modelling in the Environmental Assessment Documentation predicts that the Project will potentially reduce the available stormwater runoff yield to a farm dam, TfNSW will, in consultation with the affected landowner, calculate the nature and extent of impacts on water supply. TfNSW will also determine what measures may be implemented to prevent, mitigate or offset a loss in water supply. For further detail refer to the Construction Flood Management Sub-Plan.

The Construction Contractor will update the stage specific CSWMP and implement the measures agreed by TfNSW with 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.

In the event that TfNSW and the landowner cannot agree on the measures to mitigate the impact, TfNSW shall engage a suitably qualified and experienced independent person to advise and assist in determining appropriate mitigation measures.

6.15 Wet weather preparation and review

Where a wet weather event is predicted, the Construction Contractor 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 >22 mm rainfall occurs in a 24 hour period.

The erosion and sediment control review will be confirmed by the Construction Contractor, and include:

- Inspection of the site to ensure that all erosion/sedimentation and stabilisation controls are in place and in effective working order
- Actions to be taken to prevent any environmental incidents such as potential pollution incidents

- Measures to be implemented to protect disturbed ground from erosion.

Pre-flood response actions as identified in Section 6.1 of the CFMP will begin on receipt of BOM advice, or when other evidence leads to an expectation of flooding.

Following the wet weather event, a post wet weather inspection will be undertaken to review site performance and repair controls as required. Details regarding the timing and responsibilities of all inspections relevant to this Plan are included in Section 7.4.2.

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 6-1.

Table 6-1: Soil and Water management and mitigation measures

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Erosion and sediment control								
SW01	ESCPs must be prepared as part of Construction Contractor SWMPs 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 G38.	ESCP Hold point release	Prior to construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW02	ESCPs 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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
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	Construction Contractor Superintendent / Foreman/Site Supervisor	✓	✓	✓	REMM SWH01 NSW CoA E84

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
SW04	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.	Soil conservation specialist engagement	During construction	TfNSW / Construction Contractor ESR	✓	✓	✓	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	Designers Construction Contractor ESR	✓	✓	✓	NSW 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 • 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.	ESCP Inspection records	During construction	Construction Contractor Superintendent / Foreman/Site Supervisor	✓	✓	✓	REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Sediment basin management								
SW07	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	Designers Construction Contractor ESR	✓	✓	✓	Blue Book
SW08	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	Construction Contractor Superintendent / Foreman/Site Supervisor	✓	✓	✓	TfNSW Specifications
SW09	Provide and maintain suitable access to sediment basins and sediment traps to allow inspection, maintenance, monitoring and cleaning out in all weather conditions.	Detailed design	During construction	Construction Contractor Superintendent / Foreman/Site Supervisor	✓	✓	✓	TfNSW Specifications
SW10	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	Construction Contractor Superintendent / Foreman/Site Supervisor	✓	✓	✓	TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Saline soils								
SW11	Construction within areas of moderate to high risk saline soils will be managed in accordance with the Construction Contractor 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.	Inspection records Monitoring records	During construction	Construction Contractor ESR	✓	✓	✓	REMM SC01 REMM SWH01
Acid sulfate soils								
SW12	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:	Inspection records Monitoring records	During construction	Construction Contractor Superintendent / Foreman / Site Supervisor /ESR	✓	✓	✓	Best practice

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	• 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.							
Stockpile management								
SW13	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. • 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	ESCP Inspection records s143 approved notice	During construction	Construction Contractor Superintendent / Foreman / /Site Supervisor / ESR	✓	✓	✓	TfNSW Specifications REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	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.							
SW14	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	During construction	Construction Contractor Superintendent / Foreman / /Site Supervisor / ESR	✓	✓	✓	REMM SWH04 REMM SHW01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Tannin management								
SW15	Prepare a procedure to manage the use and stockpiling of mulch on site and to reduce the risk of tannin leachate from mulch flowing into waterways, and include this within the SWMP or ESCP. Prepare the procedure in accordance with TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch.	Procedure to manage the use and stockpiling of mulch	Prior to construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications REMM SWH01
Water abstraction								
SW16	The Construction Contractor SWMP or ESCP will describe the proposed water source(s) intended for use for construction activities and obtain approval from relevant authority for the chosen source(s) before commencing extraction. If the proposed source is other than a town water supply or natural water source, the SWMP or ESCP will include procedures for regular testing 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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW17	A Water Reuse Strategy will be developed by the Construction Contractor to reduce reliance on potable water.	Water reuse strategy	Prior to construction	Construction Contractor ESR	✓	✓	✓	REMM SWH03

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Dewatering management								
SW18	A Dewatering Management Plan will be prepared by the Construction Contractor as part of the stage-specific CSWMP which 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.	De-watering Management Plan Training records	Prior to construction	Construction Contractor ESR	✓	✓	✓	REMM SWH01 and SWH11 TfNSW Specifications
SW19	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.	De-watering Management Plan Permit to Discharge	Prior to water discharge	Construction Contractor ESR	✓	✓	✓	NSW CoA E105
SW20	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.	De-watering Management Plan Permit to Discharge	Prior to water discharge	Construction Contractor ESR	✓	✓	✓	REMM SWH01 and SWH11 TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
SW21	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 ESCP.	De-watering Management Plan	Prior to construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW22	Where a flocculant or coagulant other than gypsum is proposed to treat site water, the Construction Contractor 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 construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW23	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	Construction Contractor Superintendent / Foreman /Site Supervisor / ESR	✓	✓	✓	TfNSW Specifications
SW24	Prior to the commencement of dewatering, the Construction Contractor will inspect the entire system, including intakes and outlets, pumping and discharge locations. Wherever possible, the Construction Contractor will supervise any dewatering activities directly. If the Construction Contractor chooses not to directly supervise dewatering, a risk assessment must be carried out and mitigation measures	De-watering management plan	Prior to construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	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.							
SW25	The following records will be kept in relation to dewatering: • Dewatering procedure • 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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
Work in waterways								
SW26	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	EWMS Inspection records	Prior to construction	Construction Contractor Superintendent /	✓	✓	✓	NSW CoA E107

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	watercourse crossings on waterfront land (NSW Office of Water, 2012) and Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013).			Foreman/Site Supervisor / ESR				
SW27	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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW28	The following measures will be carried out to manage activities within watercourses or on waterfront land:	Inspection records	During construction	Construction Contractor ESR	✓	✓	✓	REMM SWH12

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	• 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.							
Temporary waterway crossings								
SW29	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"	EWMS	During construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	• 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 mud tracking on the crossing.							
Refuelling, washdown and chemical storage								
SW30	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	Construction Contractor ESR	✓	✓	✓	REMM HS04
SW31	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	Construction Contractor ESR	✓	✓	✓	REMM HS05 TfNSW Specifications
SW32	SDS must be obtained for dangerous goods and hazardous substances stored onsite before their arrival.	SDS	During construction	Construction Contractor ESR	✓	✓	✓	REMM HS06

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
SW33	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	Construction Contractor ESR	✓	✓	✓	REMM HS07
SW34	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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW35	The Construction Contractor must not 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, without the appropriate temporary bunding being provided. Refuelling operations must be attended.	Refuelling procedure	During construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
Spill prevention and response								
SW36	A spill response procedure will be prepared as part of the Construction Contractor CEMP and 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	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications
SW37	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	Construction Contractor ESR	✓	✓	✓	REMM B20 REMM SWH01 TfNSW Specifications
SW38	The Construction Contractor will prepare a procedure(s) for 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; • 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;	Procedures	Prior to construction	Construction Contractor ESR	✓	✓	✓	TfNSW Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	• Pumping out of oil and grease collection pits; • Decanting operations such as for fuel, chemicals and bitumen.							
Farm dam water supply								
SW39	The Construction Contractor will update the stage specific CSWMP and implement the measures agreed by TfNSW with 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.	Consultation	Prior to any works that may potentially affect the flow of water into farm dams	TfNSW / Construction Contractor	✓	✓	✓	NSW CoA E24
Monitoring/investigation								
SW40	The Construction Contractor will install AWS and rainfall gauges to monitor on site weather conditions in accordance with TfNSW R272.	Weather records / Pre-starts	During construction	Construction Contractor ESR	✓	✓	✓	Blue Book TfNSW Specifications
SW41	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	Construction Contractor ESR	✓	✓	✓	Blue Book TfNSW Specifications
SW42	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	Monitoring records	During construction	TfNSW / Construction Contractor	✓	✓	✓	CoA C17 REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.							REMM SWH05 REMM GW01 TfNSW Specifications
SW43	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.	Additional soil and groundwater investigations	Prior to construction	TfNSW / Construction Contractor	✓	✓	✓	REMM SC05
SW44	Undertake pre and post rainfall event monitoring	Inspection records	Pre, during and post rainfall	Construction Contractor ESR	✓	✓	✓	Best Practice Blue Book
Groundwater								
SW45	Prior to construction commencing, inflows in the first year of construction to M12 EDC Cut 7 will be estimated (including inflow from the base of the cuts) by the construction contractor, to identify if evaporation will mitigate the higher inflows expected early during construction. This measure will utilise the latest maximum observed groundwater levels prior to construction. If evaporation is determined not to be a sufficient mitigation measure, the construction contractor will identify and implement additional mitigation	Inspection records	Prior to construction	Construction Contractor ESR			✓	REMM GW09 M12 Motorway – Elizabeth Drive Connections Consistency Assessment

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Applicability			Reference or source
					M12 West	M12 Central	M12 East	
	measures and these will be documented in the Construction Contractor's Construction Environment Management Plan and Construction Soil and Water Management Plan.							

7 Compliance management

7.1 Roles and responsibilities

The Project organisational structure and overall roles and responsibilities are outlined in Section 5.1 of the OCEMP. Specific responsibilities for the implementation of soil and water management are detailed in Section 6 of this Plan.

7.1.1 Contractor Soil Conservationist

In accordance with REMM SWH02, the Construction Contractors will engage a suitably experienced Contractor Soil Conservation Specialist for the duration of construction of the Project. The Construction Contractor's Soil Conservationist will review and advise on the Construction Contractors' CSWMPs, provide specialised training to relevant site personnel and provide advice on the planning and implementation of erosion and sediment control.

The Construction Contractors will include details of the role, qualifications, responsibilities and contact details of the Construction Contractor's Soil Conservationist in the Construction Contractor stage-specific CSWMP. The Construction Contractors will also identify the critical site activities that require the presence of the Contractor Soil Conservationist in the stage-specific CSWMP.

TfNSW will also engage a Project wide suitably experienced Soil Conservation specialist to provide advice to TfNSW and Construction Contractors.

The Construction Contractor's Soil Conservationist will liaise on a regular basis with the Contractor Soil Conservationist appointed for the Project by TfNSW.

7.2 Training

All employees, Construction 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 overarching CSWMP, the Construction Contractor's stage-specific CSWMP and all plans and procedures prepared under the CSWMPs
- 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 and maintenance
- Sediment basin construction and management
- Dewatering requirements

- 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 refresher training at not less than six monthly intervals. The Contractor Soil Conservationist will provide assistance in training in regard to erosion and sediment control issues.

