Appendix B4

Construction Soil and Water Management Sub-plan

M12 Motorway – Central

January 2025

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Approval and authorisation

Plan reviewed by:	Plan endorsed by:
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Seymour Whyte Environmental Site Representative	Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	29/04/2022	Updated in response to TfNSW review
C	29/06/2022	Updated in response to TfNSW review
D	27/06/2022	Updated in response to TfNSW and ER review
E	21/08/2023	Updated in response to OCEMP update
F	18/01/2025	Updated in response to OCEMP update

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Glossary/ Abbreviations

Abbreviations	Expanded text
ANZECC	Australian and New Zealand Environment and Conservation Council
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
CFFMP	Construction Flora and Fauna Management Sub-plan
CCLMP	Construction Contaminated Land Management Sub-plan
CCS	Community Communication Strategy
CFMP	Construction Flood Management Sub-plan
CLM Act	Contamination Land Management Act 1997
CoA	Conditions of Approval
Commonwealth CoA	Federal Conditions of Approval under the EPBC Act
Construction	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the OCEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B of the Infrastructure Approval and approved under an environmental management plan(s) in accordance with Condition A24.

Abbreviations	Expanded text
Construction Ancillary Facility	A temporary facility for construction of the CSSI including an office and amenities compound, construction compound, material crushing and screening plant, concrete and asphalt batching plant, materials storage compound, maintenance workshop, testing laboratory, material stockpile area, access and car parking facilities and utility connections to the facility. Note: Where an approved CEMP contains a stockpile management protocol, a material stockpile area located within the construction boundary is not considered to be an ancillary facility.
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 (now Department of Climate Change, Energy, the Environment and Water)
DCCEEW	Department of Climate Change, Energy, Environment and Water
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
DPI	NSW Department of Primary Industries
DPE	Former NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly NSW DPE which has now been split into NSW DCCEEW and NSW DPHI)
Dredging	Has the same meaning as defined under the *Fisheries Management Act 1994* and associated Fisheries Management (General) Regulation 2010. In summary it includes any work involving excavating water land or work that involves the removal of woody debris, snags, gravel beds, cobbles, rocks, boulders, rock bars or native freshwater aquatic vegetation from water land. It also includes work that involves the removal of material from water land that disturbs, moves or harms woody debris, snags, gravel beds, cobbles, rocks, boulders, rock bars or native freshwater aquatic vegetation.
EAD	Environmental Assessment Documentation
EC	Electrical conductivity
EIS	Environmental Impact Statement
EES	FormerEnvironment, Energy and Science Group (now Environment and Heritage Group)
EHG	Environment and Heritage Group (a part of NSW DCCEEW)

Abbreviations	Expanded text
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 Change 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 • 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	Environmental Site Representative (Seymour Whyte)

Abbreviations	Expanded text
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
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
OCAQMP	Overarching Construction Air Quality Management Sub-plan
OCCLMP	Overarching Construction Contaminated Land Management Sub-plan
OCEMP	Overarching Construction Environmental Management Plan
OCFMP	Overarching Construction Flood Management Sub-plan
OCSWMP	Overarching Construction Soil and Water Management Sub-plan
OCWRMP	Overarching Construction Waste and Resources Management Sub-plan
OCS	Overarching Communication Strategy
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soil
PCC	Penrith City Council
PIRMP	Pollution Incident Response Management Plan

Abbreviations	Expanded text
POEO Act	*Protection of the Environment Operations Act 1997*
Primary CoA/REMM	CoA or REMM that is specific the development of this Plan
Project, the	The CSSI as approved by the Minister for Planning and Public Spaces on the 23 April 2021 (SSI 9364)
Reclamation	Has the same meaning as defined under the *Fisheries Management Act 1994* and Fisheries Management (General) Regulation 2010. Using any material (e.g. sand, soil, silt, gravel, concrete, timber or rocks) to fill in or reclaim water land or depositing any such material on water land for the purposes of constructing anything over water land (such as a bridge) or draining water land for the purpose of its reclamation.
Redox	Reduction-oxidation
REMM	Revised Environmental Management Measure as provided in the Amendment Report
RUSLE	Revised Universal Soil Loss Equation
RTA	Roads & Traffic Authority. Former NSW Roads and Maritime Services. Now Transport for NSW
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
Snag	Any piece of large woody debris that is both greater than three metres in length and 300 millimetres in diameter, or any rock larger than 500 millimetres in two dimensions, located in a waterway (either fresh, estuarine or marine) and is, or would be, wholly or partly submerged at a "bank-full" flow level or highest astronomical tide level. It does not include exotic plant species, such as willow and camphor laurel trees or other vegetation listed under the *Noxious Weeds Act 1993*.
SRE	Sensitive Receiving Environment
TN	Total nitrogen
TP	Total phosphorus
TfNSW	Transport for New South Wales
WHS Act	Work Health and Safety Acr 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 Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central Package.

This CSWMP has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the Environmental Impact Statement (EIS), Submissions Report, Amendment Report, and Amendment Report Submissions Report (ARSR), ARSR Amendment Report, all applicable legislation, and Transport for New South Wales (TfNSW) specifications.

1.2 Background

1.2.1 M12 Motorway (the Project)

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 will run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres (km) and is expected to be opened to traffic prior to opening of the WSIA.

Key features of the Project include:

- An east-west 16 km motorway between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham
- A motorway built for four lanes (with provision for up to six lanes) with a median to separate opposing traffic flows
- A direct connection to Western Sydney International Airport
- A new connection to The Northern Road with traffic lights
- A motorway-to-motorway interchange at the M7 Motorway
- Provision for a future interchange connecting Mamre Road and Devonshire Road at the M12 Motorway.

A detailed Project description is provided in Section 2.1 of the CEMP.

1.2.2 Statutory Context

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.

The Project was assessed as part of an EIS, Submission Report, Amendment Report, ARSR and ARSR amendment report which are herein referred to as the Environmental Assessment Documentation. REMMs are nominated in these assessments to manage the identified impacts.

Approval for the Project under the EP&A Act was granted by the Minister for Planning on 23 April 2021 (CSSI 9364). Approval for the Project under the EPBC Act was granted by the Australian Minister for the Environment on 3 June 2021 (EPBC 2018/8286).
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 Sitesd 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.

1.2.3 M12 Motorway Delivery Strategy

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

Each package of work is to be delivered under separate contracts on behalf of the proponent TfNSW. While the packages will commence at different times there will be periods during which the packages works will overlap. Co-ordination between the contractors will be required to manage cumulative impacts.

1.3 M12 Central

Seymour Whyte has been engaged to deliver the M12 Central package. Construction of the M12 Central package involves building 7.5 km of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands.

The M12 Central package will provide a dual carriageway with a wide median to allow for future widening to six lanes. Safety barriers will be provided along the length of the package. Emergency stopping bays and emergency crossovers will also be provided at regular intervals. A shared user path with lighting will provide an active transport link along the motorway and eastward to the M7.

The M12 Central package includes the following bridges:

- Twin bridges over South Creek
- A bridge for Clifton Avenue over the M12 Motorway
- Twin bridges over Kemps Creek
- Twin bridges over Elizabeth Drive near Mamre Road
- Twin Bridges over Range Road
- A bridge for the Water Tower Access Road over the M12 Motorway
- A private property access bridge in University of Sydney land.

Retaining walls will be provided around Range Road to help limit Project impacts on Range Road. Adjustments will be made to local roads including Clifton Avenue and Salisbury Road.

The M12 Central package also requires relocation of utility services including electricity, water, gas and telecommunications. Urban design features of this package include Aboriginal artwork on bridges, rest areas on shared user paths, interpretive signage and landscape planting.

A detailed description of the M12 Central package is provided in Section 2.3 of the CEMP.

1.4 Scope of the Plan

The scope of this CSWMP is to describe how the potential soil and water impacts will be managed during construction of the M12 Central package. This Plan has been prepared under and consistent with the OCEMP, and in particular the Overarching Soil and Water Management Sub-Plan (OCSWMP) considering the existing environment and construction activities. In the preparation and ongoing implementation of this Plan, SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied.

This Plan is applicable to all activities during construction of the M12 Central package, including all areas where physical works will occur or areas that may be otherwise impacted by the construction works, and under the control of Seymour Whyte. All Seymour Whyte staff and sub-contractors are required to operate fully under the requirements of this Plan and related environmental management plans, over the full duration of the construction program.

A copy of this CSWMP will be kept on the premises for the duration of construction.

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.

1.5 Environmental management systems overview

The Environmental Management System (EMS) for the M12 Central package is described in Section 3 of the CEMP. The EMS is consistent with the overarching EMS described in Section 3 of the OCEMP.

To achieve the intended environmental performance outcomes, Seymour Whyte have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO14001:2015. The Seymour Whyte EMS will be adopted as the guiding environmental management framework for the M12 Central package.

The EMS consists of governance documentation, incorporating environmental management plans, policies, procedures and tools, including:

- **M12 Central Environment and Sustainability Policy**. Outlines the commitments and intentions established by Seymour Whyte to ensure environmental performance and sustainability objectives and targets are achieved (Appendix A3 of the CEMP)
- **CEMP**. Details the processes and procedures to be implemented during the M12 Central package to comply with applicable CoA, REMMs, Environment Protection Licence (EPL), legislative obligations and contractual requirements. The relevant compliance obligations are detailed in Appendix A1, with a cross reference to where they are met in this Plan
- **Environmental Management Sub-plans**. These documents describe procedures and controls for specific environmental aspects requiring more rigorous management strategies

- **Monitoring Programs**. Details the monitoring regime to be implemented during construction to compare the actual performance of construction against the objectives outlined in the relevant Plan, including setting specific triggers and associated responses
- **Sensitive Area Maps (SAPs)**. A series of maps providing key features of the alignment and relevant environmental constraints. Features include waterways, heritage, biodiversity contamination and sensitive receivers amongst other site relevant features
- **Environmental Work Method Statements (EWMS)**. Management measures identified in this CSWMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS. EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS. Construction personnel undertaking a task governed by an EWMS must undertake the activity in accordance with the mitigation and management measures identified in the EWMS. See Section 3.3.3 of the CEMP for details of the EWMS preparation and approval requirements
- **Erosion and Sediment Control Plans (ESCPs)**. A practical guide to provide more detailed site-specific erosion and sediment control measures. ESCPs will be developed by the ESR in consultation with construction personnel and the Contractor's Soil Conservationist, as required. ESCPs will be modified to reflect site conditions at the time of construction.
- **Procedures, strategies and protocols**. Detailed procedures for inclusion in work packs.

Management measures identified in this Plan may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the CSWMP and ESCPs.

EWMS will be prepared for the following activities relating to soil and water management:

- 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
    - Construction of temporary waterway crossings
    - Vegetation clearing and grubbing (refer to the CFFMP)
    - 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 Seymour Whyte's environmental risk workshops.

EWMS must be submitted to TfNSW for approval prior to the commencement of the nominated works in accordance with TfNSW QA Specification G36 Hold Point 4.13 (refer to Section 7.4). A

register of EWMS will be maintained in Appendix A5 of the CEMP. A template EWMS is provided in Appendix A8 of the CEMP.

1.5.1 CSWMP preparation, endorsement and approval

The OCSWMP 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, the OCSWMP combined NSW CoA C4(e) surface water and groundwater with soil from NSW CoA C4(d). The OCSWMP also includes an Overarching Construction Soil and Water Monitoring Program to satisfy the requirements of NSW CoA C7, C11(b) and C11(c). This stage-specific CSWMP for the M12 Central package has been developed under and consistent with the approved OCSWMP and Overarching Construction Soil and Water Monitoring Program.

This CSWMP and Construction Soil and Water Monitoring Program (Appendix C) was be reviewed by the TfNSW Environment and Sustainability Manager (ESM) (or delegate) and the independent Environmental Representative (ER) to confirm they are consistent with, and incorporate, all relevant elements of the approved OCEMP, prior to submission to the Secretary of DPE (now DPHI) for information. Th CSWMP and Monitoring Program was also be reviewed by the TfNSW Soil Conservationist. Construction of the M12 Central package did not commence until the CSWMP and the Construction Surface Water Monitoring Program has been reviewed to the satisfaction of the TfNSW ESM and ER and provided to the Planning Secretary for information.

1.5.2 Interactions with other management plans

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

- Site Establishment Management Plan (SEMP), which identifies measures to avoid and/or minimise erosion and sedimentation impacts during the establishment of ancillary facilities. The SEMP includes details of site-specific soil and water management requirements
- Construction Flood Management Sub-plan (CFMP) addresses how flood related risks and impacts will be managed during construction of the M12 Central package
- Pollution incidents will be managed in accordance with the M12 Central package Pollution Incident Response Management Plan (PIRMP)
- Construction Contaminated Land Management Sub-plan (CCLMP) addresses the management of contaminated lands, unexpected contaminated finds and landfill gas including the details site investigation progression.
- Construction Air Quality Management Sub-plan (CAQMP) addresses the management of dust and odour, including measures to manage stockpiles
- Construction Waste and Resources Management Sub-plan (CWRMP) addresses the management of waste including the classification and handling of spoil
- M12 Central Communication and Stakeholder Engagement Strategy which has been developed under the Overarching Communication Strategy (OCS), which details procedures for community notification, consultation and complaints management
- M12 Central Sustainability Management Plan which has been developed under the overarching Project Sustainability Strategy to address sustainability requirements.

1.6 Consultation

The OCSWMP and Overarching Construction Soil and Water Monitoring Program were prepared in consultation with the following government agencies and stakeholders in accordance with NSW CoA C4(e), C7, C11(b) and C11(c):

- DPI 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
- Liverpool City Council
- Fairfield City Council.

Key matters raised by stakeholders and how they have been addressed are outlined in the OCSWMP including consultation evidence in accordance with NSW CoA C4 and A5. This stage-specific CSWMP and the associated Construction Soil and Water Monitoring Program have been prepared under and consistent with the OCSWMP and therefore no further consultation is required as part of the preparation of this Plan.

During construction changes may occur that potentially change the compliance status of this CEMP with the OCEMP, or as a result of the Review and improvement process in Section 8 of this Plan, which require this Plan to be updated. Where these changes are not considered 'minor' by the ER, further consultation with the relevant stakeholders will occur.

Ongoing consultation between TfNSW Seymour Whyte, neighbouring Project packages, other construction projects, and stakeholders, the community and relevant agencies regarding the management of soil and water impacts will be undertaken during the construction of the M12 Central package as required. The process for the community consultation will be consistent with the OCS and as described in the M12 Central Communication and Stakeholder Engagement Strategy.

Seymour Whyte will liaise with nearby residential or commercial property owners to determine any water discharge requirements (i.e. frequency of discharge, volumes, water quality criteria, etc.) and make allowances in the design and construction of the temporary waterway crossings or diversions for such requirements.

2 Purpose and objectives

2.1 Purpose

The purpose of this CSWMP is to describe how Seymour Whyte will manage impacts on soil and water during construction of the M12 Central package.

2.2 Objectives

The key objective of the CSWMP is to prevent pollution or depletion of soil and water resources resulting from construction of the M12 Central package. To aid in achieving this objective 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
- Infrastructure Approval CoA (SSI 9364)
- Environment Protection Licence
- TfNSW Quality Assurance (QA) Specifications
- All relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3 Targets

Targets for the management of soil and water impacts during the M12 Central package 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 M12 Central package through the implementation of feasible and reasonable water quality management measures, such as those detailed in Section 6.17
- All construction personnel to undergo site induction training which will include detail on soil and water management during construction.

3 Environmental requirements

In accordance with NSW CoA A7, references in the terms of this Plan 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 the Infrastructure Approval (CSSI-9364).

3.1 Relevant legislation and guidelines

3.1.1 Legislation

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

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

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

3.1.2 Guidelines and standards

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

- Acid Sulfate Soil Manual (ASSMAC 1998)
- Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DECC 2022)
- AS/NZS 5667.1.1988 (R2016) Water quality -Sampling Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000)
- Bunding and Spill Management Guidelines contained within EPA Environmental Protection Manual for Authorised Officers (EPA, 1995)
- Code of Practice for Water Management - Road Development and Management (RTA, 1999)
- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu" November 1997

- Environmental Best Management Practice Guideline for Concreting Contractors, DEC (2004)
- Environmental Direction: Management of Tannins from Vegetation Mulch, Roads and Maritime Services: Sydney (RMS, 2012)
- Erosion and Sediment Management Procedure – RTA Procedures PN 143P (RTA, 2009)
- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries
- *Fishnote – Policy and Guidelines for Fish Friendly* Waterway Crossings (Ref: NSWF – 1181) (NSW Fisheries, November 2003)
- Guideline for Construction Water Quality Monitoring (RTA, 2003)
- Guidelines for 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 QA Specification G1 – Job Specific Requirements for The M12 Motorway
- TfNSW QA Specification G36 – Environmental Protection (Management System)
- TfNSW QA Specification G38 – Soil and Water Management
- TfNSW QA Specification G40 – Clearing and Grubbing
- TfNSW QA Specification R272 - Automatic Weather Stations
- PS311 – Environmental Design and Compliance.

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	Document reference
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 1.6
	(d) Soil and contamination - DPE Water, Water NSW and relevant council(s)	
	(e) Surface water and groundwater - DPE 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:	This Plan
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	Section 2.2 Section 2.3
	(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

CoA No.	Condition Requirement	Document reference
C7	The Surface Water and Groundwater CEMP Sub-Plan must be based on a detailed site investigation of contamination risk and include, but not be limited to:	This Plan Section 1.5.2 Section 3.1.2
	(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 B
	(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 C
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:	This Plan Section 1.5.1 Section 1.6
	(b) Surface Water Monitoring Program - DPI Water, Sydney Water (if there are any discharges to their assets), relevant councils	OCSWMP Section 1.6 Appendix B
	(c) Groundwater Monitoring Program - DPI Water	OCSWMP Section 1.6 Appendix B

3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this CSWMP are listed in Table 3-2. 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	Document Reference
SWH01	A Construction Soil and Water Management Plan (CSWMP) will be prepared for the project. The plan will outline measures to manage soil and water impacts associated with the construction works, including contaminated land. The CSWMP will provide:	Prior to construction	This CSWMP
	• Measures to minimise/manage erosion and sediment transport both within the construction footprint and offsite including requirements for the preparation of Erosion and Sediment Control Plans (ESCP) for all progressive stages of construction	Prior to construction	Section 6.1
	• Measures to manage waste including the classification and handling of spoil	Prior to construction	CWRMP
	• Procedures to manage unexpected contaminated finds including asbestos which would be outlined in the Contaminated Land Management Plan and asbestos management plan to be prepared for the Project	Prior to construction	CCLMP
	• Measures to manage stockpiles including locations, separation of waste types, sediment controls and stabilisation	Prior to construction	Section 6.5 Appendix D CWRMP
	• Measures to manage groundwater de-watering and impacts including mitigation required		Section 6.8 Section 6.14 Appendix C

ID	Measure/requirement	Timing	Document Reference
	• 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 C
	• Measures to manage potential tannin leachate	Prior to construction	Section 6.6 Appendix F
	• 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 B
	• 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 Licences, permits and exemptions

Prior to the activity, Seymour Whyte will provide TfNSW evidence of receipt of the approval, licence and/or permit from the relevant authority (refer to Section 7.4).