Daily pre-start meetings conducted by the Construction Contractor 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 5.3 of the OCEMP.

7.3 Communication

The Construction Contractor will adhere to the requirements as outlined in the CCS. The CCS 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 CCS where required.

Further detail about the CCS is provided in Section 5.5 of the OCEMP.

7.4 Monitoring and inspection

7.4.1 Monitoring

An overarching Construction Soil and Water Monitoring Program has been prepared in accordance with CoA C11(b) and C11(c) and is provided in Appendix C.

Monitoring will include, but not be limited to:

- Daily monitoring of site weather conditions using the BOM website and Construction Contractor's onsite AWS
- Monitoring in accordance with the requirements of the Construction Soil and Water Monitoring Program (Appendix C) including monitoring of surface water, groundwater and leachate
- Construction sediment basin water quality prior to discharge (Appendix C)
- 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
- 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 Construction Contractors' ESCPs. The type, timing, frequency, assessment criteria and associated reporting requirements will be detailed in the ESCP.

7.4.2 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the Project. The Construction Contractor Environmental Site Representatives will carry out weekly site inspections. TfNSW will also conduct independent inspections to confirm the Construction Contractors compliance with soil and water management requirements.

Other routine inspections by the TfNSW Senior Environment Officer (or delegate), and the ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 6.1 of the OCEMP.

TfNSW will engage a Contractor Soil Conservationist to conduct regular inspections of the Project during construction. TfNSW Soil Conservationist inspections will typically occur as part of the ER and TfNSW inspections, as required, based on the complexity and anticipated risks associated with the stage of construction. Inspections will be carried out in accordance with the TfNSW inspection procedure.

The Construction Contractors will ensure appropriate environmental site personnel are available to induct, guide and accompany the Contractor Soil Conservationist on the inspections and to promptly rectify any deficiencies raised. The Construction Contractors will advise the TfNSW ESM (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 Construction Contractors 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 one week of inspection.

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	Construction Contractor ESR Construction Contractor Foreman/ Site Supervisor	TfNSW Specifications

Inspection / monitoring	Frequency	Responsibility	Requirement
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	Daily site diary records Weekly erosion and sediment inspections Prior to wet weather event Prior to site shutdown Following rainfall events	Construction Contractor Foreman/ Site Supervisor Construction Contractor ESR TfNSW Senior Environment Officer (or delegate)	TfNSW Specifications Blue Book Section 8.2
Inspection of sediment basins	Monthly	Construction Contractor ESR Construction Contractor Foreman/ Site Supervisor	TfNSW Specifications

7.5 Licences, permits and exemptions

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

7.5.1 Water Access Licence

The Construction Contractors SWMP or ESCP will describe the proposed water source(s) intended for use for construction activities and obtain approval from relevant authority and TfNSW for the chosen source(s) (i.e. creeks) before commencing abstraction.

If the proposed source is other than a town water supply or natural water source, the SWMP or ESCP will include procedures for regular testing 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.

7.5.2 Dredging or reclamation

The Construction Contractor will notify NSW Department of Primary Industries (DPI) Fisheries in accordance with the *Fisheries Management Act 1994* of any dredging or reclamation works (i.e. temporary watercourse crossings). Temporary creek crossings will be required for the construction of bridges at Cosgroves Creek, Badgerys Creek, South Creek and Kemps Creek.

7.6 Weather monitoring

The Construction Contractors 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 Construction Contractors 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 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.

7.7 Auditing

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

Audit requirements are detailed in Section 6.2.1 of the OCEMP.

7.8 Reporting

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

The Construction Contractors will be required to maintain accurate records substantiating all construction activities associated with the Project or relevant to the CoA, including measures taken to implement this CSWMP.

Table 7-2: Reporting requirements relevant to soil and water

Report	Frequency	Recipient	Responsibility	Reference
Construction Soil and Water Monitoring Results	Quarterly	Planning Secretary	Construction Contractor / TfNSW	NSW CoA C18
Soil Conservationist Inspection Report	As required, within 5 working days of inspection	TfNSW	Construction Contractor	REMM SWH02
Wet Weather Preparation Inspection Reports	Following rainfall events exceeding 10mm	TfNSW	Construction Contractor ESR	TfNSW specification G36
Monthly Environmental Reporting	Monthly	TfNSW	Construction Contractor ESR	TfNSW specification G36
Incident and Non-compliance Reports	At each occurrence	Appropriate authority dependant on nature of the incident (e.g. EPA, DPHI) (see Section 6 and Section 7 of the OCEMP)	Construction Contractor ESR	NSW CoA A44, A45 and A46 Commonwealth COA 11 and 12

Report	Frequency	Recipient	Responsibility	Reference
Construction Phase Watercourse Geomorphological Condition Report (M12 East only)	Annually	WSPT	TfNSW	M12 EDC CA

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 Construction Contractor 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 4.1 of the OCEMP.

8.2 Review by the Contractor Soil Conservationist

The Construction Contractors CSWMPs will be reviewed by a suitably qualified Contractor Soil Conservationist, as outlined in Section 7.1.1. The Construction Contractors will respond to the Contractor Soil Conservationist's review and incorporate any recommendations or justify decisions for not incorporating recommendations.

All erosion, sediment and water pollution plans, controls and measures will also be reviewed by the Construction Contractor's Soil Conservationist prior to installation.

8.3 CSWMP update and amendment

The processes described in Section 6.6 of the OCEMP 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 1.6.2 and Section 6.6 of the OCEMP.

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 6.4.2 of the OCEMP.

Appendix A – Consultation correspondence

Appendix A

Consultation Correspondence

M12 Motorway

June 2024

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1 Introduction

As detailed in Section 1.5 of the CSWMP, in accordance with NSW CoA C4(e), C7, C11(b) and C11(c), consultation has been undertaken with the following government agencies and stakeholders during the preparation of the CSWMP and Construction Soil and Water Monitoring Program:

- DPE Water
- Water NSW
- Sydney Water (where 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).

A log of the dates of engagement or attempted engagement with the parties identified above has been included in Section 1.5.1 of the CSWMP in accordance with NSW CoA A5(b). Section 2 details the evidence of engagement with each party and responses.

2 Government Agency and Stakeholder Responses

This section provides consultation documentation undertaken during the consultation period with parties including:

- Engagement with parties identified in NSW CoA C4(e), C7, C11(b) and C11(c) that occurred prior to the submission of the CSWMP and Construction Soil and Water Monitoring Program for approval by the Planning Secretary as required by NSW CoA A5(a)
- A copy of the responses provided during consultation with the required parties
- A summary of the issues raised during consultation and how they have been addressed as required by NSW CoA A5(d). A description of the outstanding issues raised during consultation and why they have not been addressed has also been included where required as per NSW CoA A5(e).

2.1 DPE Water (NRAR)

Section 2.1 details the engagement and response from NRAR regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 1: NRAR comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	No comments provided.	No further comment required.	N/A

2.2 Water NSW

Section 2.2 details the engagement and response from Water NSW regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 2: Water NSW comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	Thank you for allowing WaterNSW the opportunity to provide comment on the draft M12 Motorway Overarching Construction Soil and Water Management Plan (SWMP). WaterNSW's interest lie in adequate soil and water management near its lands and assets. As such, Water NSW has concentrated its review on works related to the M12 East sector only. Water NSW has reviewed the plan and agrees that it include strategies to address soil and water management during the construction phase of the project, and has no particular comments to make. It is noted that details SWMP plans will be prepared by the construction contractor (per sector). Water NSW would be interested to see the M12 East SWMP prepare by the successful contractor.	Water NSW will be provided the Construction Contractor CEMP and associated documentation if required.	N/A

2.3 Sydney Water

Section 2.3 details the engagement and response from Sydney Water regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 3: Sydney Water comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	Thank you for including Sydney Water. Our stakeholders reviewed the document and noted management measures appear to be consistent with our approach. However, we do not have comments to provide specifically.	No further comment required.	N/A

2.4 Penrith City Council

Section 2.4 details the engagement and response from PCC regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 4: PCC comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	No comments provided.	No further comment required.	N/A

2.5 Liverpool City Council

Section 2.5 details the engagement and response from LCC regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 5: LCC comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	No comments were provided.	No further comment required.	N/A

2.6 Fairfield City Council

Section 2.6 details the engagement and response from FCC regarding the CSWMP prior to submission for approval and a summary of how the issues have been addressed.

Table 6: FCC comments and TfNSW response

Section of comment	Comments	TfNSW Response	Section Amended
N/A	No issues raised, the SWMP is satisfied.	No further comment required.	N/A

Appendix B – Secondary CoA and REMMs

Appendix B

Secondary CoAs and REMMs

M12 Motorway

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CoA

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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**	✓	✓	✓	Appendix A Section 1.5 of Appendix C
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.	✓	✓	✓	Appendix A
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;	✓	✓	✓	Appendix C

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
	(k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Condition C14				
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.	✓	✓	✓	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.	✓	✓	✓	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.	✓	✓	✓	Appendix C
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. *Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.*	✓	✓	✓	Appendix C
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 6.14 Section 6.16 CFMP
	(a) calculate the nature and extent of impacts on water supply;				

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
	(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 6.1
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.	✓	✓	✓	

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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 Section 6
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	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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 6.9
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 1.5.2 **(Note: Only DPI Fisheries is required to be consulted with for temporary crossings)** **EES and DPI Fisheries have been consulted for permanent crossings during detailed design for M12 West and Central. M12 East will be undertaken as design progresses.**

REMMs

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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 6.13
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
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 6.7 CWRMP
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	During construction	✓	✓	✓	Section 6.5

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	• Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required.					
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	Prior to construction and during construction and operation	✓	✓	✓	Appendix C

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	discharge points, visual monitoring of other points of release of construction waters and monitoring of downstream waterways.					
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 6.8 Appendix D
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 6.9
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	Prior to construction and during construction	✓	✓	✓	Appendix C

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	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.					
GW04	Groundwater will be monitored at the airport interchange northern cut (Cut 6), airport interchange southern cut (Cut 2-AAR), the western cut (Cut 2), Cut 1, Cut 3, Cut 4, Cut 5, Cut 7 and Cut 1-AAR during the construction phase and operational phase as outlined in Table 7-1 in the groundwater supplementary technical memorandum (Appendix J) and the M12 Motorway - West Package Detailed Design Consistency Assessment Memo. The groundwater indicators to be monitored will be as per Section 7.2.5 of Appendix N of the EIS. Groundwater inflows to Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2 AAR are to be observed by the groundwater monitoring contractor during the construction and operational phases at monthly intervals. As part of observing at the identified cuts, the groundwater inflows, the groundwater monitoring contractor is to estimate the groundwater inflow rates and note the areas where groundwater inflow is occurring.	During construction and operation	✓			Appendix C

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	During construction, if groundwater inflows are observed from the cuts identified through the detailed design of the M12 Motorway - West Package including Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2 AAR, the groundwater quality from the cut is to be sampled. Operational phase groundwater quality sampling, including the quality sampling of Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2 AAR inflows, is to occur at a monthly interval for at least 6 months.					
GW05	Monitoring for M12 Motorway – Central package Groundwater quality, levels and inflows will be monitored at Clifton Avenue (Cut 9) during construction and operation as outlined in the M12 Central consistency assessment report (GHD, 2021) The groundwater indicators to be monitored will be as Section 7.2.5 of Appendix N of the EIS. Groundwater inflows are to be monitored at monthly intervals. As part of observing inflows at identified cuts, the groundwater inflow rate is to be estimated and the areas where groundwater inflow is occurring noted. During construction, if groundwater inflow rates are observed from the cuts identified through the detailed design of the M12 Motorway – Central package including Cut 9, the groundwater quality from the cut is to be sampled. Operational phase groundwater quality sampling, including the quality sampling of Cut 9 inflows, is to occur at monthly intervals for at least 6 months	During construction and operation		✓		Appendix C

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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). The results of the estimated groundwater inflows will be assessed in order to confirm whether evaporation will be sufficient to mitigate the potentially higher inflows likely to be expected early during construction. 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	✓	✓		Appendix 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	Prior to construction		✓		Appendix C

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	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. 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 Central 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.					
GW08	During construction, the construction contractor will visually monitor groundwater inflows during utility crossing excavations to ensure that inflows can be appropriately managed in accordance with Stage-specific Construction Soil and Water Management Plan. If groundwater inflows cannot be managed in accordance with the Stage-specific Construction Soil and Water Management Plan, works will stop in the affected Utility Crossing and the construction methodology would be reviewed.	During construction	✓	✓		Appendix C The M12 Sydney Water Crossings Consistency Assessment

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
GW09	M12 Motorway - Elizabeth Drive Connection Prior to construction commencing, inflows within the first year of construction to Cut 7 will be estimated (including inflow from the base of the cuts) by the construction contractor, to identify if evaporation will mitigate the higher inflows expected early during construction (not estimated during the Amendment Report). This measure will utilise the latest maximum observed groundwater levels prior to construction. 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 Construction Environment Management Plan and Construction Soil and Water Management Plan.	Prior to construction and during construction			✓	Section 6.16 The Elizabeth Drive Connections Detailed Design Consistency Assessment
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.	Prior to construction and during construction	✓	✓	✓	Section 6.3

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	• Soil salinity management will also be carried out in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook.					
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	Detailed site (contamination) investigations will be carried out in accordance with the NSW EPA (1995) Sampling Design Guidelines and other NSW EPA endorsed guidance including the NEPM (2013) guidelines within the following AEI locations to confirm the presence of contamination before the start of construction at these locations: • AEI 17: Stockpiles within Hi-quality Quarry Group Head Office • Within AEI 19: the area of miscellaneous construction activities and stockpiles of building materials along Luddenham Road (Lot 1, DP228498) • Within AEI 7: Area of waste and imported fill • Within AEI 21: Area of illegally dumped material along Range Road, Cecil Park • Within AEI 24: Stockpiles within the OzSource property • Within AEI 26: TreeServe (wood processing, stockpiles of woodchips, logs and fire wood)	Prior to construction	✓	✓	✓	Section 6.16

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	• Within the 'potential areas of existing fill' identified in the Soils and contamination assessment report (Appendix K) for the amended project of the amendment report. Further soil investigations will be required in areas of the refined construction footprint located adjacent to the following two AEIs to confirm the presence of contamination before the start of construction at these locations: • Within AEI 6: PGH Bricks and Pavers • Within AEI 9: Sydney Recycling Park/ Wanless Recycling and Former Kari & Ghossayn Pty Ltd (Solid Waste Landfill) • AEI 10: SUEZ Kemps Creek Resource Recovery Park. 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. Depending on results of the investigations, or if remediation is deemed required at any site within the refined construction footprint, a Remedial Action Plan will be prepared before the construction.					
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

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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 6.11
HS05	Secure, bunded areas will be provided around storage areas for oils, fuels and other hazardous liquids.	During construction	✓	✓	✓	Section 6.11
HS06	Safety Data Sheets will be obtained for dangerous goods and hazardous substances stored onsite before their arrival.	During construction	✓	✓	✓	Section 6.11
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 6.11

Appendix C – Construction Soil and Water Quality Monitoring Program

Appendix C

Construction Soil and Water Monitoring Program

M12 Motorway

June 2024

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Document control

File Name	M12PPW-ADAP-ALL-EN-0000024_M_S3_CSWMP_AppC
Title	M12 Motorway OCEMP Construction Soil and Water Management Sub-plan Appendix C – Construction Soil and Water Monitoring Program
Document Number (Teambinder)	M12PPW-ADAP-ALL-EN-PLN000024

Approval and authorisation

Plan reviewed by:	Plan reviewed by:
Tracey Austin	Deanne Forest
TfNSW Environment and Sustainability Manager	TfNSW Project Director, M12
Date 28.06.2024	Date 28/06/2024
Sign [redacted]	Signed [redacted]

Revision history

Revision	Date	Description
A	14/10/2020	First draft for TfNSW review
B	3/11/2020	Response to TfNSW comments
C	24/11/2020	Response to TfNSW comments
D	06/08/2021	Updated with Final NSW and Commonwealth CoA
E	08/09/2021	Response to ER and TfNSW comments
F	18/11/2021	Response to comments received during consultation
G	10/12/2021	Updated in response to DPIE review
H	17/12/2022	Additional design changes updates
I	13/02/2023	Response to TfNSW comments
J	20/03/2023	Response to ER comments
K	18/01/2024	Updated to reflect additional CAs

L	09/04/24	Response to TfNSW, ER and Construction Contractor comments
M	05/06/2024	Response to TfNSW, ER and Construction Contractor comments

Contents

Tables

Figures

Glossary/ 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
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
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan

Abbreviations	Expanded text
ESM	Transport for New South Wales Environment and Sustainability Manager
ESR	Construction Contractor Environmental Site Representative
EWMS	Environmental Work Method Statement
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
RAP	Remedial Action Plan
REMM	Revised Environmental Management Measures
ROP	Ropes Creek
SOP	Standard operating procedures
SOU	South Creek

Abbreviations	Expanded text
SRP	Soluble Reactive Phosphorus
SWL	Standing Water Level
TDS	Total dissolved solids
TfNSW	Transport for NSW
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
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 separate construction contracts:

- M12 West – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek
- M12 Central (main construction) – between about 250 metres east of Badgerys Creek and the Western Sydney Parklands at Duff Road, Cecil Park.
- M12 Central (Temporary Roundabout) – temporary roundabout installation at Elizabeth Drive and Devonshire Road, Kemps Creek
- M12 East – (as part of the M7/M12 Integration Project)
    - Elizabeth Drive Connections (EDC) – a two-kilometre section from Duff Road to about 300 metres east of the M7 Motorway
    - M7/M12 Interchange – An interchange between the M12 Motorway and M7 Motorway and tie-in works for approximately four kilometres on the M7 Motorway

1.2 Purpose and scope

This overarching Construction Soil and Water Monitoring Program (CSW-Monitoring Program) has been developed to satisfy NSW Condition of Approval (CoA) C11(b), C11(c) and Revised Environmental Management Measures (REMMs) SWH05 and GW01. It describes soil, surface water, and groundwater monitoring activities to be undertaken for the Project.

The purpose of this CSW-Monitoring Program is to:

- Provide procedures to monitor soil, surface water and groundwater impacts during construction of the Project
- 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 CSW-Monitoring Program is 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).

The SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered in the preparation of this CSW-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. Following this, TfNSW appointed consultants will be appointed for the construction and operational stages of the Project to address monitoring and reporting requirements identified in the Plan. This CSW-Monitoring Program is to be implemented for the duration of construction.

The Construction Contractors have developed stage specific CSW-Monitoring Programs to address specific requirements in accordance with this overarching CSW-Monitoring Program. The Construction Contractors' CSW-Monitoring Program does not include the monitoring covered by the separate TfNSW appointed consultants undertaking the surface and groundwater receiving water monitoring. The M12 East Construction Contractor will also undertake supplementary receiving water quality monitoring during construction, due to the M12 East stage being integrated with the M7 Widening project.

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	Construction Contractor
Climate and weather monitoring	Construction Contractor
Receiving surface water quality monitoring - construction	M12E Construction Contractor

The TfNSW appointed consultant will undertake routine receiving surface water (Section 4.1) and groundwater monitoring (Section 4.2). Receiving surface water and groundwater data collected by the TfNSW appointed consultant will be provided to the Construction Contractors, who will be responsible for implementing any actions required in response to any exceedances identified in the TfNSW appointed consultant monitoring results. The Construction Contractors 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.

The Construction Contractors' responsibilities under this CSW-Monitoring Program include monitoring of water discharges (Section 4.3) and climate data (Section 4.4). The Contractors' Construction Managers are also responsible for ensuring that EPL conditions relevant to the discharge of water are met.

1.4 Approval, review and modification

In accordance with NSW CoA C15, this CSW-Monitoring Program will be endorsed by the ER and submitted to the Secretary for approval at least one month before commencement of construction. In accordance with NSW CoA C16, unless otherwise agreed with the Planning Secretary, construction will not commence until the Secretary has approved the required CSW-Monitoring Program and the baseline data has been collected. In accordance with NSW CoA C17, the CSW-Monitoring Program will be implemented for the duration of construction and for any longer period set out in this CSW-Monitoring Program or specified by the Secretary, whichever is the greater. The duration of the receiving surface water and groundwater monitoring is identified in Section 1.2.

This CSW-Monitoring Program will be reviewed annually by TfNSW in consultation with the Construction Contractors. Minor amendments to this CSW-Monitoring Program may be approved by the ER. Any amendments to the CSW-Monitoring Program will be documented in subsequent revisions of this CSW-Monitoring Program. A copy of the updated CSW-Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the Construction Contractors' Construction Environmental Management Plans. Site personnel and sub-contractors with responsibilities relevant to water, soil and contamination monitoring will be informed of any amendments to the CSW-Monitoring Program and training provided where required.

TfNSW will review the Construction Contractors' management plans to confirm consistency with the requirements of this CSW-Monitoring Program and TfNSW specifications.

1.5 Consultation

The following government agencies and stakeholders will be consulted with during the development of this CSW-Monitoring Program in accordance with NSW CoA C11(b), C11(c) and C12:

- DPE Water
- Sydney Water (if there are any discharges to their assets)
- Penrith City Council (PCC)
- Liverpool City Council (LCC)
- Fairfield City Council (FCC).

In accordance with NSW CoA A5 and CoA C12, where a CoA requires consultation with identified parties, details of the consultation undertaken, matters raised by the parties, and how the matters were considered will be documented. The evidence of the consultation undertaken for the preparation of this CSW-Monitoring Program is provided in Appendix A of the CSWMP.