3.4.1 Environment Protection Licence

The M12 Central package is subject to an EPL (Number 21596) as a Scheduled Activity for 'road construction'. The EPL typically prescribes water quality parameters to be measured and associated discharge criteria for licenced discharge points. The EPL also details the monitoring and analytical requirements by reference to authority publications, e.g. Approved Methods for Sampling and Analysis of Water Pollutants in NSW (EPA, 2022).

In accordance with NSW CoA E105, the M12 Central package will be constructed so as to meet the water quality requirements as identified in the EPL.

3.4.2 Water access licence

Seymour Whyte may use surface and ground water as part of the M12 Central Construction Water Strategy. No water will be taken from waterways or from groundwater without obtaining all required approvals and written approval from TfNSW.

3.4.3 Dredging or reclamation

Seymour Whyte will be required to notify NSW Department of Primary Industries (DPI) Fisheries in accordance with the *Fisheries Management Act 1994* of any dredging or reclamation works including temporary watercourse crossings or in stream work platforms (refer to the Glossary/Abbreviations to this plan for the definitions of these terms).

Temporary creek crossings will be required for the construction of bridges at South Creek and Kemps Creek. The EWMS for activities involving dredging or reclamation works will be prepared in consultation with DPI Fisheries.

3.4.4 Resource recovery exemption

Resource recovery orders and resource recovery exemptions allow some wastes to be beneficially and safely re-used independent of the usual NSW laws that control applying waste to land.

The M12 Central Construction Water Strategy has identified water from Sydney Metro's Western Sydney Airport tunnel water treatment plants and Western Sydney Airport recycled water sourced from a dedicated pipeline from Glenfield Water Recycling as a potential source of construction water for the Project. These water sources are classified as a waste and will require resource recovery orders and resource recovery exemptions to permit its use on the site.

Seymour Whyte would work with Sydney Metro and WSA Co. to apply for the resource recovery orders and resource recovery exemptions to realise these opportunities if they are determined to be feasible.

3.5 TfNSW QA Specifications

The TfNSW QA Specifications set out the minimum requirements for the detailed outcomes in terms of quality or performance expected in the finished product for construction projects and are relevant to various construction activities on work sites to minimise impacts to the environment.

This CSWMP incorporates the relevant requirements for soil and water management from the TfNSW QA Specifications prepared for the *M12 Motorway (Central), Construction between Badgerys Creek and the Water Tower Access Road, Cecil Hills,* including:

- G36 – Environmental Protection
- G38 – Soil and Water Management (Soil and Water Management Plan)
- R272 – Automatic Weather Stations.

The specifications set out environmental protection requirements, including Hold Points and Witness Points that must be complied with during construction of the M12 Central package. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from TfNSW. Witness Points are an identified point in the process where TfNSW request to, review, witness, inspect method and/or process of work. The activities, however, may proceed. For processes under the CEMP, the request for release of Hold Points and Witness Points is to be made through the TfNSW ESM (or delegate).

Details of the Hold Points and Witness Points relevant to this Plan are outlined in Section 7.4.

Cross references are included in Appendix A, to indicate where the relevant TfNSW QA specifications have been addressed in this Plan or other Project documents.

3.6 Infrastructure Sustainability Council

The M12 Central package will employ an integrated approach to sustainability to ensure effective implementation and tracking of initiatives. This approach includes the identification of requirements in Plans for clarity of objectives and transparency in implementation. While the M12 Central Sustainability Management Plan details the overall requirements and targets for the M12 Central package, Table 3-3 summarises the sustainability requirements for ecology to demonstrate compliance with Infrastructure Sustainability Council (ISC) Infrastructure Sustainability (IS) Version 1.2 Rating Tool credit benchmarks.

Table 3-3: Water quality specific sustainability targets

ISC Reference	Commitment	Document reference
Dis-1	Measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented.	Section 6
Dis-1	Monitoring of water discharges and receiving waters is undertaken at appropriate intervals and at times of discharge during construction.	Appendix B

4 Existing Environment

The following section summarises the existing soil and water conditions within and adjacent to the M12 Central package, based on information contained in the EIS. Baseline surface water and groundwater data is provided in the Construction Soil and Water Quality Monitoring Program (Appendix B).

The key reference documents are:

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

4.1 Topography, geology and soil characteristics

4.1.1 Topography

The topography of the M12 Central package area may be characterised into two 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 M12 Central package	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 two meandering creeks South Creek and Kemps Creek, with each creek flowing to the north.
Creek Channels/Alluvial floodplain	Dissects the flat to gently undulating terrain within the M12 Central package	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 data from geotechnical borehole logs, the M12 Central package 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 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

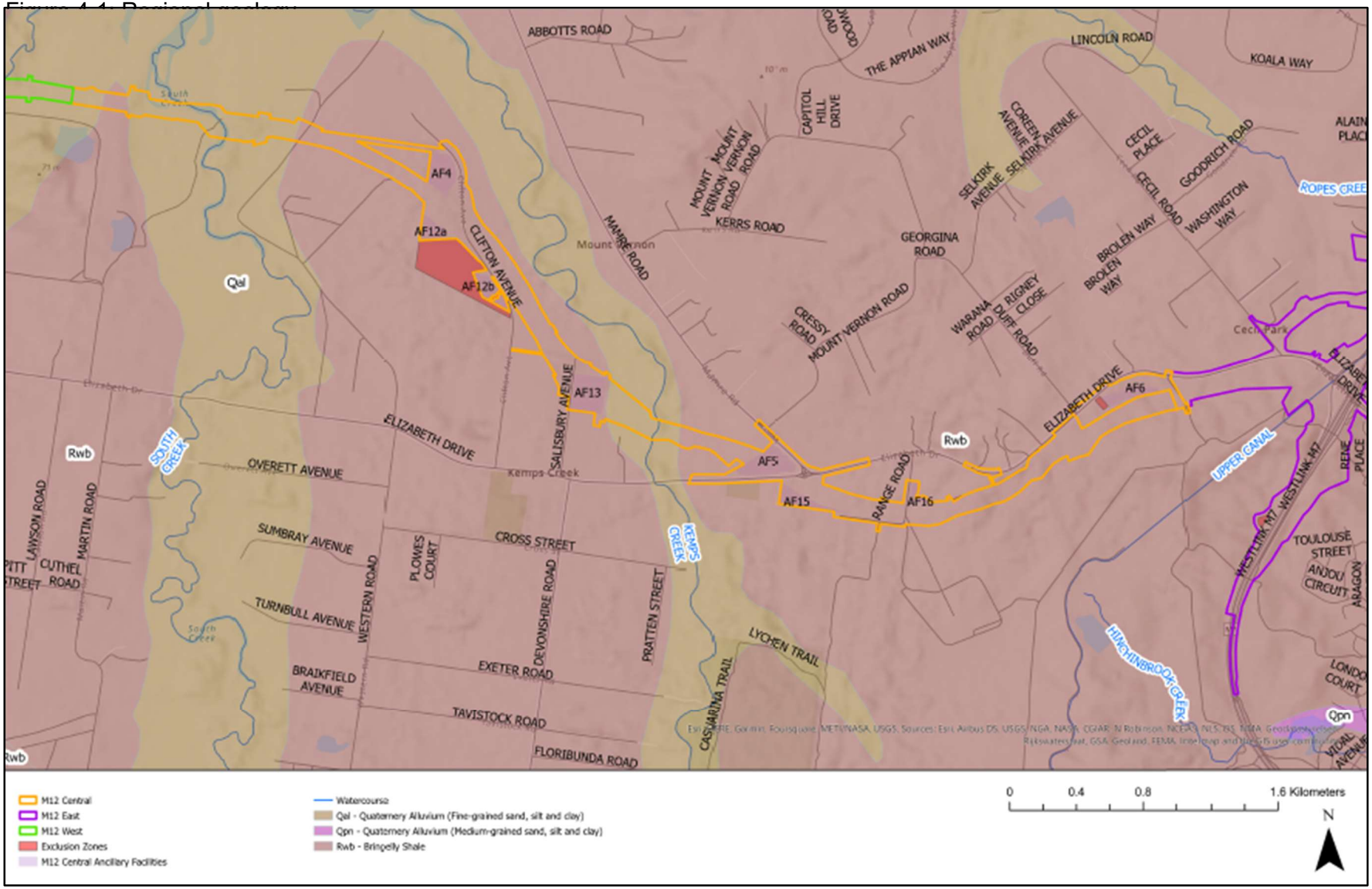
The alluvium deposits are relatively thin, occurring between about 2.5 metres below ground level (BGL) to 7.0 metres BGL.

Geotechnical boreholes carried out for the M12 Central package encountered siltstone, sandstone and interlaminated siltstone, and sandstone at typical depths of about one metre BGL to five metres BGL. Based on these 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 igneous dykes/intrusions may be present.

The M12 Central package may be crossed at one location 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, which may be an expression of regional faulting trends.


ABBOTTS ROAD
THE APPIAN WAY
LINCOLN ROAD
KOALA WAY
CAPITOL HILL DRIVE
MOUNT VERNON ROAD
COREEN AVENUE
SELKIRK AVENUE
CECIL PLACE
CECIL ROAD
GOODRICH ROAD
WASHINGTON WAY
ROPES CREEK
KERRS ROAD
MAINE ROAD
GEORGINA ROAD
BROLEN WAY
CRESSY ROAD
MOUNT VERNON ROAD
WARANA ROAD
RIGNEY CLOSE
DUFF ROAD
ELIZABETH DRIVE
AF4
AF12a
AF12b
CLIFTON AVENUE
AF13
SALISBURY AVENUE
AF5
AF6
AF15
AF16
RANGE ROAD
Qal
Rwb
SOUTH CREEK
OVERETT AVENUE
Kemps Creek
LAWSON ROAD
MARTIN ROAD
CUTHEL ROAD
SUMBRAY AVENUE
CROSS STREET
PLOWES COURT
WESTERN ROAD
DEVONSHIRE ROAD
PRATTEN STREET
KEMPS CREEK
TURNBULL AVENUE
BRAIKFIELD AVENUE
EXETER ROAD
TAVISTOCK ROAD
FLORIBUNDA ROAD
CASUARINA TRAIL
LYCHEN TRAIL
HINCHINBROOK CREEK
UPPER CANAL
WESTLINK M7
TOULOUSE STREET
ANJOU CIRCUIT
ARAGON
RENE PLACE
LONDON COURT
VIDAL AVENUE
Qpn
M12 Central
M12 East
M12 West
Exclusion Zones
M12 Central Ancillary Facilities
Watercourse
Qal - Quaternary Alluvium (Fine-grained sand, silt and clay)
Qpn - Quaternary Alluvium (Medium-grained sand, silt and clay)
Rwb - Bringelly Shale
0
0.4
0.8
1.6 Kilometers
N

4.1.3 Soil landscape

Based on a review of the 1:100,000 scale Soil Landscape Map for Penrith (Bannerman and Hazelton 1990), the M12 Central package 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 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 the eastern end of the M12 Central package	• 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 tip of the M12 Central package	• 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 • Potential for mass movement and slope instability (i.e. land sliding)

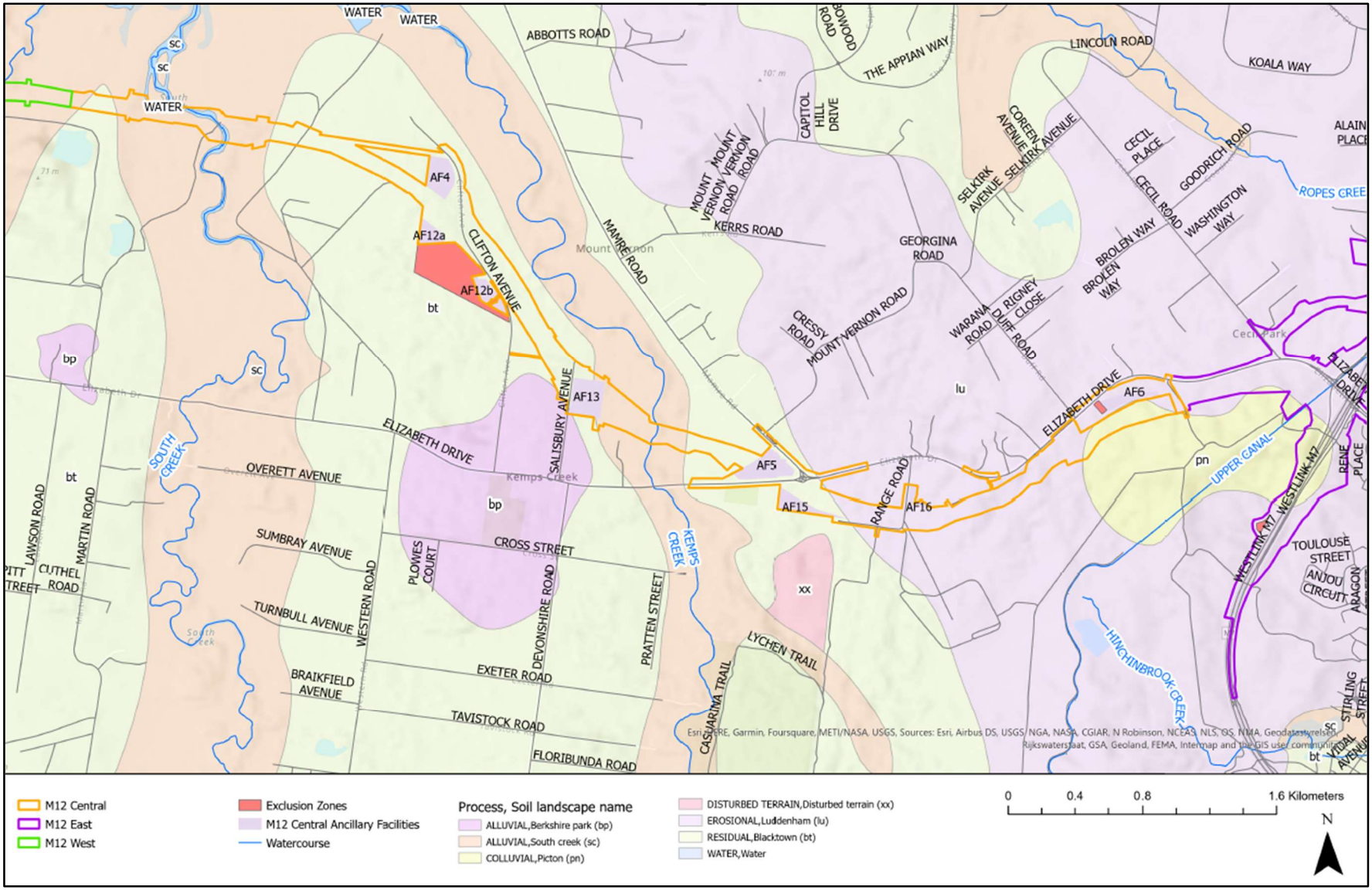


Figure 4-2: Soil landscapes

4.1.4 Soil salinity

The Salinity Potential in Western Sydney 2002 Map (DLWC, 2002b) indicates that soils within the majority of the M12 Central package 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 along Kemps Creek
- 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 M12 Central package 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 M12 Central package 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 construction footprint.

A search was carried out within Penrith Council (2010) and Liverpool Council (2008) Local Environmental Plan (LEPs) for ASS risk maps for the M12 Central package 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 of the M12 Central package.

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.

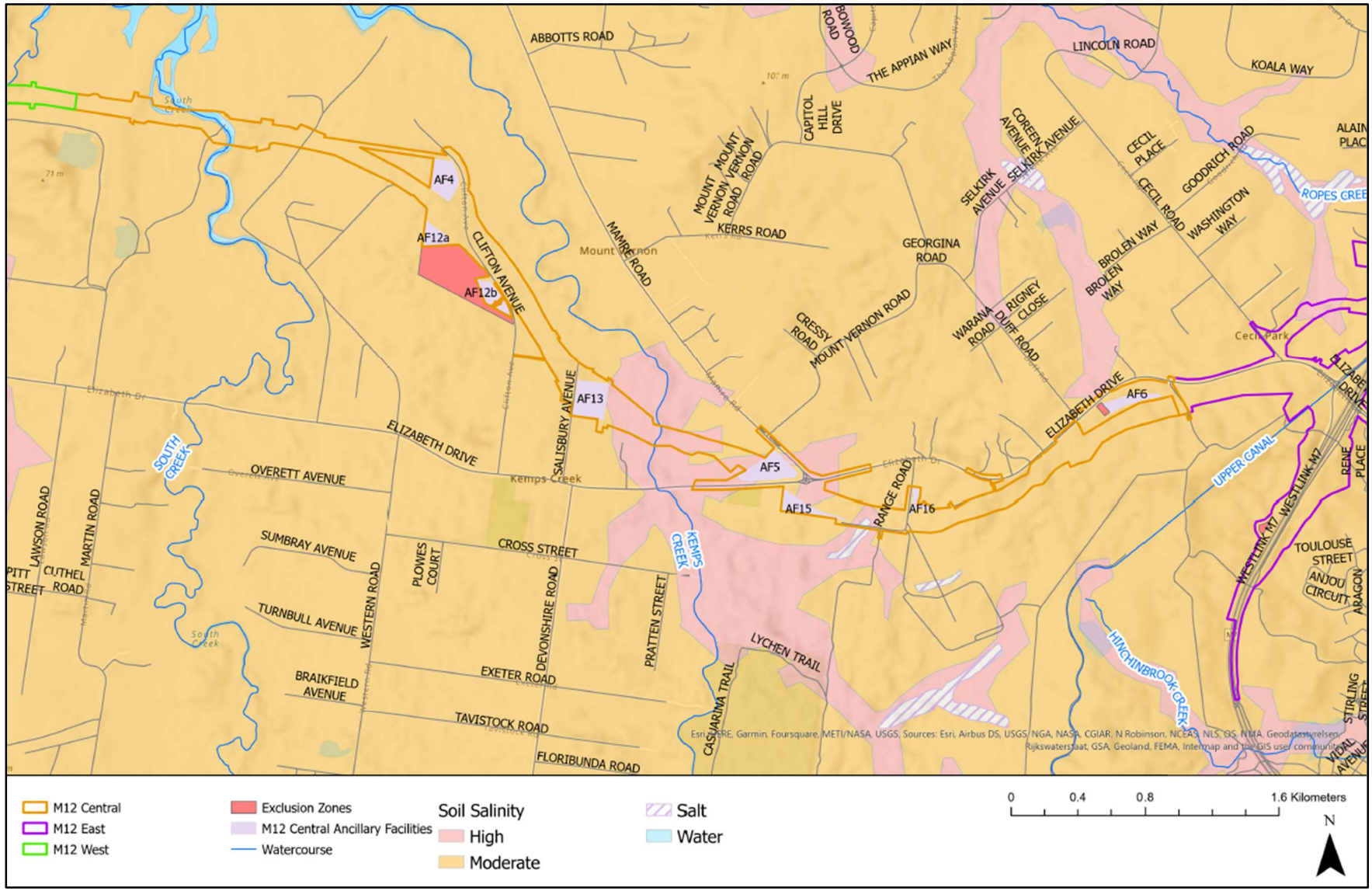


Figure 4-3: Soil salinity risk map

4.2 Surface water

4.2.1 Catchments and waterways within or adjacent to the M12 Central package

The M12 Central package 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 M12 Central package in the southeast is located within the Georges River catchment.

The M12 Central package intersects a number of waterways, ephemeral drainage lines and their associated catchments:

- 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 vicinity of the M12 Central package are shown in Figure 4-4.

4.2.2 Geomorphology and river style

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

Table 4-4: Summary of watercourse geomorphology

Watercourse	Watercourse description	Geomorphological description
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.

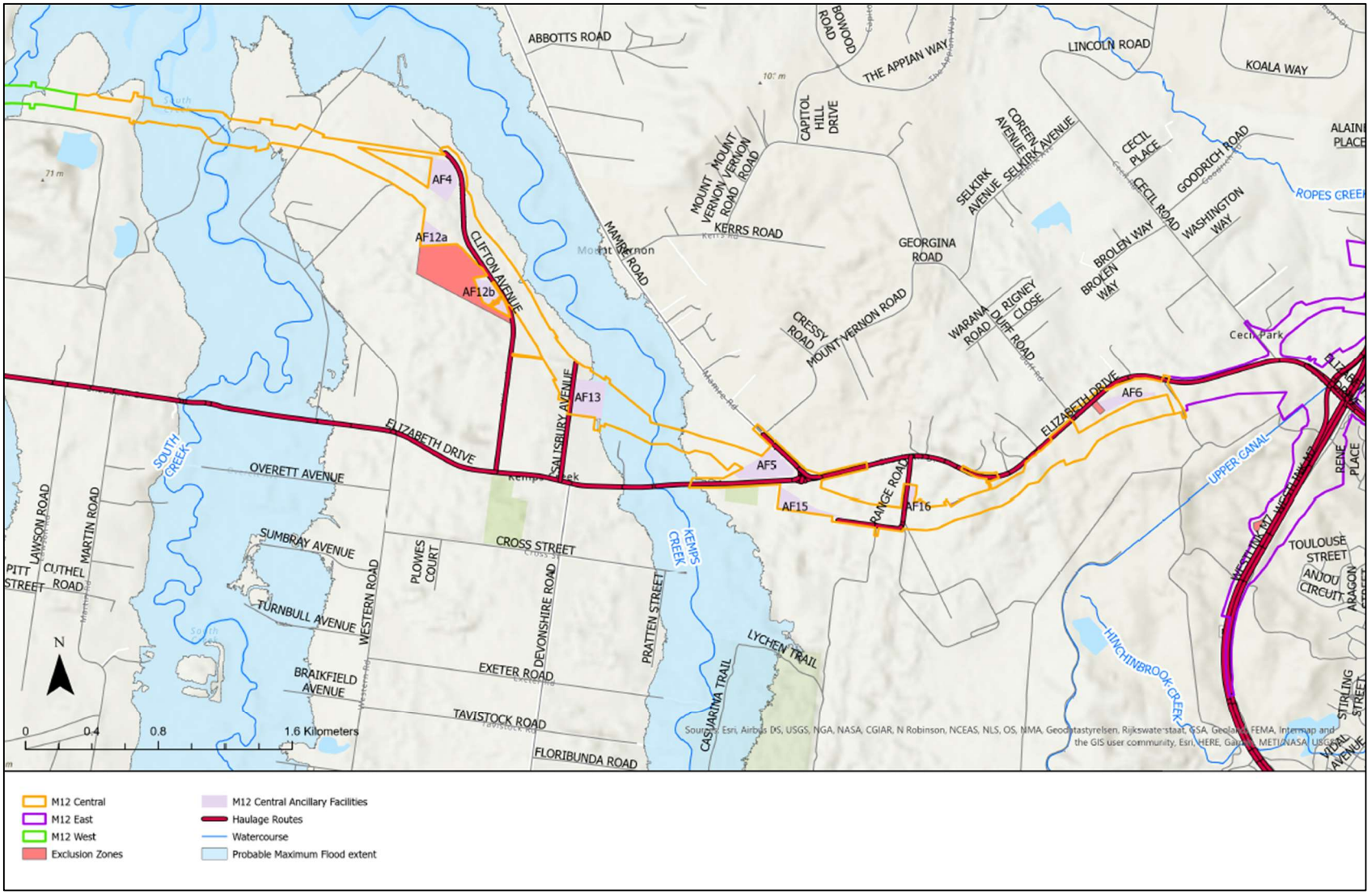


Figure 4-4: Key waterways and sensitive receiving environments

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.

Kemps Creek is the only waterway or other surface water features within the vicinity of the M12 Central package considered to be a SRE as mapped on Figure 4-4.

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 include locations relevant to the M12 Central package at South Creek, Kemps 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 are provided in Appendix B.

4.3 Groundwater

Two groundwater systems have potential to interact with the M12 Central package:

- 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 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 24 registered groundwater bores in the vicinity of the M12 Central package of which 22 are registered as exploration bores.

Two of the 24 bores have a purpose relating to water supply (i.e. irrigation, stock and domestic, water supply or commercial/industrial). The closest of these two bores is located about 400 metres away from the construction footprint.

Based on reported bore depth, one of these bores (GW105016.1.1 at 253m depth) is inferred to be accessing Hawkesbury Sandstone groundwater systems. This bore is located around 2.6 km 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 M12 Central package groundwater monitoring bores are considered to generally respond slowly to rainfall. Therefore, monitored groundwater levels, particularly in bedrock groundwater systems, whilst coinciding with below average rainfall, are expected to be influenced by the period of pronounced groundwater recharge from 2007 to March 2017. As a result, monitored groundwater levels during the Project's monitoring period are considered likely to be similar to or above long-term average levels and not uncharacteristically low.

Additional assessments were undertaken for a review of design consistency against the EIS for the M12 Central by GHD (2021). The M12 Central consistency assessment identified that the groundwater levels in M12 Central package range from 41.2 to 49.5 AHD (across boreholes BH622, BH623, BH908, BH909 and BH911).

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. No groundwater monitoring boreholes are located within the M12 Central package.

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

The baseline monitoring locations and the detailed baseline results from April 2019 through to March 2021 are provided in Appendix B.

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 M12 Central package.

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 M12 Central package construction footprint are described as either Cumberland Shale Hills Woodland or Cumberland River Flat Forest.

4.4 Rainfall and climate

The average yearly rainfall in the vicinity of the M12 Central package, 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 the M12 Central package.

The rainfall erosivity factor and other RUSLE parameters for the sizing of temporary sediment basins for the M12 Central package are summarised in Table 4-5.

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

Parameter	Value
Rainfall parameter	
Rainfall depth duration (days)	5 day
Rainfall percentile	85th
Rainfall depth (mm) – 5 day	32.2mm
Volumetric Runoff Coefficient, cv	0.64
Rainfall intensity for 2 year ARI, 6 hr duration	The BoM reports the 2-year, 6-hour rainfall event as 8.91 mm/hr for Kemps Creek.
Revised Universal Soil Loss Equation (RULSE) Parameter	
Soil/Sediment Type	D or F
Erodibility, k	0.046
Rainfall Erosivity, R	2500
Hydrologic Soil Group	D
Soil Cover, C	1
Soil Conservation Practices P	1.3
Length Slope Factors, LS	Variable

4.6 Flooding

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

Table 4-6: Existing flood conditions for the M12 Central package during a 100-year ARI flood event

Catchment	Flood conditions during a 100 year ARI flood event
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 M12 Central package.
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 M12 Central package that could result in adverse impacts to soils and water quality include:

- Site establishment
- Vegetation clearing and topsoil stripping
- Site access
- Service and Utility relocation
- 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.
- Finishing work and site restoration

Refer also to the Initial Risk Register included in Appendix A2 of the CEMP.

5.2 Impacts

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

- Exposure of soils during vegetation clearing and earthworks, creating the potential for offsite transport of eroded sediments and pollutants

- Decline in water quality and generation of turbidity due to disturbance of sediments during in-stream or riparian zone works
- Scour in the receiving drainage lines at the downstream limit of the drainage works
- Damage to ancillary facilities (including flood damage) that could result in an export of pollutants to receiving waters
- Disturbance of asbestos-containing material from imported fill sites, historical dump sites or during demolition of structures
- Contamination of soils, and surface and groundwater from accidental spills or oil leaks that could pollute receiving waterbodies
- Contamination of surface and groundwater from disturbance of unknown in-situ contaminated soils (such as asbestos, hydrocarbons or chemical impacted soils)
- Disturbance of acid sulphate soils, creating the potential for oxidation of these soils and subsequent generation of acidic runoff
- Changes to hydrology have the potential to impact on artificial wetlands (farm dams, roadside drains, effluent treatment systems)
- Contamination or other impacts to underlying aquifers from dewatering associated with piling and utility relocation activities that occur in areas where the perched shallow water table is present and close to the ground surface
- 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 M12 Central package 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 Central package gives rise to the potential for cumulative soil and water impacts. Projects within the vicinity of the M12 Central package include, but are not limited to:

- Other Project packages, M12 East and M12 West, M7 widening
- Western Sydney International Airport
- Sydney Metro – Western Sydney Airport
- Western Sydney Aerotropolis
- Sydney Water Treatment Facility and associated infrastructure
- 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 6.17.

Regular interface meetings will be undertaken with government authorities, neighbouring Project packages, other projects, and stakeholders as detailed in Section 5.5.2 and 5.5.3 of the CEMP and within the Overarching Communication Strategy (OCS).

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 M12 Central package. 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 the M12 Central package and will be provided to the EPA for review as part of the EPL application process.

Site-specific Progressive Erosion and Sediment Control Plan (PESCPs) will be prepared for each construction stage in accordance with Erosion and Sediment Control Procedure in Appendix D. A concept Erosion and Sediment Control Plan is provided in Appendix E. Throughout construction the PESCP will be developed in accordance with the concept ESCP.

The PESCPs will be prepared and inspected by suitably qualified personnel accepted by TfNSW (refer to Section 7.4). Evidence of suitable qualifications must include completion of recognised training in Blue Books 1 and 2D and erosion and sedimentation control and have suitable on site, hands on experience in preparing such plans, including refresher training as appropriate.

The ESCP must be signed and approved by the ESR, Construction Superintendent, Project Manager and Seymour Whyte's Soil Conservationist before submitting the ESCP to TfNSW for review at least 10 working days before disturbance occurs (refer to Section 7.4). TfNSW must review the ESCP before releasing the hold point.

Erosion and sediment control plans must be submitted to TfNSW for acceptance at least 10 days prior to the commencement of works in each catchment requiring the installation of erosion control and sediment capture measures not previously addressed by an ESCP (refer to Section 7.4). The drawing(s) must be signed and approved by the Environmental Site Representative (ESR), Project Manager, and Superintendent before being submitted to TfNSW.

At least five days prior to the disturbance of the existing surface on a section of the Site (catchment), other than for the installation of erosion and sediment capture measures, TfNSW must be provided with written advice that the measures described in the ESCP and included on the drawing submitted progressively for that section of the Site including sediment basins and other water quality structures together with associated temporary or permanent connecting stormwater drainage lines and/or catch drains, have been implemented or the date by which implementation will be completed (refer to Section 7.4). This witness point must be signed by the ESR and Superintendent.

ESCP will be revised progressively at key programme stages, when work methods change, or whenever work methods and control structures are found to be ineffective or no longer required.

The effectiveness of the ESCP must be reviewed following each rainfall event exceeding 10mm (refer to Section 7.3). Where the erosion and sedimentation control measures, stabilisation control measures and other soil and water control measures are found to be not fully effective, the PESCP must be reviewed and where required updated including review of design parameters used for BLUE BOOK calculations. The Stockpile Management Procedure (Appendix G) must be updated where controls relating to stockpiles have failed.

6.2 Sediment basin management

Temporary sediment basins will be required throughout the M12 Central package 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. Sediment removed from sediment basins will be appropriately managed. If sediment is disposed of, it must be classified and disposed of legally (refer to the CWRMP) (including potentially contaminated sediment) both during and immediately prior to Completion of the project.

Stormwater capacity of sediment basins must be re-established promptly after each rainfall event (routinely within 5 days but sooner if a major rainfall event substantially diminishes residual stormwater capacity, or otherwise to meet the EPL requirements). This may involve reuse of the water for dust suppression or discharging it after appropriate treatment of the water so that it meets specified requirements (refer to Section 6.8). Re-use captured stormwater for construction activities, whenever possible.

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 Construction Water Quality Monitoring Program (to be completed by other M12 Motorway packages as there are no groundwater monitoring bores within the vicinity of the M12 Central package)
- 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 topsoil stripping.

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

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 contamination

Where there is a moderate risk of encountering PASS, a Field pH Test and Peroxide Tests in accordance with the procedure in the NSW Acid Sulfate Soil Manual, ASSMAC 1998 will be completed at incremental depths through the soil profile to assess the distribution of ASS.

If the Field pH Test and Peroxide Tests indicates the presence of ASS, chemical analysis of samples are to be collected by a suitably qualified person at a representative locations and sampling density and analysed at a NATA accredited laboratory using methods recognised for the identification of acid sulfate soils (e.g. Chromium Reducible Sulfure (CRS) methodology and Suspension Peroxide Oxidation Combined Acidity and Sulfur (SPOCAS) methodology).

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 QA G38. This will include:

- Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed
- Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion
- Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required
- Locating stockpiles outside of the tree protection zone of trees or native vegetation identified for retention. Tree protection zones to be delineated in accordance with AS 4970
- Locating stockpiles at least five metres from likely areas of concentrated water flows and at least 10 metres 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 two metres, 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.
- Inspect all stockpile sites at least weekly and rectify any non-conformances to erosion and sediment controls immediately.

A Stockpile Management Procedure (Appendix G) has been prepared to outline the requirements for stockpiles. Stockpile locations must be determined to comply with the Procedure and must be idented on PESCPs that have been approved by TfNSW prior to establishment. Since this CSWMP (CEMP Sub-plan) contains a stockpile management protocol (Appendix G Stockpile Management Procedure), a material stockpile area located within the construction boundary is not considered to be an ancillary facility.

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

Tannins are naturally occurring plant compounds that can leach out of mulched vegetation stockpiled in areas that are subject to inundation. Tannin impacts may result in dark coloured water discharge from construction sites. This impact can be obvious and may raise the concern of the community and other stakeholders including regulatory authorities.

Once discharged to the environment, tannins may reduce visibility and light penetration, increase the biological oxygen demand (BOD) and change the pH of receiving waters. These impacts may affect aquatic ecosystems in receiving environments.

Stockpiles of mulched vegetation will be managed in accordance with the Tannin Management Procedure provided in Appendix F to reduce the risk of tannin leachate from mulch flowing into waterways. The Tannin Management Procedure has been prepared in accordance with the TfNSW Environmental Direction 25: Environmental Direction Management of Tannins from Vegetation Mulch (2012).

6.7 Water abstraction management

In accordance with the sustainability targets established for the M12 Central package, Seymour Whyte will target reductions in water use, in particular potable water, and increase reuse water (non-potable water) during construction including rainwater, stormwater, wastewater, and groundwater.

A Construction Water Strategy has been developed by TfNSW in accordance with REMM SWH03. Seymour Whyte have developed a stage specific construction water strategy to reduce reliance on potable water (refer to CWRMP Appendix D). The Strategy details considerations of the current and future demand of potable water within the M12 Central package, and considers possible alternate water sources to be used for construction, where potable water may not be required.

For the M12 Central Package, around 302.5 ML of water would be required. This would comprise of a core potable water demand of about 51.5 ML per year and recycled water of about 251 ML in total.

Construction will be managed in accordance with the Construction Water Strategy and TfNSW QA Specification G38 Clause 6.8 with the aim of reducing use of potable water for construction and meeting targets for use of non-potable water.

Water may be extracted from construction sediment detention basins during construction, including farm dams located on the Site for construction purposes. Where water is proposed from farm dams, and EWMS must be prepared and the Farm Dam Dewatering Procedure provided in Appendix H of the CFFMP implemented, to assess and manage impact to aquatic flora and fauna.

Seymour Whyte 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, procedures for regular testing to ensure that the water is suitable for the purpose and is not hazardous to health and the environment will be developed.

Table 6-1 provides a summary of the proposed reuse water sources for the M12 Central package and the associated approval and licence. The use of reclaimed water will comply with the requirements of TfNSW Environmental Direction 19: Use of Reclaimed Water.

Table 6-1: Water reuse sources

Source	Licence and approvals
Farms dams within the construction footprint	EPL Conditions Exempt under the *Water Management (General) Regulation 2018 (NSW) (Regulation)*
Temporary sediment basins	EPL Conditions
Western Sydney Airport recycled water sourced from a dedicated pipeline from Glenfield Water Recycling	Execution of Interface Agreement with WSA Co. Site specific resource recovery order (order) and resource recovery exemption (exemption)
Sydney Metro's Western Sydney Airport tunnel water treatment plants	Execution of Interface Agreement with Sydney Metro Site specific resource recovery order (order) and resource recovery exemption (exemption)
Groundwater (installation of new groundwater bores on site) (Note: this source is not included within or assessed by the Environmental Assessment Documentation as a source for construction water)	A consistency assessment to review the environmental impacts of the bore and to determine if a modification would be required. An aquifer interference approval under Section 91 of the Water Management Act 2000
River water local waterway	Schedule 4 of the Water Management (General) Regulation 2018 provides exemption for TfNSW to use water for dust suppression having considered the environmental impact of such an activity.

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.