2 Environmental Requirements

2.1 Minister's Conditions of approval

The NSW CoA relevant to this CSW-Monitoring Program and their applicability to each stage of the Project 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	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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 Appendix A
	(b) Surface Water Monitoring Program - DPE Water, Sydney Water (if there are any discharges to their assets), relevant councils	✓	✓	✓	
	(c) Groundwater Monitoring Program - DPE 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 Appendix A
C13	Each Construction Monitoring Program must provide: (a) details of baseline data available	✓	✓	✓	Section 5

CoA No.	Condition Requirement	Applicability			Document reference
		M12 West	M12 Central	M12 East	
					Annexure 1 Annexure 2
	(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 3 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 4.5
	(j) a consideration of SMART principles	✓	✓	✓	Section 1.2 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	Applicability			Document reference
		M12 West	M12 Central	M12 East	
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 1.2 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 and their applicability to each stage of the Project 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	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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	Prior to construction and during construction and operation	✓	✓	✓	This CSW-Monitoring Program Section 4.5 Section 5.1 Section 1.2 Section 3.1 Section 4.1 Section 5.1 Section 3.3 Appendix D

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	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.					
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	✓	✓	✓	This CSW-Monitoring Program Section 3.2 Section 4.2 Section 4.2 Section 5.2 Section 6.2 Operational water 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	During construction and operation	✓			Section 3.2 Section 4.2 Section 4.2

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	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. Operational phase groundwater quality sampling, including the quality sampling of Cut 9 inflows, is to occur at monthly intervals for at least six months.					Section 4.2 Operational document
GW05	Monitoring for M12 Motorway – Central package Groundwater quality, levels and inflows will be monitored at Clifton Avenue (Cut 9) during construction and operation as outlined in the M12 Central consistency assessment report (GHD, 2021) The groundwater indicators to be monitored will be as Section 7.2.5 of Appendix N of the EIS. Groundwater inflows are to be monitored at monthly intervals. As part of observing inflows at identified cuts, the groundwater inflow rate is to be estimated and the areas where groundwater inflow is occurring noted. During construction, if groundwater inflow rates are observed from the cuts identified through the detailed design of the M12 Motorway – Central package including Cut 9, the groundwater quality from the cut is to be sampled.	During construction and operation		✓		Section 4.2

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	Operational phase groundwater quality sampling, including the quality sampling of Cut 9 inflows, is to occur at monthly intervals for at least 6 months					
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). The results of the estimated groundwater inflows will be assessed in order to confirm whether evaporation will be sufficient to mitigate the potentially higher inflows likely to be expected early during construction. 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

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
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. 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 Central 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		✓		Section 4.2
GW08	During construction, the construction contractor will visually monitor groundwater inflows during utility crossing excavations to ensure that inflows can be appropriately managed in accordance with Stage-specific Construction Soil and Water Management Plan. If groundwater inflows cannot be managed in accordance with the Stage-specific Construction Soil and Water Management Plan, works	During construction	✓	✓	-	Section 4.2

ID	Revised environmental management measure	Timing	Applicability			Document Reference
			M12 West	M12 Central	M12 East	
	will stop in the affected Utility Crossing and the construction methodology would be reviewed.					
GW09	M12 Motorway - Elizabeth Drive Connection Prior to construction commencing, inflows within the first year of construction to Cut 7 will be estimated (including inflow from the base of the cuts) by the construction contractor, to identify if evaporation will mitigate the higher inflows expected early during construction (not estimated during the Amendment Report). This measure will utilise the latest maximum observed groundwater levels prior to construction. 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 Construction Environment Management Plan and Construction Soil and Water Management Plan.	Prior to construction and during construction			✓	The Elizabeth Drive Connections Detailed Design Consistency Assessment

2.3 Environmental Protection Licence

The Project is subject to EPL/s as a Scheduled Activity for ‘road construction’. The EPL/s typically prescribe 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)).

3 Monitoring criteria

3.1 Receiving surface water

Pre-construction surface water quality to date has been assessed against the following criteria:

- Australian and New Zealand Environment Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) water quality guidelines (2000, updated in 2018) including;
  - Trigger values for south-eastern Australian lowland river ecosystems
  - Stock watering criteria where lowland river criteria is not present
- National Health and Medical Research Council (NHMRC) & Natural Resource Management Ministerial Council (NRMMC) (2011, v3.6 updated in 2021) criteria, including:
  - Australian Drinking Water Guidelines (ADWG) value for protective of human health.
- Australia New Zealand Guidelines (ANZG) (2018) Freshwater – 95% level of species protection (slightly to moderately disturbed systems) criteria
- PFAS National Environmental Management Plan (NEMP) (HEPA, 2013) criteria, including:
  - Recreational species protection criteria
  - Drinking water criteria
  - 95% species protection criteria for slightly to moderately disturbed systems.

The default values are used in the absence of local data for a particular watercourse.

Pre-construction surface water baseline monitoring (further described in Section 5.1) for the waterbodies and waterways within the Project area has enabled the identification of site specific trigger values. The site-specific surface water trigger values are provided in Annexure 1 of this CSW-Monitoring Program. The surface water monitoring locations are identified in Section 4.1 and shown on Figure 4-1.

Data collected during the construction and operational phases of the Project will be compared to the site-specific trigger values derived from the baseline data to assist in determining whether construction and operation is impacting receiving surface waters.

3.2 Groundwater

3.2.1 Groundwater quality

Groundwater quality will be compared to:

- ANZECC and (ARMCANZ) water quality guidelines (2000, updated in 2018) including;
  - Trigger values for south-eastern Australian lowland river ecosystems
- ANZG (2018) Freshwater – 95% level of species protection (slightly to moderately disturbed systems) criteria

- National Environmental Protection (Assessment of Site Contamination) Amendment Measure (NEPM) National Environment Protection Council (NEPC) (NEPC, 2013), including:
    - Health screening levels (HSL) for petroleum hydrocarbons for commercial/industrial land use (HSL D)
- NHMRC and NRMMC (2011, v3.6 updated in 2021), including:
    - ADWG as the screening criteria protective of human health.

The listed criteria values for the parameters monitored are as presented in Annexure 2.

Pre-construction groundwater baseline monitoring (further described in Section 5.2) has enabled the identification of site specific trigger values, which have are provided in Annexure 2 of this CSW-Monitoring Program. The groundwater monitoring locations are identified in Section 4.2 and shown on Figure 4-2.

Data collected during the construction and operational phases of the Project will be compared to the site-specific trigger values derived from the baseline data to assist in determining whether construction and operation is impacting receiving surface waters.

3.2.2 Groundwater level

The M12 Environmental Assessment Documentation assessed potential groundwater impacts and identified that impacts meet the minimal impact considerations outlined in the NSW Aquifer Interference Policy (AIP). The AIP includes consideration of water table and water pressure.

Groundwater level will be monitored during construction to review compliance with the assessment during the environmental assessment. This includes monitoring to validate that the Project will satisfy:

- Less than or equal to 10 per cent cumulative variation in the water table (allowing for typical climatic “post-water sharing plan” variations)
- A cumulative pressure head decline of not more than a two metre decline.

3.3 Site discharge

A separate EPL will be obtained for each Project stage. The EPL prescribes the water quality parameters for the purposes of the monitoring and the setting of limits for discharges of pollutants to water for each Project stage. It will also detail the monitoring and analytical requirements.

The approved discharge criteria will be confirmed in the Construction Contractor’s management plans and Dewatering Management Plan (Appendix D), once the EPLs have been obtained from the EPA.

3.4 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 B8 of the OCEMP)).

Criteria for the classification and disposal of soil are provided in the Construction Waste and Resource Management Plan (CWRMP) (Appendix B7 of the OCEMP).

4 Monitoring methodology and procedures

4.1 Receiving surface water quality

4.1.1 Routine sampling

Surface water sites across the Project area have been sampled by the TfNSW appointed consultant on a monthly basis since April 2019 to establish baseline conditions for the receiving waters in the vicinity of the Project. The sites were selected on the basis of having persistent water flow and at locations upstream and downstream of receiving waterways that might be impacted by the construction activities. Refer Section 4.1.3 for further description of the surface water monitoring sites.

Ongoing monitoring of the sites will be carried out monthly during construction to detect any changes in water quality compared to baseline conditions that might be attributable to Project activities. Further discussion on baseline conditions is provided in Section 5.1 and Annexure 1.

Groundwater monitoring will also continue for Cut 2, Cut 4, Cut 5, Cut 6, Cut 7 and Cut 2-AAR inflows for at least six months during operation to verify there are no groundwater impacts and management measures are adequate. This will be recorded in the operational water monitoring program.

4.1.2 Wet weather sampling

In addition to routine sampling, wet weather sampling is being undertaken by the TfNSW appointed consultant during the pre-construction and construction phases in accordance with the Guideline for Construction Water Quality Monitoring (RTA 2004). Data from wet weather samples will demonstrate the variability in pollutant concentrations at each of the sample sites under wet weather conditions. During construction, this data will assist in providing an assessment of the impacts of the road construction on adjacent waterways and also the effectiveness of construction mitigation measures.

Wet weather sampling events are defined as 22 millimetres or more of rain within 24 hours recorded at the Badgerys Creek AWS Bureau of Meteorology (BoM) gauge (#067108). The trigger is designed to capture one wet weather sampling event per 6-month period. Sampling will occur within the following 24 hours of the rain event. If rainfall events are regularly less than 22 millimetres, opportunistic wet weather monitoring would be undertaken to ensure that some wet weather data is collected.

4.1.3 Sampling locations

The Project surface water monitoring sites are listed in Table 4-1 and their locations shown on Figure 4-1. Monitoring locations will be reviewed throughout construction. It is anticipated that once TfNSW take possession of land and have improved access, refined monitoring locations may be proposed which are closer to the Project alignment. Locations will be reviewed with the intention of identifying sites that most accurately identify water quality changes due to the Project itself, rather than external influences in the catchment (especially in downstream samples). Monitoring locations and changes to the number of locations may also be refined based on monitoring results and adaptive management outcomes (refer to Section 4.5).