If the proposed source is other than a town water supply or natural water source, a monitoring procedure will be developed and implemented for regular testing to ensure that the water is suitable for the purpose and is not hazardous to health and the environment.

6.8 Dewatering management

Dewatering is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location within the M12 Central package (including from sediment basins and dams) and the subsequent reuse or discharge of that water.

Seymour Whyte will plan to avoid and minimise discharges as much as practicable, while complying with the conditions of the EPL, and undertake dewatering activities in a manner to minimise erosion and pollution of the environment. The M12 Central package is subject to an EPL which includes discharge criteria for licenced discharge points.

TfNSW prepared a Water Quality Impact Assessment (Impact Assessment of Sediment Control Basin Discharges to Waterways Doc Number M12CDD-GHDA-ML2-EV-RPT-000010) to support the EPL application. This report included an assessment of the impacts of proposed construction-phase sediment basin discharge limits against the NSW Water Quality Objectives (WQOs) for the M12 Central package location. It follows the methodology outlined in the draft Guideline for assessing the Impacts of Treated Water Discharge from Water Quality Treatment Controls developed by TfNSW (TfNSW, 2020a). Based on the recommendations of this assessment, EPL 21596 has specified the following discharge concentration limits from the licenced discharge points:

- Oil and grease – not visible
- pH – 6.5 – 8.5
- Turbidity – 50 NTU

A Dewatering Management Plan has been prepared (refer to Appendix C) with a Trigger Action Response Protocol (TARP) to outline disposal options.

The Dewatering Management Plan includes details on the treatment of water when a flocculant or coagulant is necessary to settle suspended sediments. Where a flocculant or coagulant other than gypsum is proposed to treat site water, the ESR 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.

The controlled activity guidelines 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 in consultation with DPI Fisheries and submitted to TfNSW prior to the commencement of the works for approval (refer to Section 7.4). 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 metres away from aquatic habitats unless otherwise approved by TfNSW
- flood risks and impacts on surrounding properties
- provision of innovative all-weather haulage crossings methods that address the above clauses and minimise ongoing maintenance requirements during service.

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

- Work in waterways will be scheduled during periods of predicted low flow wherever possible.
- Implementing practices to minimise disturbance of banks
- Where possible, reclaim existing creek/ river bed material and utilise the material in the reconstruction of the creek/ river.
- Undertaking bank stabilisation and installing instream structures
- Progressively stabilise disturbed creeks/ rivers to avoid potential scouring and sedimentation and permanent stabilisation measures implemented as soon as practicable.
- 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 required for the M12 Central package will be designed, constructed and maintained 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).

As per other works in waterways, an EWMS for the work(s) will be prepared in consultation with DPI Fisheries and submitted to TfNSW prior to the commencement of the works for approval (refer to Section 6.9).

Temporary waterway crossings and erosion and sediment controls will be managed by the ESR and designed by a suitably qualified and experienced person. The temporary water crossings and ESCP will be reviewed by Seymour Whyte's Soil Conservationist.

Consideration will be given to flood risks and impacts on surrounding properties; and provision of innovative all-weather haulage crossings methods in accordance with the Blue Book that and minimise ongoing maintenance requirements during service. In accordance with Section 6.1.2 of the CFMP, flood modelling of the proposed design of temporary waterway crossings must be completed prior to the commencement of any temporary works in drainage lines (including temporary waterway). Seymour Whyte will provide TfNSW with a 3D model of the proposed temporary drainage and earthwork extents for TfNSW to run the flood modelling.

Seymour Whyte will liaise with nearby residential or commercial property owners to determine any water discharge requirements (i.e. frequency of discharge, volumes, water quality criteria, etc.) and make allowances in the design and construction of the temporary waterway crossings or diversions for such requirements. Requirements for temporary waterway diversions will be discussed at the Environmental Risk Assessment Workshop (refer to CEMP Section 4.1.1).

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 metres 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 Safety Manager (or delegate) 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.

Designated impervious bunded washdown facilities for concrete trucks and other vehicles will be provided at least 100 metres from areas prone to flash flooding or 50 metres away from other natural and built drainage lines.

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 the M12 Central package Pollution Incident Response Management Plan (PIRMP), as required by the EPL. The PIRMP will be prepared and tested in accordance with *Environmental Guidelines: Preparation of Pollution Incident Response Management Plans* (EPA, 2012).

The PIRMP includes a description and likelihood of hazards on site, including an inventory of potential pollutants, pre-emptive actions to be taken to minimise or prevent risk of pollution incidents and harm to site personnel, safety equipment available, a list of contact details for response or notification and community communication tools. The PIRMP 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 6.4.2 of the CEMP.

6.13 Spill prevention and response

A Spill Response and Management Procedure has been incorporated into the Pollution Incident Response Management Plan (PIRMP) (refer to CEMP Section 6.4.2 and Appendix A9) to minimise impacts from spills. The Procedure details on the requirements for managing, cleaning up and reporting of spills.

The CEMP Appendix A7 details the Projects Incident Classification and Reporting Procedure including the incident (including spills) response process (Figure 2-1 of Appendix A7).

Spill kits will be located to allow for timely response to uncontained spills including:

- Construction ancillary facilities compounds
- Each structures site (bridges and culverts) during structure construction works
- Within supervisors site vehicles.

All spills will be cleaned up and reported as an environmental incident. Site inductions will include a briefing on the use of spill kits.

Procedures will also be prepared prior to the commencement of the following activities, as a minimum, to minimise the possibility of pollution of the site prior to the commencement of the associated activity and included in the work packs for that activity:

- 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.

Where related to an activity for which an EWMS is also required, the procedure will be submitted with the related EWMS under the TfNSW QA Specification G36 Hold Point 4.13 (refer to Section 7.4).

6.14 Impacts on water supply

In accordance with NSW CoA E24, properties where modelling in the Environmental Assessment Documentation predicts that the M12 Central package 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 CFMP (Appendix B8 of the CEMP).

As part of the detailed design investigations, the effect of the project on farm dam yields was assessed in more detail. Four farm dams potentially affected by the M12 Central portion within land that is zoned primary production have been identified and these occur in the Ropes Creek on the north side of Elizabeth Drive.

The changes in catchment area of these dams are minor and range from zero to 3.9%. The net effect on the water balance is also minor. Three of the affected dams are predicted to have a small increase in the annual yield that is greater than the loss in annual yield from the reduced catchment size. The fourth dam will have no change in annual yield resulting from the Project. As a result, at this time no measures are required to prevent, mitigate or offset a loss in water supply.

In the event that circumstances change, this Plan will be updated with 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, Seymour Whyte will engage a suitably qualified and experienced independent professionals, approved by TfNSW, to advise and assist in determining appropriate mitigation measures on farm dam impacts from stormwater yields during construction.

6.15 Site Stabilisation

A Site Stabilisation Procedure (Appendix H) will be implemented for the staged stabilisation of the Works throughout Construction. The Site Stabilisation Sub-Plan includes:

- Site stabilisation objectives
- identification and mapping of areas along the length of the proposal requiring stabilisation (to be updated progressively through the ESCPs)
- a risk assessment framework for disturbed areas and stockpiles
- identification of timing for stabilisation
- detailed description of methods for stabilisation
- identification of areas and a program for progressive, permanent stabilisation such as implementation of landscaping
- a procedure for regularly monitoring and assessing the performance and effectiveness of your stabilisation control measures against the site stabilisation objectives and for implementing improvements
- a procedure to ensure all stabilisation risk areas would be stabilised within the periods listed in timeframes specified
- a process for identifying additional stabilisation methods.

Soil erosion and sediment control measures for any area must remain in place and be maintained at least until the new vegetation provides sufficient protection to keep erosion to a similar level to that of typical local natural bushland as agreed with the Principal

6.16 Wet weather preparation and review

Where a wet weather event is predicted, a review of site erosion and sediment controls must be undertaken. 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 ESR (or delegate), 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 a 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 7.3.

6.17 Management measures

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

Table 6-2: Soil and water management and mitigation measures

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
Erosion and sediment control					
SW1	ESCPs must be prepared in accordance with this CSWMP and submitted for approval by TfNSW prior to the commencement of works in that area. The ESCP must be prepared by a person with demonstrated skills and experience in preparing the ESCP in accordance with the Blue Book guidelines (Landcom, 2004) and TfNSW QA G38.	ESCP Hold point release	Prior to construction	ESR	TfNSW QA Specifications
SW2	ESCPs must be updated to reflect site conditions at the time of construction. Refer to the Erosion and Sediment Control Procedure in Appendix D for the procedure for updating drawings, and keeping a register of all such drawings with the dates of submission, approval, and commencement of work on that section.	ESCP	During construction	ESR	TfNSW QA Specifications
SW3	Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the “Blue Book”, as well as relevant TfNSW Guidelines.	Inspection records	During construction	Superintendent / Foreman/Site Supervisor	REMM SWH01 NSW CoA E84

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW4	ESCPs to include measures to protect earthworks including but not limited to: • Provide and maintain measures for drainage of the working areas without scouring from the surface run-off. • Prevent water ponding in the working areas and • take precautions to minimise any ingress of water into the earthworks material • Seal off ripped material remaining in cuttings, and material placed on embankments • Commence removal of topsoil on any section of the Works only after erosion and sedimentation controls have been implemented and clearing, grubbing and removal of cleared materials has been completed on that section of the Works • Construct benches at cut batters as shown on the Drawings, to provide drainage and erosion control • Shape and treat the foundations under rock fills to maintain drainage and to ensure that erosion of the foundation will not occur. Refer to the M12 Central Earthworks Management Plan for further details of the Earthworks Process outlines in TfNSW QA Specification R44.1.	Inspection records	During construction	Superintendent / Foreman/Site Supervisor	TfNSW QA Specifications
SW5	A soil conservation specialist will be engaged by Seymour Whyte for the duration of construction of the M12 Central package to provide advice on the planning and implementation of erosion and sediment control including review of ESCPs.	Soil conservation specialist engagement	During construction	ESR	REMM SWH02

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW6	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 ESR	NSW CoA E105
SW7	Controls for sensitive receiving environments, including the riparian corridor (refer to CFFMP Section 4.1.5), 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	ESR Superintendent / Foreman / Site Supervisor	REMM SWH01
SW8	Sediment fencing must be woven polypropylene and cotton / geotextile thread with a flow rate > 110 litres/m2/sec to AS 3706.9.	ESCP Inspection records	During construction	ESR	TfNSW QA Specifications
SW9	Erosion and sedimentation controls must remain in place until 70% of the disturbed area beyond the pavement is stabilised or as otherwise agreed with the Principal.	ESCP Inspection records	During construction	ESR	TfNSW QA Specifications
Sediment basin management					
SW10	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 ESR	Blue Book

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW11	Sediment basins must be cleaned out whenever the accumulated sediment exceeds 60% of the sediment storage zone. Accumulated sediment from sediment basins and traps must be removed in such a manner as not to damage the structures and disposed of, or reused, in accordance with CWRMP.	Inspection records Depth marker	During construction	Superintendent / Foreman / Site Supervisor	TfNSW QA Specifications
SW12	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	Superintendent / Foreman / Site Supervisor	TfNSW QA Specifications
SW13	All construction sediment retention basins and sediment traps must be removed before completion, making all areas good, but not before all upstream areas have been vegetated or otherwise stabilised in accordance with the Blue Book (Landcom, 2004)	Inspection records	During construction	Superintendent / Foreman / Site Supervisor	TfNSW QA Specifications
Saline soils					
SW14	Construction within areas of moderate to high risk saline soils will be managed in accordance with this CSWMP. Specific measures will also include (but not be limited to): • Ongoing groundwater monitoring of salinity as part of the water quality monitoring program (refer to Appendix B for details) • 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	ESR	REMM SC01 REMM SWH01
Acid sulfate soils					

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW15	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.	Inspection records Monitoring records	During construction	Superintendent / Foreman / Site Supervisor / ESR	Best practice
Stockpile management					
SW16	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 TfNSW, and slopes to no steeper than 2:1 • Cover, or otherwise protect from erosion, stockpiles that will be in place for more than 20 days as well as any stockpiles that are	ESCP Inspection records s143 approved notice	During construction	Superintendent / Foreman / Site Supervisor ESR	TfNSW QA Specifications REMM SWH01

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
	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.				
SW17	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	Superintendent / Foreman / Site Supervisor / ESR	REMM SWH04 REMM SHW01
SW18	Install and maintain erosion and sedimentation control measures, including at stockpile areas and borrow areas.	ESCP Inspection records	During construction	Superintendent / Foreman / Site Supervisor / ESR	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
Tannin management					
SW19	Manage mulch stockpiles in accordance with the tannin management procedure provided in Appendix F to reduce the risk of tannin leachate from mulch flowing into waterways. This procedure has been prepared in accordance with the TfNSW Environmental Direction 25: Management of Tannins from Vegetation Mulch. Measures to manage tannin leachates from mulch stockpiles are to be included in ESCPs.	Procedure to manage the use and stockpiling of mulch	Prior to construction	ESR	TfNSW QA Specifications REMM SWH01
Water abstraction					
SW20	Obtain approval from the relevant authority for the chosen water source(s) before commencing extraction. If the proposed source is other than a town water supply or natural water source, the CSWMP and/or ESCP will be updated to 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	ESR	TfNSW QA Specifications
SW21	Construction will be managed in accordance with the Construction Water Strategy developed by TfNSW with the aim of reducing use of potable water for construction and meeting targets for use of non-potable water.	Water reuse strategy	Prior to construction and during construction	ESR	REMM SWH03
Dewatering management					

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW22	The Dewatering Management Plan (Appendix C) will be implemented during construction including complying with 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	ESR	REMM SWH01 and SWH11 TfNSW QA Specifications
SW23	Prior 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.	Water Pollution Impact Assessment Permit to Discharge	Prior to water discharge	ESR	NSW CoA E105
SW24	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	ESR	REMM SWH01 and SWH11 TfNSW QA Specifications
SW25	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 an ESCP. Normally, gypsum should be applied at a rate of about 30 kilograms per 100 cubic metres of stored water.	De-watering Management Plan	Prior to construction	ESR	TfNSW QA Specifications
SW26	Where a flocculant or coagulant other than gypsum is proposed to treat site water, an application to 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” must be approved by TfNSW.	Alternative flocculants and coagulants – template to propose use	Prior to construction	ESR	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW27	Apply the flocculant or coagulant (whether gypsum or another approved material) to settle suspended sediments within 24 hours of the conclusion of each rain event causing runoff.	Post rainfall inspection	During construction	Superintendent / Foreman /Site Supervisor ESR	TfNSW QA Specifications
SW28	Prior to the commencement of dewatering, inspect the entire system, including intakes and outlets, pumping and discharge locations. Wherever possible, supervise any dewatering activities directly. A risk assessment must be carried out to support instances where direct supervision of dewatering is not undertaken. Mitigation measures must be identified in the risk assessment and implemented to eliminate the risks of pollution and to prevent the occurrence of the following (as a minimum): • Intake suction placed within the deposited sediments resulting in discharge of sediment laden waters • Erosion at discharge locations and downstream areas • Inadvertent or intentional controlled discharge of untreated waters.	De-watering management plan	Prior to construction	Superintendent / Foreman /Site Supervisor ESR	TfNSW QA Specifications
SW29	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	ESR	TfNSW QA Specifications
Work in waterways					

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW30	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).	EWMS Inspection records	Prior to construction	Superintendent / Foreman/Site Supervisor ESR	NSW CoA E107
SW31	The NSW Department of Primary Industries (DPI) Fisheries will be notified 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 South Creek and Kemps Creek.	EWMS Inspection records	Prior to construction	ESR	TfNSW QA Specifications
SW32	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	ESR	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW33	The following measures will be carried out to manage activities within watercourses or on waterfront land: • Implementing practices to minimise disturbance of banks • Undertaking bank stabilisation and installing instream structures • Maintaining minimum flows to assist in maintaining the viability of aquatic communities and preventing barriers to fish passage • Constructing instream crossings during low flows and design so that drainage off crossing doesn't contribute sediment load to the stream • All drainage feature crossings (permanent and temporary watercourse crossings and stream diversions), drainage swales and depressions will be designed by a suitably qualified and experienced professional and will be designed and constructed in accordance with relevant guidelines.	Inspection records	During construction	ESR	REMM SWH12
Temporary waterway crossings					
SW34	Temporary waterway crossings will consider the following: • Design, construct and maintain the crossing in accordance with the requirements of the Blue Book (Landcom, 2004) • Maintain fish passage in accordance with DPI Fisheries guideline "Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings" • Use material that will not result in fine sediment material entering the waterway. Rock used must be hard, sound, durable rock, free of fine particles and not contaminated with foreign materials • Provide erosion and sediment controls at entry/exits points of the crossing to minimise mud tracking on the crossing.	EWMS	During construction	ESR	TfNSW QA Specifications
Refuelling, washdown and chemical storage					

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW35	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	ESR	REMM HS04
SW36	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	ESR	REMM HS05 TfNSW QA Specifications
SW37	SDS must be obtained for dangerous goods and hazardous substances stored onsite before their arrival.	SDS	During construction	Safety Manager	REMM HS06
SW38	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	Traffic Manager	REMM HS07
SW39	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".	PIRMP	During construction	ESR	TfNSW QA Specifications
SW40	Designated impervious bunded washdown facilities for concrete trucks and other vehicles will be provided at least 100 metres from areas prone to flash flooding or 50 metres away from other natural and built drainage lines (see also TfNSW G36).	Site inspection records	During construction	ESR	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW41	Activities which may result in spillage of a chemical, fuel or lubricant at any location which drains directly to waters or environmentally sensitive areas including refueling, maintaining plant and equipment, plant/equipment washdown, mixing cutting oil with bitumen, must not be undertaken without the appropriate temporary bunding being provided. Refuelling operations must be attended.	Refuelling procedure	During construction	ESR	TfNSW QA Specifications
Spill prevention and response					
SW42	A spill response procedure will be prepared as part of the PIRMP, to minimise the impact of spills. The procedure will include details on the requirements for managing, cleaning up and reporting of spills.	PIRMP	Prior to construction	ESR	TfNSW QA Specifications
SW43	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	ESR	REMM B20 REMM SWH01 TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW44	Procedure(s) will be prepared 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 • Pumping out of oil and grease collection pits • Decanting operations such as for fuel, chemicals and bitumen.	Procedures in work packs	Prior to construction	ESR	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
Farm dam water supply					
SW45	No dams were identified that would experience loss in annual yield as a result of the project. As such, no measures are required to prevent, mitigate or offset a loss in water supply based on the detailed design. If design of construction changes result in changes to the loss in water supply to farm dams, this CSWMP will be updated to 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, Seymour Whyte will engage a suitably qualified and experienced independent professionals, approved by TfNSW, to advise and assist in determining appropriate mitigation measures on farm dam impacts from stormwater yields during construction.	Consultation	Prior to any works that may potentially affect the flow of water into farm dams	TfNSW ESR	NSW CoA E24
Revegetation					
SW46	Mulch blanket to hydroseeded areas must be comprised of any one of the following • Mulch as defined in TfNSW R179 Clause 2.2; • Straw as defined in TfNSW R178 Clause 2.5; or • Cellulose Fibre Mulch as defined in TfNSW R178 Clause 2.6. TfNSW must approve submitted documents evidencing compliance with the requirement for mulch blanket, and may inspect the compost blanket material, prior to authorising the release of the Hold Point.	Hold Point R178 2.13	During construction	Engineers	TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW47	Vegetate stockpiles, stockpile sites and other areas nominated by the Principal to control erosion and weed invasion with the following cover crop species: • Rye Corn (during the months of April to August) at a rate of 35 kg per hectare; • Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare. Where directed by the Principal, include native seed in accordance with the species listed in Annexure R178/A	TfNSW directions Inspection records	During construction	ESR	TfNSW QA Specifications
SW48	Turf used in vegetated drainage channels must comply with recommendations in AS5181:2017 “Use and installation of turf as an erosion, nutrient and sediment control measure”.	Inspection records	During construction	ESR	TfNSW QA Specifications
SW49	Do not spray herbicide in windy weather (wind of 10 km/hr or greater) or within such distance of a watercourse which would permit the herbicide to enter the water.	Herbicide spray records	During construction	ESR	TfNSW QA Specifications
Monitoring/investigation					
SW50	An Automatic Weather Station (AWS) and rainfall gauge(s) will be installed to monitor on site weather conditions in accordance with TfNSW QA R272.	Weather records / Pre-starts CAQMP	During construction	ESR	Blue Book TfNSW QA Specifications
SW51	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	ESR	Blue Book TfNSW QA Specifications

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW52	Surface water monitoring must be undertaken in accordance with the Construction Soil and Water Monitoring Program and implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Monitoring records	During construction	TfNSW ESR	CoA C17 REMM SWH01 REMM SWH05 REMM GW01 TfNSW QA Specifications
SW53	Undertake pre and post rainfall event monitoring	Inspection records	Pre, during and post rainfall	ESR	Best Practice Blue Book
SW54	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). Refer to Appendix B for details	Overarching Construction Surface Water and Groundwater Monitoring Program Reports	During construction	ESR	GW05 (new)

ID	Management Measures	Evidence of implementation	When to implement	Responsibility for implementation	Reference or source
SW55	Prior to construction commencing, Seymour Whyte will use the earthworks methodology to estimate the potential groundwater inflows that are expected in the first year of construction. This will 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). Seymour Whyte 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 Seymour Whyte will identify and implement additional mitigation measures and these will be documented in the M12 Central CEMP and this CSWMP.	Estimate the potential groundwater inflows	Pre-construction	Project Engineers Geotechnical engineer	REMM GW07 (new)

7 Compliance management

7.1 Roles and responsibilities

The organisational structure for the M12 Central package and overall roles and responsibilities are outlined in Section 5.1 of the CEMP. Specific responsibilities for the implementation of soil and water management are detailed in Section 6 of this Plan.

7.1.1 Contractor's Soil conservationist

In accordance with REMM SWH02, Seymour Whyte have appointed an experienced soil conservation specialist for the duration of construction of the M12 Central package (referred to as the Contractor's Soil Conservationist). The Contractor's Soil Conservationist is John Wright (Diploma in Agriculture) from T.R.E.E.S Pty Ltd. John is on the TfNSW list of registered contractors for erosion, sedimentation and soil conservation consultancy services and accepted by TfNSW (refer to Section 7.4).

The Contractor's Soil Conservationist will review and advise on the CSWMPs, provide specialised training to relevant site personnel and provide advice on the planning and implementation of erosion and sediment control. For the full responsibilities of the Contractor's Soil Conservationist, refer to Section 5.1 of the CEMP.

The Contractor's Soil Conservationist will complete inspections as required, but at least monthly (refer to Section 7.3). The Contractor's Soil Conservationist must also be present for the following critical site activities:

- Prior to the disturbance of existing surface on a section of site, other than for the installation of erosion and sediment controls, to confirm the measures described in the ESCP have been implemented.
- Prior to the commissioning of new sediment basins to confirm the inlet and outlet controls and connecting drainage have been constructed in accordance with design drawings
- Prior to commissioning of new temporary stormwater drainage or drainage diversions
- Prior to commissioning temporary waterway crossings or in-stream temporary work platforms
- During and following flooding events
- Following the failure of any erosion or sediment control measures that results in a reportable incident under the EPL or Planning Approval.

The responsibilities of the Contractor's Soil Conservationist are detailed in Table 7-1

Table 7-1: Contractor's Soil Conservationist

Environmental Co-ordinators	
Authority	• Appointed by the ESR.
Responsibility	• Review of all erosion, sediment and water pollution plans, controls and measures prior to installation

Environmental Co-ordinators	
	• Assistance in project training relating to erosion and sediment control issues • Attend site for any critical and/or activities deemed high risk for erosion and sediment control management • Attend site inspections as required, but at least monthly and prepare a report detailing findings from these inspections. Issues identified in these inspection reports must be acted on and reported to TfNSW within 5 working days. • Work in partnership with the ESR to build environmental capabilities, drive cultural change, and achieve performance improvements • Assist the ESR in implementing the environmental training program • Assist Seymour Whyte staff with environmental inquires • Assist in the implementation of site environmental controls • Conduct environmental monitoring and inspections • Assist the ESR in the investigation and close out of relevant complaints. • Advise and assist in determining the impact and relevant mitigation measures on farm dam impacts from stormwater yields during construction.
Lines of communication	• Functional reporting to the ESR • Indirect reporting to the Area Project Manager(s) • Liaise with any soil conservationist appointed for the Project by TfNSW.
Minimum skill levels	• A suitably experienced external Certified Practicing Erosion and Sediment Control Professional (CPESCP) as the Soil Conservationist approved under TfNSW at category S1 or higher.

7.1.2 TfNSW's Soil conservationist

TfNSW will also engage a Project wide suitably experienced soil conservation specialist to provide advice to TfNSW and Seymour Whyte (referred to as the TfNSW Soil Conservationist). The Contractor's Soil Conservationist will liaise on a regular basis with the TfNSW's Soil Conservationist appointed for the Project.

The TfNSW's Soil Conservationist will conduct regular inspections on the site during construction. Seymour Whyte will make appropriate personnel available to induct, guide and accompany the TfNSW's Soil Conservationist on the inspections and to promptly rectify any deficiencies raised by the TfNSW Soil Conservationist.

Seymour Whyte will report to TfNSW the status of actions being taken, in accordance with the priorities nominated in TfNSW Soil Conservationist's Environmental Inspection Report. The report will state the priority of the rectification works. Seymour Whyte will rectify the actions listed within the inspection report within the timeframes included on the Environmental Inspection Report.

7.2 Training

To ensure that this Plan is effectively implemented, all site personnel (including sub-contractors) will undergo site induction training that includes construction soil and water

management issues prior to construction commencing. The induction training will address elements related to soil and water management, including:

- Existence and requirements of the OCSWMP, this CSWMP and all plans and procedures prepared under the CSWMPs relevant to the M12 Central package
- Responsibilities under the POEO Act, other relevant legislation, and EPL conditions for Site specific issues, including:
  - erosion and sediment controls, water quality management and controls and sediment basin management
  - groundwater and surface water
  - location of spill kits
- 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's Soil Conservationist will provide assistance in training in regard to erosion and sediment control issues.

The ER will review and approve the induction and training program prior to the commencement of construction and monitor implementation.

Daily pre-start meetings conducted by the Foreman / Site Supervisor (or delegate) 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 CEMP.

7.3 Monitoring and inspection

Construction soil and water monitoring will be conducted in accordance with the Monitoring Program included in Appendix B, which has been prepared in accordance with the Overarching Construction Soil and Water Monitoring Program and relevant TfNSW QA specifications. Where monitoring detects a non-compliance, an incident report and corrective actions will be raised.

An Automatic Weather Station (AWS) and rain gauge(s) will be installed by Seymour Whyte to record weather conditions on the M12 Central package. Details of the proposed monitoring is provided in the CAQMP (Appendix B7 of the CEMP) within the Construction Air Quality Monitoring Program.

Inspections will include daily site inspections by Site Supervisors, and weekly site inspection by environmental personnel during construction as a minimum. The frequency of these inspections may be increased to reflect the risk associated with potential impacts during adverse weather conditions or during specific construction activities (e.g. instream works).

The Contractor's Soil Conservationist will also undertake regular inspections of erosion and sediment control measures to ensure they are installed correctly and maintained thereafter.

Inspection and monitoring requirements relevant to soil and water are summarised in Table 7-2

Table 7-2: 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	ESR Foreman/ Site Supervisor	TfNSW Specifications
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 Inspect check dams and sediment fences plus stormwater entry points such as pits and inlets at least weekly and rectify any blockages immediately.	Daily site diary records Weekly erosion and sediment inspections Prior to wet weather event Prior to site shutdown Following rainfall events	Foreman/ Site Supervisor ESR	TfNSW Specifications Blue Book Section 8.2
Inspection of all stockpiles	At least weekly	ESR / Foreman/ Site Supervisor	TfNSW Specifications

Inspection / monitoring	Frequency	Responsibility	Requirement
TfNSW environmental inspection including review of the implementation of the current ESCPs SWC will ensure a copy of the current relevant ESCP is available at each TfNSW environmental inspection.	Fortnightly	Foreman/ Site Supervisor ESR TfNSW ESM (or delegate)	TfNSW Specifications
Soil Conservationist site inspections	As required, but at least monthly	Contractor's Soil Conservationist	TfNSW Specifications
Inspection of sediment basins	Monthly	ESR Contractor's Soil Conservationist Foreman/ Site Supervisor	TfNSW Specifications
Visually monitor water quality upstream and downstream of any temporary waterway crossings or diversions	Daily site diary records	Foreman/ Site Supervisor ESR	TfNSW Specifications
Wet weather preparation inspections to ensure that all erosion/ sedimentation and stabilisation controls are in place and in effective working order (refer to Section 6.15)	When wet weather event is predicted (50% chance of 10 mm of rainfall or greater)	Foreman/ Site Supervisor ESR	OCSWMP Section 6.15
Inspect all disturbed areas as soon as practicable but within 3 hours (work day) or 24 hours (non work) after the start of all rainfall events exceeding 10mm and during periods of prolonged rainfall	As required	Foreman/ Site Supervisor ESR	TfNSW Specifications
Post-rainfall inspections to review the review the effectiveness of the ESCP following each rainfall event exceeding 10mm	As required	Foreman/ Site Supervisor ESR	TfNSW Specifications

An adaptive approach to soil and water management will be implemented. Mitigation measures can be amended and improved if they are found to not meet the required outcomes. Weather forecasts and observations will be assessed and communicated through pre-starts and other tools.

Site inspections will be recorded (along with actions and issues observed) and actioned appropriately within agreed timeframes. These inspections will be recorded as part of the Weekly Environmental Inspection Checklist, and will also be used as a record of activities

and observations related to soil and water which could be correlated to the monitoring activities. Additional requirements and responsibilities in relation to inspections are documented in Section 5.1 of the CEMP.

Weekly and other routine inspections by the TfNSW ESM (or delegate), the Environmental Review Group (ERG) representatives and the ER will also occur throughout construction. Detail on the nature and frequency of these inspections are documented in Section 7.1 of the CEMP.

The TfNSW's Soil Conservationist to conduct regular inspections of the M12 Central package during construction. The TfNSW's Soil Conservationist will typically join the scheduled 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. Seymour Whyte will ensure appropriate site personnel are available to induct, guide and accompany the TfNSW's Soil Conservationist on the inspections and to promptly rectify any deficiencies raised.

The ESR will advise the TfNSW ESM (or delegate) of actions being taken, in accordance with the priorities nominated in the TfNSW Soil Conservationist's Environmental Inspection Report. The report will state the priority of the rectification works. The actions listed within the inspection report will be rectified 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.

7.4 Hold Points and Witness Points

Hold Points and Witness Points relevant to this Plan are outlined in Table 7-3.

Table 7-3: Hold Points and Witness Points applicable to this Plan

TfNSW QA spec	Clause	Type	Description	Plan reference
G36	3.2.2	Hold	Evidence of approvals, licences and permits obtained	
G36	3.2.4	Hold Point	Submission of EWMS	Section 1.5
G38	1.2.7	Hold	Submission of evidence of appropriate Soil and Water Management Plan and Erosion and Sediment Control personnel	Section 6.1 and 7.1
G38	2.1.2	Hold	Submission of SWMPs	Section 1.5.1

TfNSW QA spec	Clause	Type	Description	Plan reference
G38	3.2.2	n/a	Submission of construction sediment basin design drawings for acceptance with a report that lists design parameters, including confirmation by Seymour Whyte's Soil Conservationist that construction sediment retention basin designs (and restoration and revegetation proposals) conform to the requirements of the TfNSW QA Specification G38.	Section 6.2
G38	3.1	Hold	Submission of an ESCP(s) and, where required, WQMP for a section of the Work Under the Contract	Section 6.1
G38	3.1	Witness	Submission of written notice that measures set out in the ESCP for a section of the work have been installed.	Section 6.1
G38	3.9	Hold	Commencement of construction of any activities in flood prone areas	CFMP
R178	2.13	Hold	At least 10 working days prior to application of the compost blanket, submit certification for compliance of the compost blanket, supplier's written instructions for installation and details of the locations to be treated.	Table 6-2

7.5 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 7.4 of the CEMP.

7.6 Reporting

Reporting requirements relevant to soil and water are summarised in Table 7-4. Reporting of soil and water monitoring results is presented in Section 4 of the Monitoring Program (Appendix B of this Plan). Requirements and responsibilities for reporting are further described in Section 7.5 of the CEMP.

Accurate records will be maintained substantiating all construction activities associated with the M12 Central package or relevant to the conditions of approval, including measures taken to implement this CAQMP. Records will be made available to the DPE and Commonwealth

Department of Agriculture, Water and the Environment (DAWE) upon request, within the timeframe nominated in the request.

Table 7-4: Reporting requirements relevant to this Plan

Item	Frequency	Standards	External reporting	Responsibility
Monthly Environmental Report	Monthly	Reporting as required by TfNSW G36 Specification, Section 3.11.1.2, including: • All discharges from licensed points and any other dewatering activities includes dates, time, monitoring results and volumes released. • All environmental monitoring data including but not limited to. rainfall and water quality.	TfNSW	ESR
Incident and non-compliance reports	At each occurrence	Reporting of incidents and non-compliances in accordance with CoA, EPL, PIRMP, G36 and the TfNSW Environmental Incident Classification and Reporting Procedure.	Appropriate authority dependant on nature of the incident (e.g. EPA, DPE) (see Section 6 of CEMP)	ESR
Complaint register	Daily (ER, EPA) as received DPE as requested	Reporting of complaints, in accordance with the CoA, EPL and OCS, through the complaints register, to the ER and EPA for any complaints received (on the day they are received). Communication, notification and complaints handling requirements regarding erosion and sedimentation matters will be managed through the Complaints Management System and the OCS. Receipt of a complaint(s) in relation to surface or ground water is a trigger to carry out monitoring of surface water quality or groundwater.	ER (NSW CoA A35) EPA (in accordance with EPL conditions) DPE (as requested by the Secretary)	ESR Stakeholder and Engagement Manager

Item	Frequency	Standards	External reporting	Responsibility
Construction Soil and Water Monitoring Results	Quarterly	Reporting as detailed in the Construction Soil and Water Monitoring Program (Appendix B)	TfNSW (as per G36) ER (as per NSW CoA) EPA (as per EPL) DPE (as per NSW CoA)	ESR
Pollution monitoring data	Monthly	Reporting of monitoring data in accordance with the Environment Protection Licence requirements.	Published monthly (as per EPL)	ESR
Soil Conservationist Inspection Report	As required, but at least monthly, within 5 working days of inspection	Inspections of erosion and sediment control measures to ensure they are installed correctly and maintained thereafter.	TfNSW ER	ESR Contractor's Soil Conservationist
Wet weather preparation inspection reports	Following rainfall events exceeding 10mm	Provide written and photographic evidence of the site's permanent and temporary erosion and sediment control works after each of these events. Keep a register of all inspections performed and of maintenance or repairs carried out.	TfNSW	ESR
Soil conservationist report of the site post restoration	Upon completion of use of land used for the Contractor's site facilities	Soil conservationist report of the site post restoration with verification that no erosion and sediment control issues are present as required under TfNSW QA Specification G36.	TfNSW	ESR Contractor's Soil Conservationist

Item	Frequency	Standards	External reporting	Responsibility
Erosion and Sediment Control Inspection and Maintenance Register	As required, but at least monthly	Maintain a register of inspection and maintenance of erosion control and sediment capture measures.	TfNSW	ESR Contractor's Soil Conservationist

8 Review and improvement

8.1 Continuous improvement

Continuous improvement of this CSWMP and the Construction Soil and Water Monitoring Program (Appendix B) will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

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

The ESR is responsible for ensuring stage-specific environmental risks are identified and included in the M12 Central package risk register and appropriate mitigation measures implemented throughout the construction, as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 4.1.2 of the CEMP.

8.2 CSWMP update and amendment

The processes described in Section 7.7 of the CEMP may result in the need to update or revise this CSWMP. This will occur as needed. Any revisions to this CSWMP and other Sub-plans will be in accordance with the process outlined in Section 1.12 of the CEMP.

This Plan will also be reviewed, and updated where relevant, when erosion/sedimentation control measures, stabilisation control measures and other soil and water control measures are found to be not fully effective, including review of design parameters used for BLUE BOOK calculations.

A copy of the updated CSWMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 7.6.2 of the CEMP).

Construction Soil and Water Management Sub-plan

Appendix A – Secondary CoA, Secondary REMMs and TfNSW QA specifications

M12 Motorway - Central

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Appendix A - Secondary CoA, Secondary REMMs and TfNSW QA Specifications

Secondary requirements that are related, but not specific to, the development of this Plan are outlined in this appendix. Cross references are provided to indicate where the requirements are addressed in this Plan or other Project management documents. This includes:

- Secondary NSW Conditions of Approval (CoA) which are listed in Table A1
- Secondary Revised Environmental Management Measures (REMMs) which are listed in Table A2
- Relevant requirements of the TfNSW QA Specifications which are listed in Table A3.