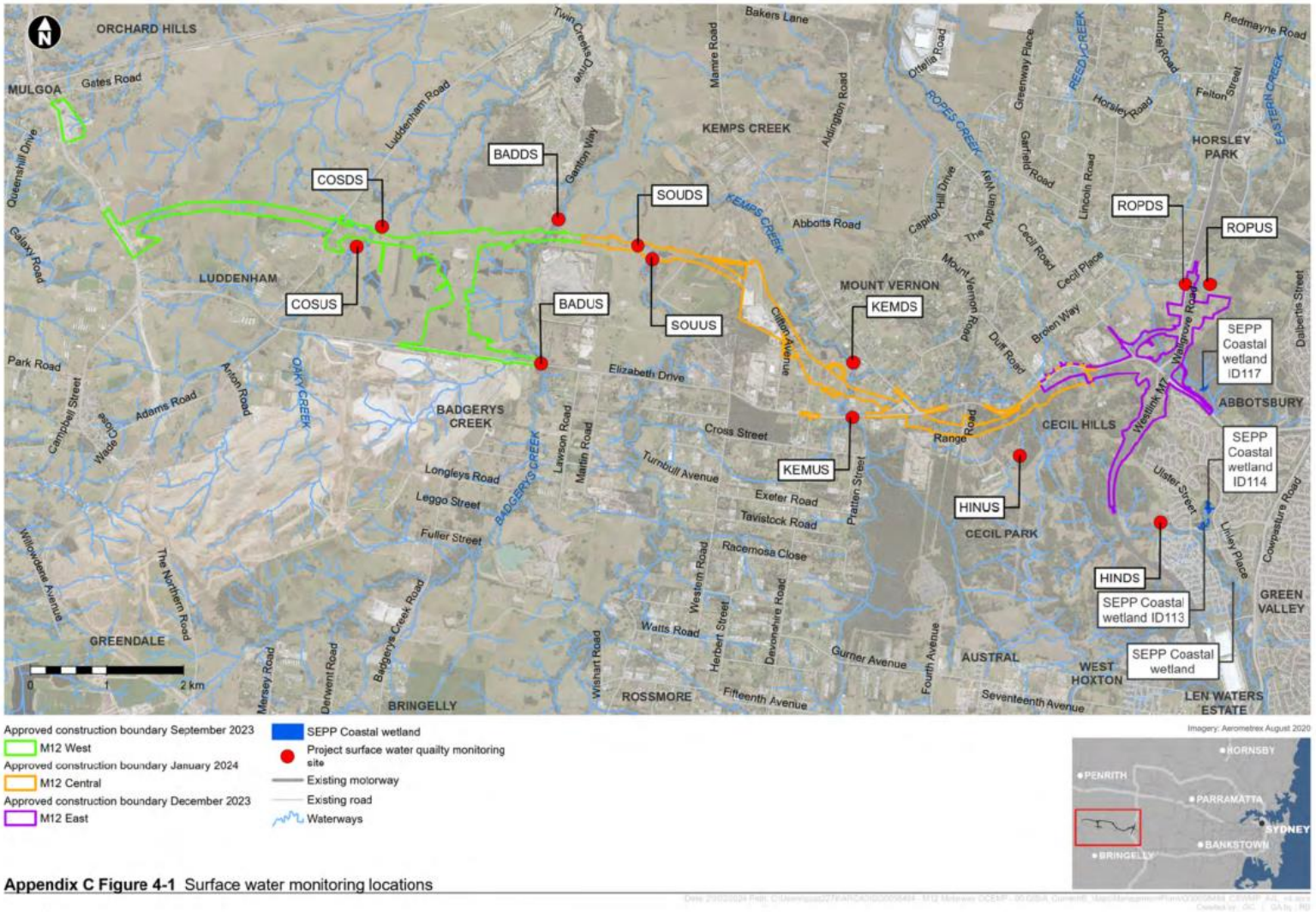
Any changes to individual monitoring locations and / or number of monitoring locations will be approved by the ER, undertaken in accordance with the EPL and identified in future revisions of the CSWMP.

It should be noted, the monitoring sample location of HINUS (upstream) is usually a dry creek bed and does not appear connected to HINDS (downstream). While the ponds are likely to be connected during or following rainfall, they can be observed as a series of standalone ponds during dry periods.

The location of HINUS on Figure 4-1, has been moved adjacent to the creek bed as the run-off during rainfall events is considered similar to other tributaries in M12 East and therefore is a preferred location for monitoring.

Table 4-1: Surface water monitoring locations

Site ID	Watercourse	Coordinates	Description and location details	Project Stage
COSUS	Cosgroves Creek	289921E 6251091N	Upstream of motorway alignment	M12 West
COSDS	Cosgroves Creek	290257E 6251358N	Downstream of motorway alignment	M12 West
BADUS	Badgerys Creek	292335E 6249567N	Upstream of motorway alignment	M12 West
BADDS	Badgerys Creek	292568E 6251452N	Downstream of motorway alignment	M12 West
SOUUS	South Creek	293796E 6250930N	Upstream of motorway alignment	M12 Central
SOUDS	South Creek	293604E 6251106N	Downstream of motorway alignment	M12 Central
KEMUS	Kemps Creek	296413E 6248857N	Upstream of motorway alignment	M12 Central
KEMDS	Kemps Creek	296422E 6249580N	Downstream of motorway alignment	M12 Central
ROPUS	Ropes Creek	301094E 6250602N	Upstream of motorway alignment	M12 East
ROPDS	Ropes Creek	300773E 6250601N	Downstream of motorway alignment	M12 East
HINUS	Hinchinbrook Creek	298606E 6248359N	Upstream of motorway alignment	M12 East
HINDS	Hinchinbrook Creek	300448E 6247491N	Downstream of motorway alignment	M12 East



Appendix C Figure 4-1 Surface water monitoring locations

Figure 4-1: Surface water monitoring locations

4.1.4 Sampling methodology

Field data and laboratory analysis data are managed by the TfNSW appointed consultant using water quality data management software.

Water quality sampling 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).
- TfNSW appointed consultant standard operating procedures (SOP) for surface water quality sampling, which complies with procedures detailed in the ANZECC & ARMCANZ (2000) guidelines and the NSW EPA's Approved Methods for the Sampling and Interpretation of Results of Water Pollutants (NSW EPA, 2004).

In situ water quality parameters will be recorded and grab samples collected from each site for laboratory analysis.

In situ water quality measurement

In situ field measurements of water quality are taken at all sites during each monthly site visit by the TfNSW appointed consultant. Physio-chemical measurements are 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).

Relevant site descriptions and notes are taken for each site and visual observations made of:

- Visual oil and grease
- Occurrence of algal scum
- Streamflow
- Water clarity
- Water colour, odour and any other notable observations.

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

Surface Water Sampling

Grab samples are collected near the in-situ monitoring point to ensure representative sampling. At each site, several sub-samples are taken from 100 - 200 mm depth below the surface using a long-handled sampling pole and bottle. The sub-samples are combined in a bucket to form a

‘composite’ sample from which the sample bottles for analyses are filled. The bucket and the sampling bottle are washed between sampling sites to prevent cross contamination.

Water quality samples are transported in ice in an esky to a National Association of Testing Authorities (NATA) accredited laboratory, under Chain of Custody (CoC) requirements. Samples are analysed for the following:

- Microbiological public health indicator: Thermotolerant Coliforms
- Water quality indicators:
  - TSS (sediment runoff indicator)
  - Nutrients (NH_3, NO_2, NO_3, TKN, TN, TP, SRP (Soluble Reactive Phosphorus) (nutrient indicators that are attributable to runoff impacts)
  - Chlorophyll-a (algal indicator; algae proliferate in water if enriched by nutrients)
  - Oil and grease (associated with runoff from construction activities related to roads)
- Major urban pollutants: including ultra-trace Polychlorinated Biphenyls (PCBs); organochlorine (OC) and organo-phosphorus (OP) pesticides; fumigants; halogenated aliphatic and aromatic compounds; BTEXN (Benzene, Toluene, Xylene, Naphthalene); phenols and poly-cyclic aromatic hydrocarbons (PAHs). These pollutants are associated with runoff from construction activities in relation to roads and certain landscapes
- Heavy metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni) and Zinc (Zn). These metals are associated with runoff from construction activities from certain peri-urban landscapes such as the Project area.

4.2 Groundwater

4.2.1 Sampling locations

The Project groundwater monitoring sites that are to be monitored during construction are listed in Table 4-2 and their locations shown on Figure 4-2.

Groundwater boreholes BH104, BH107, BH112 and BH145 (now BH145R as of April 2023) will be monitored by TfNSW during construction whilst the Construction Contractor will monitor groundwater Cut 6, Cut 2-AAR, Cut 2, Cut 1, Cut 3, Cut 4, Cut 5, Cut 7, Cut 1-AAR, Cut 9 and M12 EDC Cut 7 during construction. Groundwater inflows to Cut 2, Cut 4, Cut 5, Cut 6, Cut 7, Cut 2 AAR and M12 EDC Cut 7 are also to be observed by the Construction Contractor.

In accordance with REMM GW06, GW07 and the additional REMM GW09 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. 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.

Additionally, groundwater inflows will be visually monitored by the Construction Contractor for the utility crossing excavations that will be managed in accordance with the Stage-specific Construction Soil and Water Management Plans.

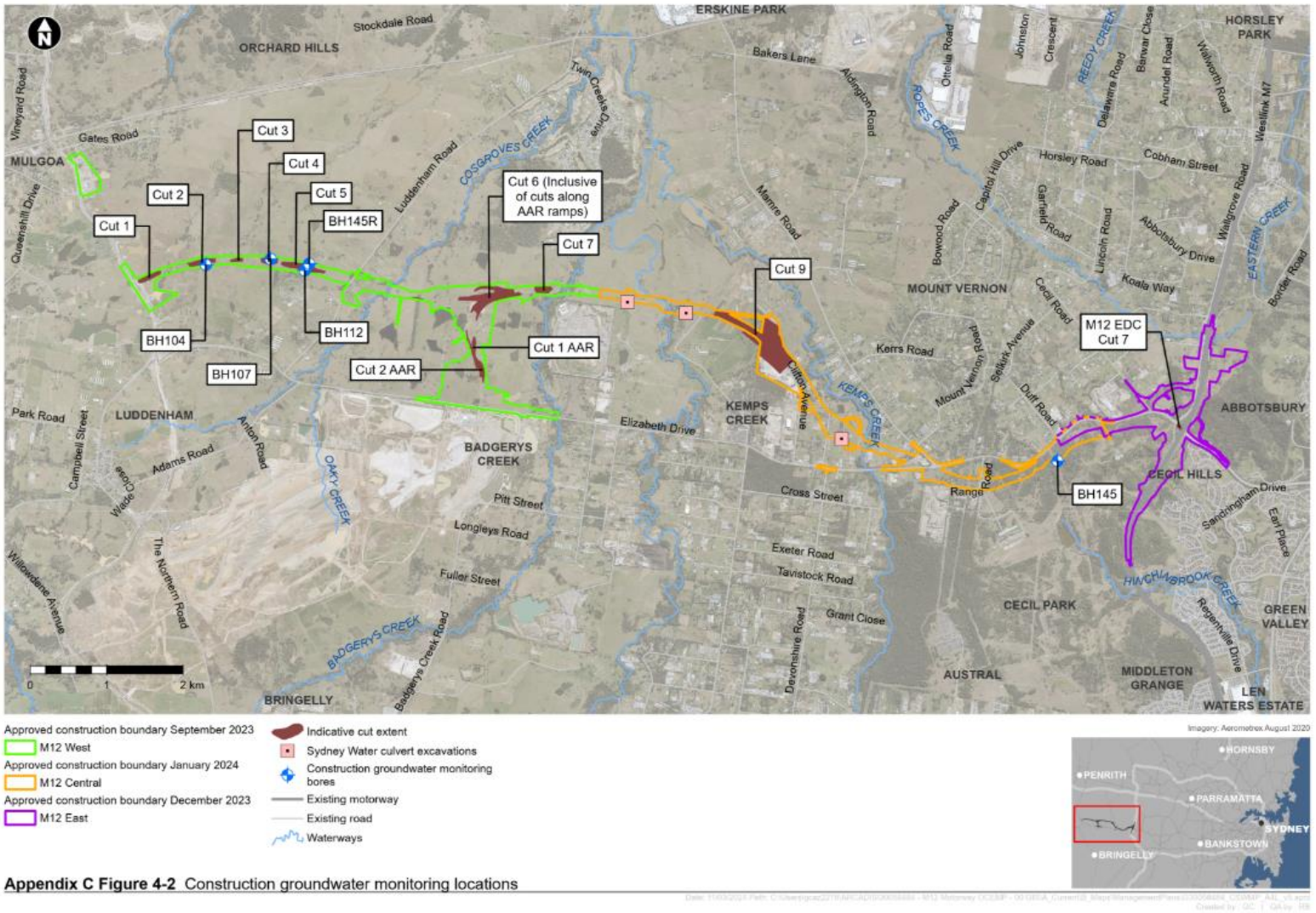
Table 4-2: Groundwater monitoring locations

Site ID*	Sampling type	Frequency	Responsibility
Construction monitoring locations			
BH104	Groundwater quality and level	Monthly	TfNSW
BH107	Groundwater quality and level	Monthly	TfNSW
BH112	Groundwater quality and level	Monthly	TfNSW
BH145 (now BH145R as of April 2023)	Groundwater quality and level	Monthly	TfNSW
M12 West – Observed monitoring			
Cut 1	Groundwater quality and level	Monthly	M12 West Construction Contractor
Cut 1 - AAR	Groundwater quality and level	Monthly	M12 West Construction Contractor
Western cut (Cut 2)	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor
Airport interchange southern cut (Cut 2-AAR)	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor

Site ID*	Sampling type	Frequency	Responsibility
Cut 3	Groundwater quality and level	Monthly	M12 West Construction Contractor
Cut 4	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor
Cut 5	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor
Airport interchange northern cut (Cut 6)	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor
Cut 7	Groundwater inflows and quality^	Monthly	M12 West Construction Contractor
M12 Central			
Clifton Avenue (Cut 9)	Groundwater inflows and quality^	Monthly	M12 Central Construction Contractor
Sydney Water Culvert Excavations	Groundwater inflows and quality^	Monthly	M12 Central Construction Contractor
M12 East			
M12 EDC Cut 7	Groundwater inflows and quality^	Monthly	M12 East Construction Contractor

**Bores BH104, BH107, BH112 are within the construction footprint and will be replaced with newly drilled and constructed bores. The replacement bores will be completed such that monthly groundwater quality sampling during construction can continue without a gap in the data record.*

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



Appendix C Figure 4-2 Construction groundwater monitoring locations

Figure 4-2: Groundwater monitoring locations

4.2.2 Sampling methodology

Technical guidance

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*
- *The TfNSW appointed consultants standard operating procedure*

Groundwater level

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

Groundwater inflows

Groundwater inflows to the Cut 2, Cut 4, Cut 5, Cut 6, Cut 7, Cut 2 AAR, and Clifton Avenue (Cut 9) will be observed by the Construction Contractor at monthly intervals. As part of observing the groundwater inflows, the Construction Contractor will estimate the groundwater inflow rates and note the areas where groundwater inflow is occurring.

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

Sampling

Groundwater quality samples 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.

Exceptions to this methodology include when water quality (WQ) parameters do not stabilise over a long period of time (for example, greater than one hour of purging) and samples are collected prior to stabilisation.

Another exception is when a well is low-yielding and has poor recovery, in which case the standing water level (SWL) may not stabilise and samples may need to be collected to ensure collection of a sample prior to the well pumping dry.

In each of these cases, comprehensive field notes detail the rationale for collecting samples when stabilisation of WQ parameters and/or SWL are not attained.

Analytical suite

All 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 NH_3, 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 Site discharge

The Construction Contractors will undertake treatment and water sampling of captured stormwater prior to water being discharged in accordance with the EPL requirements.

For each discharge, the Construction Contractor will monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in the Dewatering Management Plan (Appendix D) and the EPL.

The Construction Contractor will undertake the 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.

4.4 Climate monitoring

The Construction Contractors 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. The Construction Contractors 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.

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 Construction Contractors 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 (ESM) (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 ESM (or delegate) and TfNSW Project Manager, as necessary. Data will be accessible at all times by the TfNSW ESM (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. The Construction Contractors 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.

4.5 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 Construction Contractor Environmental Site Representatives, 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 Construction Contractor Environmental Site Representatives
- 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, the Construction Contractor (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 noncompliance with environmental management controls outlined in Section 6 of the OCEMP. The Construction Contractors will be required to verify and document the effectiveness of any management measures or preventative / corrective actions implemented to avoid further exceedances.

The Construction Contractors will communicate regularly to ensure plans are co-ordinated and cumulative soil and water quality impacts are minimised. The Overarching Consultation Strategy provides details on the requirements for coordination and communication between the Construction Contractors working on the Project stages. The timing for any improvement will be agreed between the relevant Construction Contractor Project Engineer / Construction Contractor Superintendent and TfNSW Project Manager and TfNSW Environment and Sustainability Manager (ESM) (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 monthly since April 2019. The sampling locations for surface water sites are shown on Figure 4-1. 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).

Summary statistics from the baseline surface water monitoring for the period April 2019 to September 2022 is provided in Annexure 1. 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 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.

Monitoring Report	General observations
M12 Motorway Surface Water Monitoring Biannual Report 4 – October 2020 to March 2021 (GHD, 2021)	• Majority of samples reported total suspended solid (TDS) concentrations above ANZECC & ARMCANZ (2000) ecological criteria during monitoring events. • 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).

Monitoring Report	General observations
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 monthly since April 2019. The sampling locations for groundwater include four boreholes (BH) located within the vicinity of the Project. The sampling locations for groundwater BH are shown on Figure 4-2.

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).

Summary statistics from the baseline groundwater monitoring for the period April 2019 to March 2022 is provided in Annexure 2. 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.

Monitoring Report	General observations
	• 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*

Monitoring Report	General observations
	(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 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

General groundwater level observations as presented in the EIS in the vicinity of the Project include:

- Excluding post purging trends, groundwater levels appear to be generally stable or exhibiting a declining groundwater level trend at the majority of Project monitoring bores. This is attributed to low rainfall over the monitoring period.
- BH145 exhibited a gradual increasing trend throughout the data period (in 2018), which is interpreted to represent slow post purging recovery due to low hydraulic conductivity. BH145 groundwater level is interpreted to not yet have recovered from purging. BH145 is a key bore for the Project because it is in area of relatively deep cut. The groundwater level at BH145 at the end of the available data period represents the maximum level monitored by data logger and was 99.19 metres AHD.

6 Reporting

6.1 Environmental report

The Construction Contractor's ESR will prepare Monthly Environmental Reports for the duration of the Project for incorporation in the Construction Contractors Project Monthly Reports and submission to the TfNSW ESM (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 Surface water and groundwater monitoring reporting

Data for the monitored parameters will be analysed by the TfNSW appointed consultant and presented in construction Surface Water and Groundwater Monitoring Program Reports. The reports will provide the following information:

- The rainfall data for the reporting period
- Summary statistics of the monitored parameters including number of samples, minimum, maximum, mean, median, 20th percentile (where a lower limit is applicable), 80th percentile, standard deviation for the monitored analytes
- Comparison of the statistics to the site specific trigger values derived from the baseline data (Annexures 1 and 2) and, where site specific trigger values are not available, default trigger values (refer Section 3.1 and Section 3.2)) and identification of any exceedances
- 'Box and Whisker plots' of the monitored parameters, where the 'box' represents 50% of the dataset (20th and 80th percentile), the 'whiskers' extend to the minimum and maximum values and the median value is shown as a line within the box. Outliers and extreme data points, which may indicate significant deviances resulting from in extreme events, are also identified on these plots
- Discussion and analysis of the results and recommendations arising from the monitoring.

In accordance with NSW CoA C18, the Construction Surface Water and Groundwater Monitoring Program Report will be provided to the Planning Secretary and relevant government agencies. The Construction Monitoring Reports will be submitted 6-monthly until commencement of operation.

6.3 Reporting on non-conformances and exceedances

In the event that the criteria identified in Section 3 are exceeded, the Construction Contractors (and/or the TfNSW appointed consultant if applicable) will report the exceedance to the TfNSW

Project Manager, TfNSW ESM (or delegate) and ER within seven days of identification of the exceedance. Details of exceedances will be provided in the Monthly Environmental Reports and Monitoring 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 5.6 of the OCEMP and the Environmental Incident Classification and Reporting Procedure (refer to Appendix A7 of the OCEMP) will apply. The Construction Contractor Environmental Site Representatives are responsible for reporting on incidents.

The Construction Contractor will immediately notify the TfNSW Project Manager, TfNSW ESM (or delegate) 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.

The Construction Contractor 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 Construction Contractor 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 by the Construction Contractor. The Construction Contractor will provide such further details to the EPA within the time specified in the request. The Construction Contractors will also complete an incident form for submission to the TfNSW Project Manager and TfNSW ESM (or delegate) within three business days of the occurrence of the event.

6.4 EPL reporting

The Construction Contractor Environmental Site Representative 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 return. EPL annual returns will be prepared for each stage of the Project for which there is an EPL and submitted to the EPA within 60 days of the anniversary of the EPL for the duration of construction.

Annexure 1: Baseline Surface Water Data

Baseline surface water quality monitoring results between April 2019 and March 2022 are provided in Tables AN1-2 – AN1-6. The locations of the surface water monitoring sites are shown on Figure 4-1 and described in Table 4-1.

The site-specific trigger value for each parameter/analyte for each monitoring location is shown in in Tables AN1-2 – AN1-6 below. The adopted trigger values are based on the 20th percentile value (lower limit trigger value if applicable) and / or 80th percentile value (upper limit trigger value) of the analysed baseline data.

Tables AN1-2 – AN1-6 also include the default guideline trigger values as identified in Table 2-1 and Table 2-2 of this CSW-Monitoring Program for comparison purposes.

Table AN1-1 provides a list of the baseline parameters presented in this Annexure.

Table AN1-1: Baseline Parameters

Table	Parameter
AN1-2	Field parameters (pH, EC, DO, Turbidity)
AN1-3	Total suspended solids
AN1-4	Total dissolved solids
AN1-5	Nutrients
AN1-6	Metals

Table AN1-2: Baseline data – Field parameters (dry weather, April 2019 to March 2021)

Parameter	pH		EC (µS/cm)		DO (%)		Turbidity (NTU)	
ANZECC guidelines:	**6.5 – 8.5**		**125 - 2200**		**85 - 110**		**6 - 50**	
Sampling location	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile
BADDS	7.32	7.67	830	1604	**57.2**	87.4	14.0	**75.3**
BADUS	7.28	7.59	739	1432	**43.4**	**73.7**	6.8	48.1
COSDS	7.18	7.68	494	698	**48.3**	**60.5**	8.2	**73.8**
COSUS	7.52	8.15	358	955	**37.9**	88.5	**3.1**	**54.6**
HINDS	7.54	**9.97**	191	943	**65.8**	**119.7**	**3.6**	12.5
HINUS	7.30	7.72	300	**2395**	**58.8**	**119.6**	10.1	30.1
KEMDS	7.60	8.44	938	1446	**62.4**	96.9	32.6	**70.3**
KEMUS	7.47	7.92	1029	**2236**	**51.5**	**77.3**	6.9	40.4
ROPDS	7.52	7.89	871	1458	**56.2**	**79.9**	**2.1**	11.1
ROPUS	7.55	8.10	969	**3909**	**57.2**	85.5	**2.4**	21.3
SOUDS	7.31	7.78	922	1238	**42.5**	90.6	33.8	**73.3**
SOUUS	7.42	7.80	798	1296	**60.4**	**82.0**	**5.5**	44.4
BADDS	7.32	7.67	830	1604	**57.2**	87.4	14.0	**75.3**
BADUS	7.28	7.59	739	1432	**43.4**	**73.7**	6.8	48.1

BOLD – values below or exceeds adopted screening criteria.