Table A1: Secondary NSW CoA

CoA No.	Condition Requirement	Document reference
A5	Where the terms of this approval require a document or monitoring program to be prepared, or a review to be undertaken and submitted to the Planning Secretary, evidence of the consultation must be submitted to the Planning Secretary with the relevant document, monitoring program or review. The evidence must include: (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party; (c) documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations; (d) outline of the issues raised by the identified party and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed.	Section 1.6
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 – DPI Water, Sydney Water (if any Sydney Water assets are affected), relevant councils (c) Groundwater Monitoring Program - DPI Water	OCSWMP Appendix B

CoA No.	Condition Requirement	Document reference
C13	Each Construction Monitoring Program must provide: (a) details of baseline data available (b) details of baseline data to be obtained and when (c) details of all monitoring of the CSSI to be undertaken (d) the parameters of the CSSI to be monitored (e) the frequency of monitoring to be undertaken (f) the location of monitoring (g) the reporting of monitoring results and analysis of results against the relevant criteria (h) details of methods that will be used to analyse monitoring data (i) procedures to identify and implement additional mitigation measures where results of monitoring indicate unsatisfactory CSSI impacts; (j) a consideration of SMART principles; (k) any consultation to be undertaken in relation to the monitoring programs; and (l) any specific requirements as required by Condition C14	Appendix B
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 B
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.	Appendix B
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 6.17 CFMP
	(a) calculate the nature and extent of impacts on water supply;	

CoA No.	Condition Requirement	Document reference
	(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	Document reference
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.*	Appendix B Section 3.4 Section 6.8 Appendix C
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, 6.10
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

CoA No.	Condition Requirement	Document reference
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.	OCSWMP CFFMP Section 6.5.1

Table A2: Secondary REMMs

ID	Revised environmental management measure	Timing	Document Reference
B20	Spill kits will be located to allow for timely response to uncontained spills. Site inductions will include a briefing on the use of spill kits.	During construction	Section 6.13
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 7.1.1
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 OCWRMP
SWH04	Stockpiles will be managed to minimise the potential for mobilisation and transport of dust and sediment in runoff in accordance with TfNSW Stockpile Sites Management Guideline (Roads and Maritime, 2015). This will include: • Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed • Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion • Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required.	During construction	Section 6.5 Appendix G

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

ID	Revised environmental management measure	Timing	Document Reference
SWH12	The following measures will be carried out to manage activities within watercourses or on waterfront land: • Implementing practices to minimise disturbance of banks • Undertaking bank stabilisation and installing instream structures • Maintaining minimum flows to assist in maintaining the viability of aquatic communities and preventing barriers to fish passage • Constructing instream crossings during low flows and design so that drainage off crossing doesn't contribute sediment load to the stream • All drainage feature crossings (permanent and temporary watercourse crossings and stream diversions), drainage swales and depressions will be designed by a suitably qualified and experienced professional and will be designed and constructed in accordance with relevant guidelines.	Prior to construction and during construction and operation	Section 6.9
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 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	Appendix B Overarching Construction Soil and Water Quality Monitoring Program presented in the OCSWMP

ID	Revised environmental management measure	Timing	Document Reference
GW05 (amended)	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 per 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 the 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 and the Sydney Water culvert excavations, the groundwater quality from the cut is to be sampled. Operational phase groundwater quality sampling, including the quality sampling of Cut 9 inflows and the Sydney Water culvert excavations, is to occur at monthly intervals for at least six months.	During construction and operation	Appendix B

ID	Revised environmental management measure	Timing	Document Reference
GW06	Prior to construction commencing, the Construction Contractor will use their earthworks methodology to estimate the potential groundwater inflows that are expected in the first year of construction in order to confirm the inflows expected and if the proposed mitigation measures are sufficient to manage higher inflows that are likely during early earthworks activity. The estimate of groundwater inflows is to be undertaken for Cut 2, Cut 4, Cut 5, Cut 6, Cut 7, Cut 2 AAR, Cut 9 and at the Sydney Water culvert excavations. The estimate is to include groundwater inflow from both the walls and base of the cuts, and will take into account the construction methodology and staging for each cut. In addition, the estimate will utilise the maximum observed groundwater levels (as sourced from M12 West and 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.	During construction and operation	Appendix C

ID	Revised environmental management measure	Timing	Document Reference
GW07 (amended)	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 earthworks activities. If evaporation is determined not to be a sufficient mitigation measure, the Construction Contractor will identify and implement additional mitigation measures and these will be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.	During construction and operation	Appendix B
SC01	Construction within areas of moderate to high risk saline soils will be managed in accordance with the CSWMP. Specific measures will also include (but not be limited to): • Ongoing groundwater monitoring of salinity as part of the water quality monitoring program • Identification and management of saline discharge sites • Progressive stabilisation and revegetation of exposed areas following disturbance as soon as is practicable • Testing to confirm the presence of saline soils in areas of high salinity potential prior to disturbance. • Soil salinity management will also be carried out in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook.	Prior to construction and during construction	Section 6.3

ID	Revised environmental management measure	Timing	Document Reference
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
SC06	Further intrusive asbestos investigations throughout the construction footprint will be carried out to assess asbestos risks before the start of construction. The investigations are to include visual assessments and ground truthing along the length of the Project.	Prior to construction	CCLMP
HS04	Storage, handling and use of dangerous goods and hazardous substances would be in accordance with the Work Health and Safety Act 2011 and the Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005).	During construction and operation	Section 6.11
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

Table A3: TfNSW QA specifications

Specification	Measure/requirement	CSWMP Reference
G36 4.15.3 (b)	In addition to the post-construction land condition assessment, provide the Principal with the following; (b) a soil conservationist report of the site post restoration with verification that no erosion and sediment control issues are present;	Table 7-4
G38 1.2.7	Personnel who prepare your Soil and Water Management Plan and Erosion and Sediment Control Plans (including Site Stabilisation Sub-Plans and Stockpile Management Sub-Plans) and who carry out erosion and sediment control inspections in accordance with Clause 4, must have completed training in Blue Books 1 and 2D and erosion and sedimentation control (with a certificate as proof of training) and have suitable on site, hands on experience in preparing such plans, including refresher training as appropriate. Key personnel who control construction work at each worksite must also have completed a training course in erosion and sedimentation control. A Soil Conservationist on the TfNSW list of registered contractors for erosion, sedimentation and soil conservation consultancy services is also required for review, amongst other things – refer to TfNSW G36 Clause 3.3.2.	Section 6.1 Section 7.2 Section 7.1.1
G38 2.1	You are responsible for the preparation of your Site-specific Erosion and Sediment Control Plan incorporated into your Soil and Water Management Plan; and the design and implementation of associated erosion and sedimentation control measures.	Section 6.1
G38 2.1.1	If specified in Annexure G38/A, prepare a Soil and Water Management Plan (SWMP) for the Work Under the Contract. The SWMP will form part of the Contractor's Environmental Management Plan (CEMP) specified in TfNSW G36, and incorporates the Erosion and Sediment Control Plan (ESCP) (refer Clause 2.2). The SWMP must be prepared by a person as specified in Clause 1.2.7 and reviewed by your Soil Conservationist (refer to TfNSW G36). You must respond to the review and incorporate any recommendations or justify decisions for not incorporating recommendations.	Section 6.1
G38 2.1.2	The Soil and Water Management Plan (SWMP) must identify all risks relating to soil erosion, and pollution caused by sediments and other materials, and describes how these risks will be addressed during construction.	Section 3.1.2

Specification	Measure/requirement	CSWMP Reference
	In preparing the SWMP refer to following: (i) RMS Code of Practice for Water Management; (ii) RMS Erosion and Sedimentation Procedure; (iii) RMS Environmental Direction 25: Management of Tannins from Vegetation Mulch; (iv) The NSW Soils and Construction – Managing Urban Stormwater Volume 1 “the Blue Book” (Landcom, 2004) and Volume 2 (DECC, 2008); (v) Stockpile Site Management Guideline (RMS, 2015) (vi) RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction (2011); (vii) RMS Technical Guideline: Environmental Management of Construction Site Dewatering (2011); (viii) Be compliant with the overarching Soil and Water Management Plan, submitted to DPIE.	
G38 2.1.2 (a)	The SWMP must include details of the following, where relevant: Purpose and objectives of SWMP.	Section 2
G38 2.1.2 (b)	Approvals, licence requirements and relevant legislation.	Section 3.1
G38 2.1.2 (c)	Site investigation and assessment of the following: (i) catchment and sub-catchment areas during each construction stage;	Section 4.2.1
	(ii) soil properties and types (including dispersion properties and presence of acid sulphate soils and contamination);	Section 4.1.3
	(iii) topography of disturbed area of the Site, within each catchment through the construction phase, that will require erosion and sediment control protection measures and areas that will require stabilisation measures;	Section 4.1.1

Specification	Measure/requirement	CSWMP Reference
	(iiiv) rainfall records and design parameters;	Section 4.4
	(v) estimated runoff from each construction catchment at each construction stage (can be updated progressively);	Section 4.5
	(vi) direction of runoff and drainage paths to drain into sediment basins during each construction stage;	Section 6.1
G38 2.1.1 (c)	(vii) diversion upstream water flow around or through the Site with adequate controls to prevent the mixing of upstream water and water originating or discharging from the Site;	Section 6.1
	(viii) the requirements for water discharge of any residential or commercial properties through or adjacent to your proposed waterway diversions;	Section 6.8, Appendix C
	(iiiix) waterways and other water related sensitive environments;	Section 4.2.3
	(ivx) groundwater;	Section 4.3
	(vxi) possibilities of, and limitations on, water extraction.	Section 6.7
G38 2.1.2 (d)	Environmental control measures to address the potential impacts, including: (i) responsibility for its implementation, including the names and contact details of the person(s) responsible; (ii) resources required for its construction, monitoring, maintenance and removal; (iii) implementation schedule for the measures, related to construction activities; (iv) monitoring and maintenance of the environmental controls; (v) water pollution mitigation measures including measures to avoid and minimise discharges.	Section 6.17
G38 2.1.2 (e)	Other associated plans, Environmental Work Method Statements (EWMS) and procedures.	Section 1.5

Specification	Measure/requirement	CSWMP Reference
G38 2.1.2 (f)	Construction sediment retention basins, including details of the following: (i) installation and timing requirements, locations and design of the construction sediment retention basins, including any temporary modifications to the operational basins, providing details of the approach, standards, criteria and references used in the design of the basins; (ii) management of the basins including measures for flocculation/ coagulation and dewatering; (iii) procedures for testing, treatment and discharge of water from the basins; (iv) procedures for the periodic removal and disposal of the sediment collected within the basins.	Section 6.2
G38 2.1.2 (g)	Training, including: (i) site induction; (ii) environmental training; (iii) toolbox training.	Section 7.2
G38 2.1.2 (h)	Inspection maintenance and auditing including a review process by your Soil Conservationist and a process for reporting any recommendations, as well as maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls	Section 7.3
G38 2.1.2 (i)	Preparation of a wet weather rain event plan which includes a process to routinely monitor the Bureau of Meteorology (or equivalent) weather forecast and identification of controls to be implemented in the event of wet weather. See also Clauses 2.2.2 (l) & 3.9 and TfNSW R272;	Section 7.3
G38 2.1.2 (j)	A stream (where relevant) and farm dam dewatering plan (the plan must be reviewed and endorsed by your experienced and qualified Ecologist) to be prepared include: (i) a map showing locations of farm dams to be dewatered; (ii) a Fisheries Permit (where determined by the Ecologist) and animal care and ethics requirements;	CFFMP

Specification	Measure/requirement	CSWMP Reference
	(iii) methodology for dewatering dams with consideration to aquatic ecology including the capture, storage, relocation, release of fish and other aquatic fauna including turtles; (iv) euthanisation procedure; (v) location of any offsite discharge points; (vi) requirements to manage encounters of contaminated water; (vii) contact details of your Ecologist who will oversee the dewatering of farm dams and undertake any required relocation or euthanasia; (viii) details of identified fauna relocation sites, including permission from private landowners if the relocation site is on private land; and (ix) mitigation measure to prevent fauna being hit by vehicles when dewatering dams adjacent to roads.	
G38 2.1.2 (k)	Statements in the SWMP of how: (i) the environmental performance outcomes identified in the Environmental Assessment Documentation will be achieved; (ii) the mitigation measures identified in the Environmental Assessment Documentation will be implemented; (iii) how the Conditions of Approval will be complied with; and (iv) the identification of the relevant environmental specific training and induction processes for construction personnel.	Section 3.2, 3.3 and this Appendix A
G38 2.1.2 (l)	how issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed;	Section 6 CEMP Section 3.3.3 EWMS
G38 2.1.2 (m)	methods for the management of the water that flows into the farm dams from the Site to maintain the pre-construction water quality unless otherwise agreed to by the landholder in consultation with the Principal;	Section 6.14

Specification	Measure/requirement	CSWMP Reference
G38 2.1.2 (n)	identification of the relevant ambient water quality objectives for receiving waterways and water quality management criteria for achieving the objectives; and	Appendix B
G38 2.1.2 (o)	a Trigger Action Response Protocol for potential discharge waters, identifying alternative disposal options for water with contaminant concentrations exceeding water quality management criteria.	Appendix C
G38 2.1.2	In addressing items (g) and (h) above, refer to TfNSW G36.	Information
G38 2.1.2	The SWMP must also detail the following as a minimum: (i) Identification of catchment areas, high risk areas and sensitive areas for each construction stage; (ii) Sizing of each of the above areas and catchments; (iii) The likely run-off from each road catchment; (iv) Direction of flow of on-site, off-site water, run-off and drainage points during each stage of construction; (v) Separation of on-Site and off-Site water; (vi) The locations and sizing of sediment traps such as sumps or basins as well as associated drainage; (vii) A mapped plan identifying all of the above (on an aerial base with contours and the proposed drainage); (viii) Identify construction areas with a potential sediment load greater than 150m3 per year; (ix) A process for the management of site water quality that flows offsite; and (x) Provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls.	Appendix D
G38 2.1.2	Liaise with nearby residential or commercial property owners to determine any water discharge requirements (i.e. frequency of discharge, volumes, water quality criteria, etc.). Make allowances in the design and construction of the temporary waterway crossings or diversions for such requirements. Requirements for temporary waterway diversions are to be discussed at the Environmental Risk Assessment Workshop required under G36 (Clause 3.2.1).	Section 1.6 Section 6.10

Specification	Measure/requirement	CSWMP Reference
G38 2.1.2	Visually monitor the water quality upstream and downstream of any temporary waterway crossings or diversions to identify any water quality impacts caused by your construction activities. Maintain any records in accordance with Clause 3.1.2.	Section 7.3
G38 2.2.1	Prepare and implement an Erosion and Sediment Control Plan (ESCP) for the Work Under the Contract. The ESCP will form part of the CEMP, and where a SWMP is also required, the ESCP will be incorporated in the SWMP.	Section 6.1 Appendix D
	Include progressive site-specific Erosion and Sedimentation Control Plans (ESCPs) for each construction stage, showing contours, drainage paths, extent of disturbance and location of all erosion and sediment controls and identifying any constraints to making drainage paths.	Appendix D
	Revise the ESCP whenever the Contract Program or work methods change, and whenever the work methods and control structures are found to be ineffective or are no longer required. Have available at each fortnightly environmental inspection (see TfNSW G1 Clause 20) copies of the current relevant ESCPs. Each revision of the ESCP must be reviewed by your Soil Conservationist. You must respond to the review and incorporate any recommendations or justify decisions for not incorporating recommendations. Each revision of the ESCP must be recorded on an up-to- date ESCP register; this can be a sub-category of your document register.	Section 6.1
	Your Soil Conservationist (see TfNSW G36) must undertake Site inspections as required, but at least monthly and prepare a report detailing findings from these inspections. Issues identified in these inspection reports must be acted on and reported to the Principal within 5 working days.	Section 7.3 and 7.6
	The ESCP must be prepared by a person as specified in Clause 1.2.7 and in accordance with the BLUE BOOK guidelines.	Section 6.1 Appendix D
G38 2.2.2	The ESCP must identify all erosion and sediment control risks and describe how these will be addressed during construction. The ESCP must include details of the following where relevant: (a) erosion and sediment control measures required for each stage of construction, including: (i) before clearing and grubbing of the Site;	Appendix D

Specification	Measure/requirement	CSWMP Reference
	(ii) before removal of topsoil and commencement of earthworks within the catchment area; (b) how upstream water will be managed so it is not polluted by the construction activities; (c) method of tree removal in intermittent watercourses, leaving grasses and small understorey species undisturbed wherever possible; (d) 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; (e) measures for promptly stabilising disturbed areas and temporary drains; (f) measures to minimise erosion during construction of embankments; (g) measures to minimise erosion and control sedimentation from stockpiles; (h) methods of constructing batters to assist the retention of topsoil on the batter slopes; (i) measures to temporarily trap sediment in median areas at regular intervals; (j) controls in runoff flow paths to reduce flow velocities and minimise the potential for erosion; (k) measures for controlling waste water discharge on or around the Site from dewatering (refer to Clause 3.4), surface washing, grit blasting, saw cutting, drilling, activities associated with concrete washouts, washing vehicles and plant and any other activities which add pollutants to water; (l) measures to be put in place during an extended shut-down of the Site or when rainfall above a certain trigger level is predicted (see Clause 3.9) including a procedure: (i) for monitoring Bureau of Meteorology forecast heavy rainfall events in order to allow sufficient time to vacate and prepare the Site prior to the commencement of heavy rainfall events; (ii) to allow for programming of construction work to minimise the risk of erosion and sedimentation by staging of work and programming of high risk soil and erosion activities to avoid high rainfall or wind events. (This component of the ESCP is to be included in your Shutdown Procedure as required in TfNSW G1); (m) maintenance of erosion and sediment control structures including measures to restore their capacity;	

Specification	Measure/requirement	CSWMP Reference
	(n) inspection and auditing program for all erosion and sediment controls to ensure that no disturbed area is left without adequate erosion and sediment controls (include as a minimum: weekly and pre and post rainfall inspections); (o) mapping and description of locations of construction sediment retention basins, their catchments and drainage structures directing water to the basins; (p) controls to be implemented at Site entry and exit points to minimise tracking of soil and particulates onto pavement surfaces and for the removal of any materials transported onto adjacent road pavement surfaces (such as sweeping) as soon as practical or at a minimum at the end of each working day; (q) additional controls to be implemented ahead of forecast rainfall events (see Clause 3.9) and ahead of Site shutdown of greater than two calendar days; (r) staged plans for construction erosion and sediment control measures over waterways where culverts and/ or bridges will be constructed; (s) measures to manage contaminated soil and/or water that may be present and/or identified during the implementation of erosion and sediment control measures, including existing drainage; and (t) design and construct drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions in accordance with relevant guidelines by your suitably qualified and experienced person in consultation with DPI Fisheries. In addressing item (k) above, refer to TfNSW G36.	
G38 2.2.3	When preparing the ESCP, subdivide the site into sections based on the separate catchment areas, or alternatively and into high risk areas, that will be affected by Work Under the Contract. Progressively, before work begins on any section of the Site, prepare a drawing for that section showing all controls required to avoid erosion and sedimentation of the Site, surrounding areas, watercourses, drainage systems, water bodies and wetlands. Update each drawing regularly as the site conditions changes during the progress of Work Under the Contract. Include as part of the ESCP 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.	Appendix D