Table AN1-3: Baseline data – Total suspended solids (April 2019 to March 2021)

Total suspended solids (TSS) (mg/L)												
ANZECC & ARMCANZ guideline: 6												
Location	BADDS	BADUS	COSDS	COSUS	HINDS	HINUS	KEMDS	KEMUS	ROPDS	ROPUS	SOUDS	SOUUS
20th %ile	12.8	1.2	8.4	6	0	0	27.6	7.8	0	0	24.8	9.4
80th %ile	**55.8**	23.2	**110.6**	35.2	10.8	44.8	**60.8**	26.8	15.6	24.2	**75**	27.2

BOLD – values below or exceeds adopted screening criteria.

Table AN1-4: Baseline data – Total dissolved solids (April 2019 to March 2021)

Total dissolved solids (TDS) (mg/L)												
ADWG palatability limit: 600												
Location	BADDS	BADUS	COSDS	COSUS	HINDS	HINUS	KEMDS	KEMUS	ROPDS	ROPUS	SOUDS	SOUUS
20th % ile	**606**	451.2	437.2	510.4	147	196.6	522.6	589.2	**607.6**	**652.4**	476.4	469.6
80th % ile	**805**	**779.6**	**840**	**824.8**	204.6	308	**729.2**	**1204**	**864.8**	**1726**	**658.8**	**629.4**

BOLD – values below or exceeds adopted screening criteria.

Table AN1-5: Baseline data – Nutrients (April 2019 to March 2021)

Adopted guidelines	Ammonia (mg/L)		Oxidised nitrogen (NOx) (mg/L)		Reactive phosphorus (mg/L)		Total phosphorus (mg/L)		Total nitrogen (mg/L)		Chlorophyll-a (mg/L)	
ANZECC & ARMCANZ (2000)	-		0.04		0.008		0.025		0.35		0.003	
ANZG (2018)	0.9		-		-		-		-		-	
Location	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile
BADDS	0.02	0.136	0	**0.176**	0	**0.062**	**0.096**	**0.306**	**1.1**	**2.22**	**3**	**18.6**
BADUS	0.04	0.108	0.02	**0.15**	**0.01**	**0.076**	**0.102**	**0.342**	**0.92**	**2.08**	**1.2**	**8.2**
COSDS	0	0.168	0.022	**0.22**	0	**0.056**	**0.03**	**0.272**	**0.74**	**2.2**	**2**	**8**
COSUS	0.02	0.082	0.016	**0.15**	0	0.002	**0.028**	**0.184**	**0.78**	**1.88**	**0.8**	**8.2**
HINDS	0	0.088	0	**0.108**	0	**0.038**	**0.06**	**0.124**	**1.2**	**1.6**	**2.2**	**14.4**
HINUS	0.02	0.144	0	**0.1**	0	0	**0.062**	**0.218**	**1.44**	**2.84**	**2**	**15.4**
KEMDS	0.044	0.26	**0.078**	**1.304**	0	**0.228**	**0.166**	**0.388**	**1.76**	**3.08**	**4**	**22.4**
KEMUS	0.026	0.08	**0.106**	**2.308**	**0.316**	**0.756**	**0.376**	**0.992**	**1.06**	**3.84**	**2**	**9.6**
ROPDS	0.004	0.052	**0.04**	**0.148**	**0.06**	**0.156**	**0.09**	**0.258**	**0.5**	**0.8**	**0**	**6.2**
ROPUS	0.016	0.106	0.03	**0.09**	**0.016**	**0.05**	**0.04**	**0.172**	**0.4**	**1.54**	**0.6**	**31.8**
SOUDS	0.01	0.072	0.018	**0.488**	0	0	**0.084**	**0.356**	**1**	**2.42**	**4.4**	**16.8**
SOUUS	0.01	0.066	0.03	**0.94**	**0.014**	**0.152**	**0.084**	**0.38**	**0.94**	**2.2**	**3**	**13.4**

BOLD – values below or exceeds adopted screening criteria.

Table AN1-6: Baseline data – Metals (April 2019 to March 2021)

	Arsenic (mg/L)		Cadmium (mg/L)		Chromium (mg/L)		Copper (mg/L)		Iron (mg/L)		Lead (mg/L)		Manganese (mg/L)		Mercury (mgL)		Nickel (Mg/L)		Zinc (mg/L)	
ADWG (2011)	0.01		0.002		No criterion		2		No criterion		0.01		0.5		0.001		0.02		No criterion	
ANZG (2018)	**0.013**		**0.0002**		**0.001**		**0.0014**		**0.3**		**0.0034**		**1.9**		**0.0006**		**0.011**		**0.008**	
Location	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile	20th % ile	80th % ile
BADDS	0.0008	0.002	0	0	0	**0.002**	0.001	**0.0044**	**1.14**	**1.79**	0	0.001	0.185	0.753	0	0	0.002	0.004	0	**0.0124**
BADUS	0	0.002	0	0	0	0	0	**0.0046**	**0.834**	**2.812**	0	0	0.079	0.657	0	0	0.001	0.003	0	**0.0096**
COSDS	0	0.003	0	0	0	**0.0028**	0	**0.0058**	**0.666**	**8.132**	0	0.0026	0.1146	0.3752	0	0	0.001	0.004	0	**0.0108**
COSUS	0	0.002	0	0	0	**0.0024**	0.0008	**0.0082**	**0.39**	**5.324**	0	**0.0042**	0.1978	0.3482	0	0	0.001	0.0034	0	**0.0204**
HINDS	0.0006	0.002	0	0	0	0	0	**0.002**	**2.228**	**3.086**	0	0	0.1896	0.7622	0	0	0	0.001	0	0
HINUS	0.0002	0.002	0	0	0	**0.0018**	0	**0.002**	**3.566**	**6.852**	0	0.0018	0.2414	0.193	0	0	0	0.0028	0	**0.0134**
KEMDS	0.001	0.002	0	0	0	**0.0022**	**0.002**	**0.0052**	**0.976**	**3.01**	0	0.002	0.3176	0.5188	0	0	0.002	0.003	0	**0.012**
KEMUS	0.001	0.002	0	0	0	**0.0014**	**0.002**	**0.0044**	**0.348**	**1.83**	0	0.001	0.00068	0.085	0	0	0.002	0.003	0.006	**0.0114**
ROPDS	0	0.001	0	0	0	0	0	**0.002**	0.294	**0.396**	0	0	0.122	0.2528	0	0	0	0.001	0	0.006
ROPUS	0	0	0	0	0	**0.001**	**0.002**	**0.0074**	0.114	**0.434**	0	0.0004	0.0882	0.324	0	0	0	0.002	0.006	**0.0336**
SOUDS	0	0.002	0	0	0	**0.002**	0.0004	**0.0046**	**1.044**	**3.07**	0	0.002	0.1328	0.448	0	0	0.002	0.003	0	**0.01**
SOUUS	0	0.002	0	0	0	**0.001**	0.001	**0.004**	**0.662**	**2.322**	0	0.001	0.1244	0.3988	0	0	0.0014	0.003	0	**0.0106**

BOLD – values below or exceeds adopted screening criteria.

Annexure 2: Baseline Groundwater Data

Baseline groundwater quality monitoring results between April 2019 and March 2021 are provided in Tables AN2-2 – AN2-7. The locations of the groundwater monitoring sites are shown on Figure 4-2 and described in Table 4-2.

The site-specific trigger value for each parameter/analyte for each monitoring location is shown in in Tables AN2-2 – AN2-7 below. The adopted trigger values are based on the 20th percentile value (lower limit trigger value if applicable) and / or 80th percentile value (upper limit trigger value) of the analysed baseline data.

Table AN2-1 provides a list of the baseline parameters presented in this Annexure.

Table AN2-1: Baseline Parameters

Table	Parameter
AN2-2	Field parameters (DO, EC, pH, Temp, Redox)
AN2-3	Sulfate
AN2-4	Nutrients
AN2-5	Metals
AN2-6	Total dissolved solids
AN2-7	Total suspended solids

Table AN2-2: Baseline data – Field parameters (April 2019 to March 2021)

	DO (mg/L)		EC (µS/cm)		pH		Temp. (°C)		Redox (mV)*	
ANZECC (2000) guideline	85 – 110%		125 - 2200		6.5 – 8.5		-		-	
Well	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile
BH104	0.428	1.796	12243	17151	6.038	6.586	19.14	20.88	94.5	269.8
BH107	0.67	1.91	8853	9607	6.57	6.85	18.9	21.9	190.3	270.98
BH112	0.716	1.518	11691	12778	6.316	6.592	19.46	21.22	205	279.24
BH145	0.316	1.284	3519	6321	6.078	6.62	17.18	19.86	205	276.78

* Corrected for standard hydrogen electrode (SHE) by adding 205 mV to redox values collected in the field

Table AN2-3: Baseline data – Sulfate (April 2019 to March 2021)

Well	Sulfate (mg/L)	
	20th percentile	80th percentile
BH104	468.8	759.6
BH107	437.0	498
BH112	548.0	628
BH145	139.0	212

Table AN2-4: Baseline data – Nutrients (April 2019 to March 2021)

	Ammonia (mg/L)		Nitrate (mg/L)		Nitrite (mg/L)		NOx (mg/L)		TN (mg/L)		TP (mg/L)	
Well	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile
BH104	0.032	0.298	0.03	0.12	0	0.028	0.03	0.12	0.4	1.26	0.02	0.104
BH107	0.04	0.06	0.05	0.112	0	0	0.05	0.11	0	0.56	0.02	0.17
BH112	1.58	2.07	0.08	0.48	0.006	0.048	0.1	0.48	2.3	3.2	0.13	0.44
BH145	1.24	3	8.24	28.3	0.28	6.28	10.2	36.3	15.7	38	0.18	1.16

Table AN2-5: Baseline data – Metals (April 2019 to March 2021)

	Cadmium (mg/L)		Chromium (mg/L)		Copper (mg/L)		Iron (mg/L)		Lead (mg/L)		Manganese (mg/L)		Nickel (mg/L)		Zinc (mg/L)	
Well	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile	20th %ile	80th %ile
BH104	0	0.0001	0.001	0.0016	0.0036	0.0404	0	0.826	0	0.0012	0	0.6664	0.0548	0.1074	0.025	0.1336
BH107	0	0.00026	0.006	0.006	0.0066	0.087	0	0.15	0.0006	0.003	0	0.543	0.037	0.068	0.026	0.122
BH112	0	0.0002	0.011	0.05	0.0036	0.086	0	0.096	0.0008	0.0022	0	0.267	0.048	0.101	0.0374	0.16
BH145	0.0001	0.0002	0.009	0.086	0.0088	0.0828	0	24.1	0	0.002	0	1.48	0.019	0.082	0.0542	4.236