Specification	Measure/requirement	CSWMP Reference
	Include on the drawings construction project boundaries, environmentally sensitive areas and exclusion zones, vegetation within the site to be retained, north arrow, scale, complete legend, version number and date the plan was last updated, locations of all ancillary activities and/or areas and activities that may impact on water quality, such as: (a) access and haulage; (b) borrow pits; (c) stockpile and storage areas; (d) temporary work areas; (d) materials processing areas; (e) compound areas; (f) concrete and asphalt batching areas and location(s) of concrete wash-outs; (g) known (or site identified areas) of contamination.	
G38 2.3	If specified in Annexure G38/A, prepare a Water Quality Monitoring Program (WQMP), as a supplement to the ESCP, in accordance with the TfNSW Guideline for Construction Water Quality Monitoring and EPA publication "Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.". Carry out all monitoring in accordance with 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 to comply with the requirements of your EPL. The Principal will also undertake surface water, groundwater quality and groundwater level monitoring as outlined in TfNSW G1. This raw data and reports will be provided to you to assist in the preparation and implementation of your WQMP. You are responsible for the rectification of any potential issues identified by the Principal's monitoring. Include the following in the WQMP: (a) objectives of the monitoring (including EPA licence requirements); (b) map showing the water sampling locations;	Appendix B

Specification	Measure/requirement	CSWMP Reference
	(c) sampling protocol, including sample collection, chain of custody information and sample preservation; (d) water quality parameters and locations to be analysed and monitored; (e) method for interpretation of field results and identifying exceedance(s) of water quality criteria (including identification of adopted water quality criteria against which results will be compared); (f) accountabilities, responsibilities and training required to the meet the monitoring objectives; (g) method of comparison of results between sampling locations (e.g. upstream and downstream) and any water quality criteria and/or targets; (h) reporting and recording of the monitoring results; (i) responsibility for planning, implementing, checking and reviewing each element of the monitoring; (j) methodology for using monitoring results to assess and manage identified problems; (k) reporting requirements in the case the monitoring results exceed the set criteria; (l) provision to keep all records in legible form, for a minimum of four years and be able to produce immediately to any authorised EPA officer; (m) details of baseline data available; (n) details of baseline data to be obtained, and when; (o) the frequency of monitoring to be undertaken; and (p) any consultation to be undertaken in relation to the monitoring programs. Laboratories used in the monitoring program must be accredited by the National Association of Testing Authorities (NATA). Undertake monitoring of water discharges and receiving waters at appropriate intervals and at times of discharge during construction.	

Specification	Measure/requirement	CSWMP Reference
G38 2.5	Develop a documented process to periodically review the effectiveness and proper implementation of the SWMP and ESCP. The management review process must identify opportunities for continual improvement of your environmental management processes and practices, and ensure that the SWMP and ESCP remain current and relevant to the Work Under the Contract. Include in the SWMP and ESCP a procedure for assessing the performance of the control measures implemented and for addressing inspection reports from the Principal, EPA, your Environmental Site Representative (ESR) and the Environmental Representative (ER).	Section 8
G38 3.7	Conduct work in waterways in line with the requirements of Clause 3.7.	Section 6.9
G38 3.7.2	The design of temporary waterway crossings, stream diversions, drainage swales and depressions must be carried out by your suitably qualified and experienced professional in consultation with DPI Fisheries. Provide temporary waterway crossings if required to maintain the flow in the waterway. To minimise impacts on the waterways, take into consideration the following: (a) design, construct and maintain the crossing in accordance with the requirements of the BLUE BOOK; (b) maintain fish passage in accordance with DPI Fisheries guideline “Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings”; (c) 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; (d) provide erosion and sediment controls at entry/exits points of the crossing to minimise mudtracking on the crossing; (e) flood risks and impacts on surrounding properties as per Clause 3.9; and (f) provision of innovative all-weather haulage crossings methods that address clauses 3.7.2(a) to (e) and minimise ongoing maintenance requirements during service.	Section 6.10

Specification	Measure/requirement	CSWMP Reference
G38 3.8	Where relevant, describe in the SWMP or ESCP the proposed water source(s) intended for use for construction activities. Obtain all necessary approvals and licences from the New South Wales Office of Water, the Local Council and/or any other persons or authorities having responsibility for the chosen source(s) before commencing extraction.	Section 6.7
G38 3.10	Prepare and implement a Site Stabilisation Sub-Plan as part of the CEMP (see TfNSW G36) for the staged stabilisation of the Works throughout Construction. The Site Stabilisation Sub-Plan must include the requirements outlined in Clause 3.10 para 2	Section 6.15 Appendix H
G38 4	Visually monitor local water quality (i.e. turbidity, hydrocarbon spills/slicks) daily to identify potential spills or the effects of sediment-laden runoff.	Section 7.3
	Keep daily records of rainfall at the site in millimetres.	CAQMP
	Inspect all disturbed areas and revegetated/stabilised areas together with all permanent and temporary erosion and sediment control works as soon as practicable but within 3 hours (during normal work hours and days) or within 24 hours (outside normal work hours and days, including industry rostered days off and public holidays) after the start of all rainfall events exceeding 10mm and during periods of prolonged rainfall. Rectify any non-conformances revealed by such inspections immediately and clean, repair and augment these works as required, to ensure effective control thereafter.	Section 7.3
	Provide written and photographic evidence to the Principal of the Site's permanent and temporary erosion and sediment control works after each of these events. Keep a register of all inspections performed and of maintenance or repairs carried out (refer TfNSW G36 Clause 3.11).	Section 7.6
	Inspect check dams and sediment fences plus stormwater entry points such as pits and inlets at least weekly and rectify any blockages immediately. Clear sediment from behind check dams and sediment fences on a regular basis.	Section 7.3
	Inspect all stockpile sites at least weekly and rectify any non-conformances to erosion and sediment controls immediately.	Section 6.5

Specification	Measure/requirement	CSWMP Reference
		Appendix G Section 7.3
	Review the effectiveness of the ESCP following each rainfall event exceeding 10mm. Revise the SWMP (refer Clause 2.1), ESCP (refer Clause 2.2) and Stockpile Management protocol/ procedure (refer Clause 3.5) when erosion/sedimentation control measures, stabilisation control measures and other soil and water control measures are found to be not fully effective, including review of design parameters used for BLUE BOOK calculations.	Section 7.3
	The Principal may also engage a Soil Conservationist to conduct regular inspections on the site during construction. Make appropriate personnel available to induct, guide and accompany the Principal's Soil Conservationist on the inspections and to promptly rectify any deficiencies raised by the Principal's Soil Conservationist. Advise the Principal of actions being taken, in accordance with the priorities nominated in the Principal's Soil Conservationist's Environmental Inspection Report. The report will state the priority of the rectification works. You are required to rectify the actions listed within the inspection report within the timeframes included on the Environmental Inspection Report.	Section 7.3

Appendix B - Construction Soil and Water Quality Monitoring Program

Appendix B

Construction Soil and Water Monitoring Program

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
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Approval and authorisation

Plan reviewed by:	Plan endorsed by:
[redacted]	[redacted]
Seymour Whyte Environmental Site Representative	Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	-	Internal draft
C	29/06/2022	Updated in response to TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	28/08/2023	Updated in response to OCEMP update
F	18/01/2025	Updated in response to OCEMP update

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
BTEX	Benzene, Toluene, Ethylbenzene Xylene and Naphthalene
BoM	Bureau of Meteorology
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
ESM	Transport for New South Wales Environment and Sustainability Manager

Abbreviations	Expanded text
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
QA	Quality Assurance
RAP	Remedial Action Plan
REMM	Revised Environmental Management Measures
ROP	Ropes Creek
SOP	Standard operating procedures
SOU	South Creek
SRP	Soluble Reactive Phosphorus

Abbreviations	Expanded text
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 Context

This Soil and Water Monitoring Program (CSW-Monitoring Program) is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Monitoring Program has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

1.2 Background

1.2.1 M12 Motorway (the Project)

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 will run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres (km) and is expected to be opened to traffic prior to opening of the Western Sydney International Airport (WSIA). The Project will be delivered in a number of stages (or work packages) as described in the Project Staging Report. A detailed Project description is provided in Section 2 of the CEMP.

1.2.2 M12 Central

Seymour Whyte has been engaged to deliver the M12 Motorway – Central package. Construction of the M12 Central package involves building 7.5 km section of motorway from west of Badgerys Creek to the Water Tower Access Road within Western Sydney Parklands. A detailed description of the M12 Central package is provided in Section 2 of the CEMP.

1.3 Scope of the program

The scope of this Monitoring Program is to describe how the environmental soil and water impacts from construction will be monitored during the delivery of the M12 Central package. This Monitoring Program has been prepared under and consistent with the OCEMP, and in particular the Overarching Soil and Water Monitoring Program which forms part of the Overarching Construction Soil and Water Management Sub-Plan (OCSWMP), considering relevant sensitive receivers and construction activities. In the preparation and ongoing implementation of this Plan, SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied.

This Monitoring Program has been developed primarily to describe how surface water and ground water will be monitored in the immediate vicinity of construction sites. Operational monitoring measures do not fall within the scope of the construction phase and therefore are not included in this Monitoring Program. A copy of this Monitoring Program will be kept on the premises for the duration of construction.

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 some of the monitoring and reporting requirements identified in the Plan. Seymour Whyte will complete the remaining monitoring and reporting. This CSW-Monitoring Program is to be implemented for the duration of construction.

1.4 Environmental Management Systems overview

The Environmental Management System (EMS) for the M12 Central package is described in Section 3 of the CEMP. To achieve the intended environmental performance outcomes, Seymour Whyte have established, implemented, maintained and continually improved an EMS in accordance with the requirements of ISO14001:2015. Seymour Whyte's EMS, which is consistent with overarching EMS described in the OCEMP, will be adopted as the guiding environmental management framework for the M12 Central package.

This Monitoring Program forms part of the environmental management framework for the M12 Central package, as described in Section 3.3 of the CEMP. This Monitoring Program has been developed consistent with the OCEMP including the Overarching Construction Soil and Water Monitoring Program, the CSWMP and the EMS.

1.5 Approval, review and modification

The Overarching Construction Soil and Water Monitoring Program has been prepared to satisfy the NSW and Commonwealth CoA in relation to soil and water management during construction of the Project, particularly NSW CoA C11(b and c). This Monitoring Program will be reviewed by the TfNSW ESM (or delegate) and the ER to confirm it is consistent with, and incorporates, all relevant elements of the approved OCEMP and other requirements, prior to submission to the Planning Secretary and Environment Protection Authority (EPA) for information. Construction of the M12 Central package will not commence until the CSWMP, and this Monitoring Program has been reviewed to the satisfaction of the TfNSW ESM and ER and provided to the Planning Secretary and EPA for information.

The Monitoring Program will be implemented for the duration of construction and for any longer period set out in this Monitoring Program or as specified by the Planning Secretary, whichever is the greater. This Monitoring Program will be reviewed every six months by Seymour Whyte's Environmental Site Representative (ESR) in consultation with TfNSW. Minor amendments to this Monitoring Program may be provided to the ER for acceptance.

Any amendments to the Monitoring Program will be documented in subsequent revisions of this Monitoring Program. A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure outlined in the CEMP. Site personnel with responsibilities relevant to noise and vibration monitoring will be informed of any amendments to the Monitoring Program with appropriate training provided, where relevant.

1.6 Purpose and objectives

The purpose of this Monitoring Program is to describe how, where and when Seymour Whyte will monitor for receiving surface waters and groundwater during construction of the M12 Central package including:

- 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 21596) 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).

See Section 2.2 of the CSWMP for further details objectives of this Monitoring Program. See Section 2.3 of the CSWMP for specific targets for the management of soil and water impacts during the delivery of the M12 Central package.

1.7 Responsibilities

Site personnel or sub-consultants 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 (BH145)	TfNSW appointed consultant
Routine groundwater inflows Cut 9	ESR or delegate
Discharge monitoring	ESR or delegate
Climate and weather monitoring	ESR or delegate

The TfNSW appointed consultant will undertake routinereceiving 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 Seymour Whyte, who will be responsible for implementing any actions required in response to any exceedances identified in the TfNSW appointed consultant monitoring results. Seymour Whyte 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.

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

1.8 Consultation

The OCSWMP and overarching Construction Soil and Water Monitoring Program were prepared in consultation with the following government agencies and stakeholders in accordance with NSW CoA C4(e), C7, C11(b) and C11(c):

- DPIE Water (now 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).

Key matters raised by stakeholders and how they have been addressed are outlined in the OCSWMP including consultation evidence in accordance with NSW CoA C4 and A5. This stage-CSW-Monitoring Program has been prepared under and consistent with the overarching CSW-Monitoring Program and therefore no further consultation is required as part of the preparation of this Plan.

During construction changes may occur that potentially change the compliance status of the OCEMP, or as a result of the Review and improvement process in Section 8 of the CSWMP, which require this Program to be updated. Where these changes are not considered 'minor' by the ER, further consultation with the relevant stakeholders will occur.

Ongoing consultation between TfNSW Seymour Whyte, neighbouring Project packages, other construction projects, 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 consistent with the OCS and as described in the M12 Central Communication and Stakeholder Engagement Strategy.

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	Document reference
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 1.8
	(b) Surface Water Monitoring Program - DPIE Water, Sydney Water (if there are any discharges to their assets), relevant councils	
	(c) Groundwater Monitoring Program - DPIE Water	
C12	Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant Construction Monitoring Programs, including copies of all correspondence from those agencies as required by Condition A5.	Section 1.8
C13	Each Construction Monitoring Program must provide: (a) details of baseline data available	Section 5 Annexure 1 Annexure 2
	(b) details of baseline data to be obtained and when	Section 5

CoA No.	Condition Requirement	Document reference
	(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 1.3 Section 4
	(k) any consultation to be undertaken in relation to the monitoring programs.	Section 1.8
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 1.5
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 1.5
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 1.5

CoA No.	Condition Requirement	Document reference
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.*	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	Document Reference
SWH05	A construction water quality monitoring program will be developed and included in the CSWMP for the project to establish baseline conditions, observe any changes in surface water and groundwater during construction, and inform appropriate management responses. The program will be based on the water quality monitoring methodology, water quality indicators and the monitoring locations identified in the Surface water and hydrology assessment report (Appendix M of the EIS) and supplementary memo (Appendix I of this amendment report), and Groundwater quality and hydrology assessment report (Appendix N of the EIS) and supplementary memo (Appendix J of this amendment report).	Prior to construction and during construction and operation	This CSW-Monitoring Program Section 4.5 Section 5.1 Section 1.6 Section 3.1 Section 4.1

ID	Revised environmental management measure	Timing	Document Reference
	Baseline monitoring will be carried out monthly for a minimum of 12 months before the start of construction. As a minimum this will include three wet weather sampling events over six months where feasible. Sampling locations and monitoring methodology to be carried out during construction will be further developed in detailed design in accordance with the Guideline for Construction Water Quality Monitoring (RTA 2003) and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). It will include collection of samples for analysis from sedimentation basin discharge points, visual monitoring of other points of release of construction waters and monitoring of downstream waterways.		Section 5.1 Section 4.2.1
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

ID	Revised environmental management measure	Timing	Document Reference
GW05 (amended)	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 per 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 the 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 six months.	During construction and operation	Section 4.2
GW07 (amended)	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 earthworks activities. If evaporation is determined not to be a sufficient mitigation measure, the Construction Contractor will identify and implement additional mitigation measures and these will be documented in the Construction Contractor's CEMP and Construction Soil and Water Management Plan.	During construction and operation	Section 4.2

ID	Revised environmental management measure	Timing	Document Reference
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	Section 4.2

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 phase 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 phase 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 for the M12 Central package will be monitored during construction by TfNSW at BH145 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

The EPL for the M12 Central package prescribes the water quality parameters for the purposes of the monitoring and the setting of limits for discharges of pollutants to water. The limits for discharges of pollutants set in the EPL only apply to the licensed monitoring and discharge points. The licensed monitoring and discharge points, along with and all sediment basins, must be identified in the map(s) and in a schedule submitted to, and approved in writing by, the EPA.

The concentration of a pollutant discharged at a Licenced Discharge Point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the Table 3-1.

Table 3-1: Water and/or Land Concentration Limits

Pollutant	Unit of Measure	Concentration Limit (100 percentile)
Oil and grease	Visible	Not visible

Pollutant	Unit of Measure	Concentration Limit (100 percentile)
pH	pH	6.5-8.5
Turbidity	nephelometric turbidity units (NTU)	50

Exceeding the limits specified in Table 3-1 for discharges from licensed discharge points is only permitted when:

- the discharge occurs solely as a result of rainfall measured at the premises exceeding the design 5-day rainfall depth value (32.2mm) and,
- the sediment basins and other erosion and sediment controls corresponding to the discharge point(s) have been designed, constructed, operated and maintained in accordance in accordance with Managing Urban Stormwater – Soils and Construction, Volume 2D, Main Road Construction (DECC, 2008), to be read and used in conjunction with Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom, 2004).

In all other circumstances, Seymour Whyte must comply with section 120 of the *Protection of the Environment Operations Act 1997*.

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).

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

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 M12 Central Package. 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 by the TfNSW appointed consultant on a monthly basis 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.

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 early works 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 24 millimetres, opportunistic wet weather monitoring would be undertaken to ensure that some wet weather data is collected.