Table AN2-6: Baseline data – Total dissolved solids (April 2019 to March 2021)

Well	TDS (mg/L)	TDS (mg/L)
	20th %ile	80th %ile
BH104	6,840	9,818
BH107	5,782	6,300
BH112	8,132	8,382
BH145	2,492	3,952

Table AN2-7: Baseline data – Total suspended solids (April 2019 to March 2021)

Well	TSS (mg/L)	TSS (mg/L)
	20th %ile	80th %ile
BH104	17	49.6
BH107	24	65.6
BH112	246.4	422.6
BH145	453.2	2,258

Appendix D – Dewatering Management Plan

Appendix D

Dewatering Management Plan

M12 Motorway

June 2024

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Document control

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Approval and authorisation

Plan reviewed by:	Plan reviewed by:
Tracey Austin TfNSW Environment and Sustainability Manager	Deanne Forrest TfNSW Project Director, M12
Date 28.06.2024	Date 28/06/2024
Signed [redacted]	Signed [redacted]

Revision history

Revision	Date	Description
A	14/10/2020	First draft for TfNSW review
B	3/11/2020	Response to TfNSW comments
C	24/11/2020	Response to TfNSW comments
D	06/08/2021	Updated with Final NSW and Commonwealth CoA
E	08/09/2021	Response to ER and TfNSW comments
F	18/11/2021	Response to comments received during consultation
G	10/12/2021	Update in response to DPIE review
H	17/11/2022	Additional design changes updates
I	13/02/2023	Response to TfNSW comments
J	20/03/2023	Response to ER comments
K	18/01/2024	Updated to reflect additional CAs

L	09/04/2024	Updated to reflect comments from TfNSW, ER and Construction Contractors
M	05/06/2024	Response to TfNSW, ER and Construction Contractor comments

Contents

Tables

Figures

Glossary/ Abbreviations

Abbreviations	Expanded text
CoA	Conditions of Approval
CCLMP	Construction Contaminated Land Management Plan
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	Transport for New South Wales Environment and Sustainability Manager
ESR	Construction Contractor Environmental Site Representative
EWMS	Environmental Work Method Statement
OCEMP	Overarching Construction Environmental Management Plan
POEO Act	*Protection of the Environment Operations Act* 1997
REMMs	Revised Environmental Management Measures
TARP	Trigger Action Response Protocol
TfNSW	Transport for NSW
TSS	Total Suspended Solids
WSP	Western Sydney Parklands

1 Introduction

1.1 Purpose

This overarching Dewatering Management Plan 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 Project (the Project) will involve dewatering of ponded stormwater, infiltrated groundwater and farm dams. Ecological processes for the dewatering of farm dams are included in the Construction Flora and Fauna Management Sub-plan (CFFMP).

This Plan has been prepared in accordance with the Revised Environmental Mitigation Measures (REMMs) SWH11, the TfNSW specifications and the NSW Conditions of Approval (CoA).

The Construction Contractors will prepare a stage-specific Dewatering Management Plan as part of the Construction Contractors' Construction Soil and Water Management Sub-plans (CSWMP) in accordance with the legislation, guidelines and standards identified in Section 3 of this overarching CSWMP.

1.2 Objective

The objectives of this Plan include:

- 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)
  - Overarching CSWMP.

1.3 Scope

This Plan 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 Plan.

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

1.6 Review

This Plan will be updated by the Construction Contractor and reviewed by the Construction Contractor's 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)
- TfNSW Water Discharge and Reuse Guideline (TfNSW, 2016)
- TfNSW 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 will be subject to EPL/s 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 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 3.5.3
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

The Construction Contractors will develop an 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 Construction Contractors 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. A template EWMS for use by the Construction Contractors is provided in Appendix A8 of the OCEMP. Appendix A8 also contains a template EWMS register and template EWMS training register.

3.2 Approach

The Construction Contractors 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 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).

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 Construction Contractors ESR.

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)

In addition to the above, discharges to land:

- Over landscaped areas will only occur if pH levels are between 6.5 – 8.5
- Outside the site boundary will only occur if consultation has been undertaken with the landowner. Otherwise, all discharge water must be wholly contained within the site boundary.

If all criteria above are met, then the water may be authorised for discharge to land by Construction Contractors ESR.

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

3.3.3 Discharge to waters

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. A Water Pollution Impact 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.

The Project is subject to EPL/s as a Scheduled Activity for ‘road construction’. The EPL/s typically prescribe 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 applicable EPL.

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.

3.4 Water treatment

The Construction Contractors will identify the methods for treating water if the water does not meet the discharge criteria. This will include measures for treatment of pH, a flocculation procedure to manage total suspended solids (TSS), and methods to remove petroleum hydrocarbons, metals or other pollutants.

Prior to water treatment activities, the Construction Contractors will 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" to the TfNSW ESM (or delegate) for approval.

Where flocculation is necessary to settle suspended sediments in the basins, the proposed flocculant or coagulant will be applied as the flocculating agent to settle the sediments within 24 hours of the conclusion of each rain event causing runoff. Before applying a flocculating agent, the amount of the agent that is appropriate for the volume to be treated, the sediment type and the prevailing weather conditions will be determined.

The Construction Contractors will ensure that flocculants and other water treatment chemicals are appropriately stored on site. Bulk flocculants 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 and covered locations that are locked to prevent unauthorised access. Requirements of the Safety Data Sheets will be followed.

3.5 Discharging water

3.5.1 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. 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).

In situ water quality parameters will be recorded and grab samples collected for laboratory analysis (as required). 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.

3.5.2 Discharge, inspection and monitoring

Water discharge will only occur following approval by the Construction Contractor's ESR who will issue a Permit to Discharge.

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

The Construction Contractor will supervise any dewatering activities directly.

If the Construction Contractor chooses not to directly supervise dewatering, 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.

3.5.3 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.

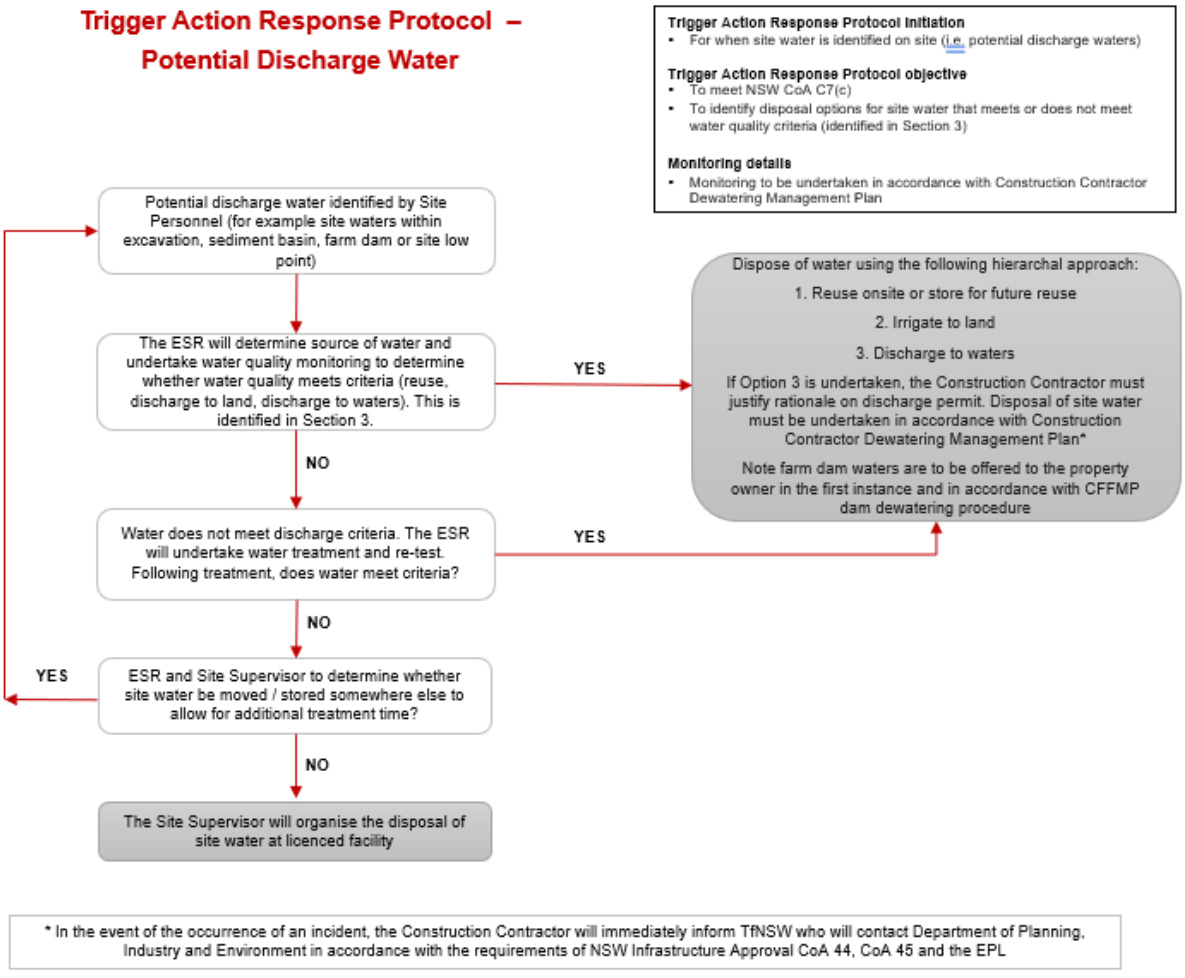

Figure 3-1: Trigger Action Response Protocol

3.6 Farm dam discharge

In addition to the discharge requirements outlined in Section 3.5 for the discharge of water (including farm dam waters), 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.

As detailed in the Construction Contaminated Land Management Plan (CCLMP), Western Sydney Parklands (WSP) found elevated concentrations of copper recorded in the surface water sample collected from a farm dam in the M12 East package. Appropriate management procedures and protocols are to be implemented during dewatering of the farm dam.

Refer to the CFFMP Appendix H for the fauna steps required for farm dam discharge. The reuse of farm dam water onsite or discharge of farm dam water will be authorised by the Construction Contractor's ESR. The above process will be used in instances where the farm dam refills with water.

3.7 Sydney Water infrastructure dewatering

In addition to the discharge requirements outlined in Section 3.5 for the discharge of water, if the Construction Contractors undertake the dewatering of Sydney Water infrastructure (i.e. decommissioning and dewatering of pipes, followed by commissioning), it must be undertaken in accordance with the Sydney Water discharge protocols which outlines measure for erosion control, discharge rate, chlorination and monitoring. This may apply to planned isolations of trunk mains (potable or recycled water mains) to prevent water quality contamination. Typical activities that include isolations of trunk mains include:

- Discharge of drinking water (e.g. maintenance or construction work on a water main, pumping station or reservoir)
- Cleaning water mains (e.g. flushing, swabbing & scouring)
- Disinfecting water mains (e.g. new mains, existing mains following main breaks) or water supply reservoirs
- Discharge of water from excavation pits.

4 Records

The Construction Contractors will maintain records of relevant data, including records of water quality management and water discharge (Permit to 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.

The Construction Contractor will report on site discharge monitoring results in the Soil and Water Monitoring 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).