4.1.3 Sampling locations

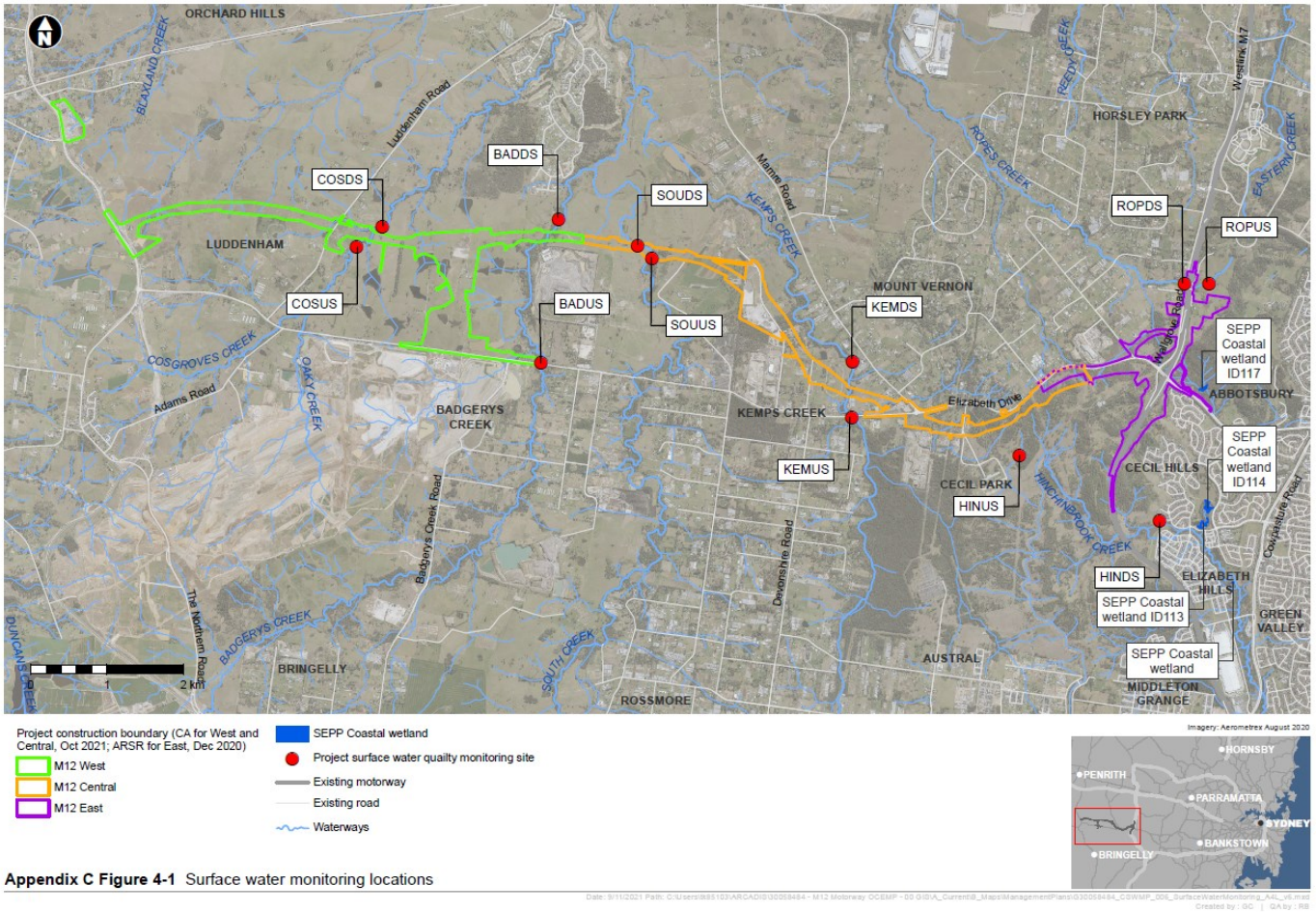
The M12 Central Package surface water monitoring sites are listed in

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 M12 Central Package 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.

Table 4-1: M12 Central package Surface water monitoring locations

Site ID	Watercourse	Coordinates	Description and location details	Project Stage
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



Appendix C Figure 4-1 Surface water monitoring locations

Figure 4-1: Surface water monitoring locations

4.1.4 Sampling methodology

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).
- 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 suitably trained and experienced personnel. 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 M12 Central package 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.

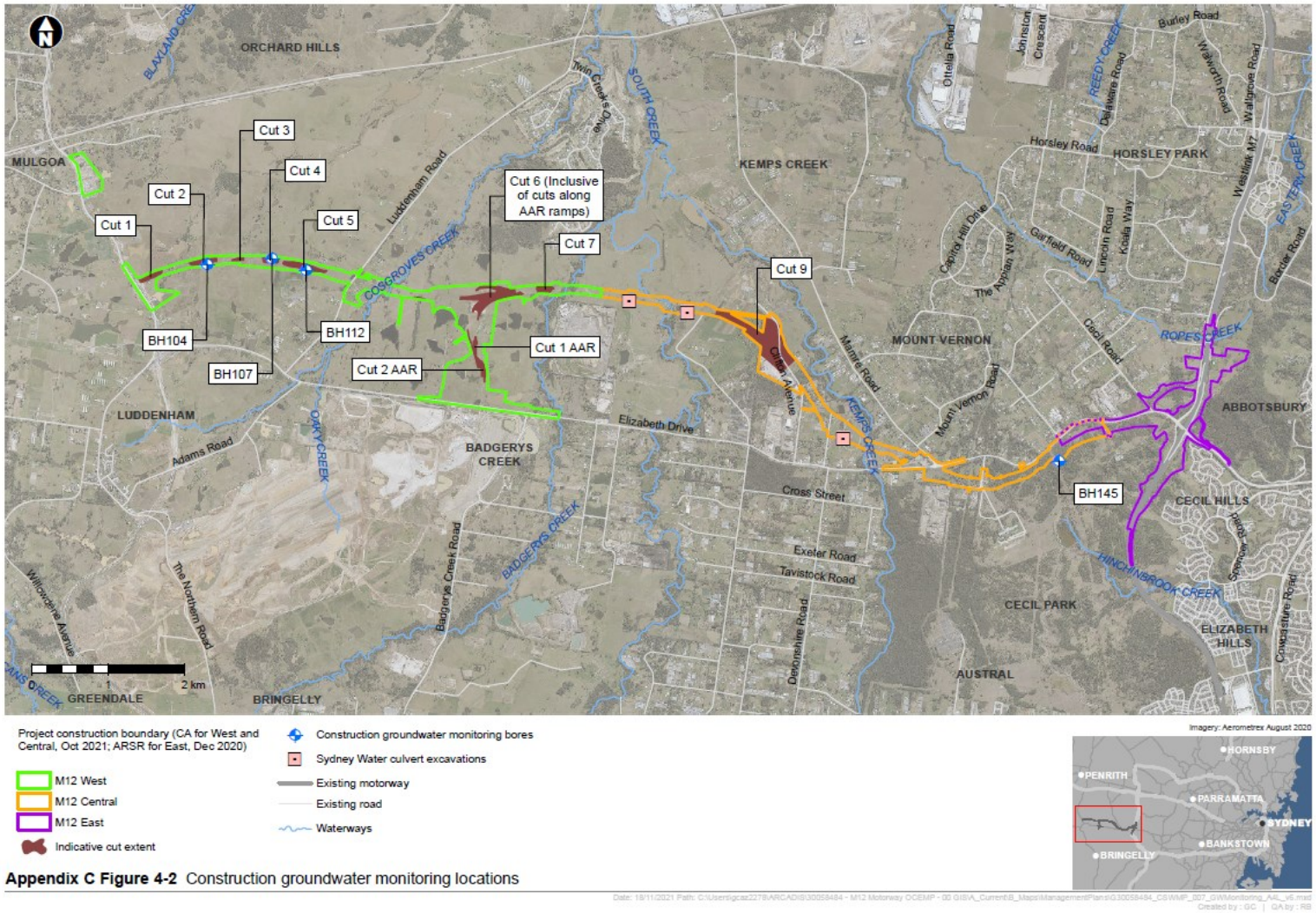
Groundwater boreholes BH145 (now BH145R as of April 2023) will be monitored by TfNSW during construction whilst Seymour Whyte will monitor groundwater in Cut 9 during construction.

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			
BH145(now BH145R as of April 2023)	Groundwater quality and level	Monthly	TfNSW
M12 Central			
Clifton Avenue (Cut 9)	Groundwater inflows and quality^	Monthly	Seymour Whyte

^ *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 for BH 145.*

Groundwater inflows

Seymour Whyte 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).

Groundwater inflows to the Clifton Avenue (Cut 9) will be observed by Seymour Whyte at monthly intervals. As part of observing the groundwater inflows, an estimate of 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

Treatment and water sampling of captured stormwater will be undertaken prior to water being discharged from site in accordance with the M12 Central package EPL requirements.

For each discharge, monitoring (by sampling and obtaining results by analysis) the concentration of each pollutant specified in the Dewatering Management Plan (Appendix D) and the EPL will be undertaken and recorded.

The sampling will be undertaken 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

In accordance with normal standard construction practices, weather forecasts will be used to guide work activities undertaken on-site. Weather forecasts will be reviewed at the start of each day and before 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.

4.4.1 Automatic Weather Station

An Automatic Weather Station (AWS) will be established to record on an hourly basis:

- Rainfall
- Temperature
- Relative humidity
- Wind speed
- Wind direction
- Bathometric pressure.

The AWS will be established at the Clifton Ave site compound (construction ancillary facility AF4) in accordance with the design and location requirements outlined within TfNSW QA Specification R272, unless otherwise approved by TfNSW. The AWS will be situated on land owned by TfNSW and within a secure compound area fully protected by fencing. If suitable locations within TfNSW land are not available and the AWS has to be situated on private land, permission will be obtained from the landowner to allow access for monitoring and maintaining the AWS. The AWS will be solar powered, and AWS instrumentation, communication or power cabling contained within conduits will be buried to a depth of at least 100 millimetres.

Before establishment of the AWS, an Automatic Weather Station Location Report will be prepared in consultation with a suitably qualified person with experience installing and operating AWS. The Automatic Weather Station Location Report will identify suitable locations for the AWS, including any consultation required, and be submitted to the TfNSW ESM for acceptance of the AWS location.

The M12 Central Weather Station Location Report will be reviewed by the TfNSW ESM (or delegate) to confirm it is consistent with all relevant elements of the approved OCSWMP, the CSWMP and this CSW-Monitoring Program. Construction of the M12 Central package will not commence until the M12 Central Weather Station Location Report is accepted by the TfNSW ESM (or delegate) and the AWS is installed. Monitoring will be carried out from at least two weeks prior to any construction work until at least four weeks after any construction work has ceased.

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.

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 Seymour Whyte personnel and 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.

4.4.2 Manual rain gauge

Rainfall will be measured using a manual rain gauge installed at the Clifton Ave site compound and the Corner of Elizabeth Drive and Mamre Road site compound (construction ancillary facility AF5). Rainfall data will be recorded in millimetres per 24-hour period at the same time each day. Manual rain gauges will be used as necessary to assist with confirming the accuracy of rainfall data collected from the AWS. The manual rain gauge will be installed in accordance with TfNSW QA specification R272.

Prior to installation, the proposed location of the manual rain gauge(s) and monitoring requirements will be identified within the M12 Central Weather Station Location Report, and accepted by the TfNSW ESM (or delegate).

4.5 Adaptive management

Should soil, water or contamination monitoring results directly attributable to the M12 Central Package exceed the criteria set out in Section 3 of this CSW-Monitoring Program, the following steps will be undertaken:

- Analysis of the results by the ESR, in consultation with the TfNSW appointed consultant and TfNSW, in more detail with a view of determining possible causes for the exceedance, including identifying the Project stage (or stages) responsible for the issue
- Site inspection by the ESR
- Advising relevant personnel of the problem
- Identifying and agreeing on actions and/or additional mitigation measures to resolve or mitigate the exceedance
- Implementing actions to rectify or mitigate the exceedance, including stop work arrangements where necessary or if directed by the ER
- Identifying and implementing additional mitigation measures.

Where criteria are exceeded, the ESR (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 CEMP. The ESR will verify and document the effectiveness of any management measures or preventative / corrective actions implemented to avoid further exceedances.

The ESR will communicate regularly with the other packages of the M12 project (East and West), Sydney Water, Western Sydney Parklands and TfNSW to ensure plans are co-ordinated and

cumulative soil and water quality impacts are minimised. The M12 Central Communication and Stakeholder Engagement Strategy provides details on the requirements for coordination and communication between the contractors M12 Motorway package stages in accordance with the Overarching Communication Strategy. The timing for any improvement will be agreed between the relevant Project Engineer / 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 South Creek (SOU), Kemps Creek (KEM),. 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 2022is 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. A number of samples reported concentrations of EC in exceedance of the ANZECC criteria • 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 M12 Central package. 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 2021 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. • 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. • 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. • 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 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 nitrate and nitrite in eastern monitoring well BH145; • Exceedances of ANZG (2018) 95% freshwater criteria for ammonia in 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. • 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.

Monitoring Report	General observations
M12 Motorway Groundwater Monitoring Report 6 – October 2021 to March 2022	• Sulfate concentrations in BH104 and BH112 exceeded *Australian Drinking Water Guidelines {ADWG} 6 Health and Recreation criteria* (NHMRC & NRMMC, 2011) in the majority of monitoring events. Sulfate concentrations in BH107 and BH145 remained below criteria. • All groundwater samples reported concentrations of metals, benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN), total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH) and phenols below the laboratory LOR and adopted human health criteria, with the exception of: ◦ BH145; which exceeded ADWG (NHMRC & NRMMC, 2011) criterion for nitrate and nitrite in all samples except October 2021. ◦ BH107 in November 2021 and BH112 in February 2022 exceeded ANZG freshwater criterion for nitrate. • All samples reported total dissolved solids (TDS) concentrations above the laboratory LOR (10 mg/L). Human health criteria are generally not applied to total dissolved solids as it is an aesthetic issue; however, the ADWG (NHMRC & NRMMC, 2011) states that concentrations exceeding 1200 mg/L are regarded as unacceptable drinking water. All samples exceeded this limit. • The majority of groundwater samples exceeded adopted ANZECC ecological criterion for ammonia, total oxidised nitrogen, total nitrogen and total phosphorous. • The majority of groundwater samples collected during the current monitoring period reported heavy metal concentrations below the limit of reporting (LOR) and/or adopted ANZG and ANZECC ecological assessment criteria, with the exception of exceedances 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 ESR will prepare Monthly Environmental Reports for the duration of the construction for incorporation in the 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
- Summary of monthly rainfall data and/or significant rainfall and storm events
- Results of all surface discharge events
- Summary of any basin overtopping events
- Results of groundwater inflows to the Clifton Avenue (Cut 9)
- 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 Overarching 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 Overarching Construction Surface Water and Groundwater Monitoring Program Report collated by TfNSW will be provided to the Planning Secretary and relevant government agencies 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, Seymour Whyte (and/or the TfNSW appointed consultant if applicable) will report the exceedance to the TfNSW Project Manager, 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 7.3 of the CEMP and the Environmental Incident Classification and Reporting Procedure (refer to Appendix A7 of the CEMP) will apply. The ESR is responsible for reporting on incidents.

The ESR will immediately notify the TfNSW Project Manager, 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 ESR 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 Seymour Whyte personnel who witnessed the event
- The name, address and business hours telephone number of other witnesses to the event
- Action taken by Seymour Whyte 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 Seymour Whyte. Seymour Whyte will provide such further details to the EPA within the time specified in the request. Seymour Whyte will also complete an incident form for submission to the TfNSW Project Manager and ESM (or delegate) within three business days of the occurrence of the event.

6.4 EPL reporting

Seymour Whyte's ESR will prepare a summary of site discharge water quality monitoring results, including a statement of compliance with the relevant EPL conditions, and a summary of complaints received related to water quality issues, for inclusion in the annual EPL return. EPL annual returns will be prepared for the M12 Central 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 2021 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. For regional reference the all monitoring locations from the Project wide baseline assessment have been presented.

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 4-3. For regional reference the all monitoring locations from the Project wide baseline assessment have been presented.

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 C - Dewatering Management Plan

Appendix C

Dewatering Management Plan

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
Title	M12 Central CEMP: Appendix B4 Construction Soil and Water Management Sub-plan Appendix C: Dewatering Management Plan
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000013

Approval and authorisation

Plan reviewed by:	Plan endorsed by:
[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	-	Internal draft
C	29/06/2022	Updated in response to TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	28/08/2023	Updated in response to OCEMP update
F	18/01/2025	Updated in response to OCEMP update

Contents

Tables

Figures

Glossary/ Abbreviations

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

1 Introduction

1.1 Purpose

This Dewatering Management Plan (the 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 Central package 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 under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

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 M12 Central package site
- Ensure that water discharges from the M12 Central package site are compliant with the:
  - Project Environmental Protection Licence (EPLs)
  - Overarching CSWMP.

1.3 Scope

This Dewatering Management Plan (the Plan) is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

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

1.4 Induction / training

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

An Environmental Work Method Statement (EWMS) will be prepared 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 (refer to Section 3.1).

Additional training will be provided personnel involved in dewatering activities. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and responsibilities

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

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

1.6 Review

Updates of the Plan will be and reviewed by the Soil Conservationist appointed by Seymour Whyte 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 QA Specification G38 – Soil and Water Management
- TfNSW Technical Guideline EMS-TG-011: Environmental Management of Construction Site Dewatering (RTA, 2011)

The POEO Act is the key piece of environment protection legislation in NSW, administered by the NSW Environmental Protection Authority (EPA). The M12 Central package 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 QA Specifications relevant to the development of this Plan are listed in Table 2-1, as identified in the CSWMP.

Table 2-1: Dewatering requirements

Reference	Measure/Requirement	Where addressed
NSW CoA C7	The Surface Water and Groundwater CEMP Sub-Plan must be based on a detailed site investigation of contamination risk and include, but not be limited to: (c) a Trigger Action Response Protocol for potential discharge waters, identifying alternative disposal options for water with contaminant concentrations exceeding water quality management criteria.	CSWMP Section 3.5.3
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

A Construction Site Dewatering EWMS will be prepared to manage and control dewatering activities in a manner that does not cause harm to the environment, including where construction water may be discharged into natural waterways.

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

EWMS incorporate appropriate mitigation measures and controls, including those identified in relevant Sub-plans. The EWMS also identifies key procedures to be used concurrently with the EWMS. EWMS are specifically designed to communicate requirements, actions, processes and controls to construction personnel using plans, diagrams and simply written instructions. A template EWMS is provided in Appendix A8 of the CEMP. Appendix A8 also contains a template EWMS register and template EWMS training register.

3.2 Approach

The 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.
- pH levels are between 6.5 – 8.5 is being applied to landscaped areas.

If all criteria above are met, then the water may be authorised for reuse by the 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 ESR.

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

3.3.3 Site discharge

The EPL for the M12 Central package prescribes the water quality parameters for the purposes of the monitoring and the setting of limits for discharges of pollutants to water. These criteria were proposed by TfNSW based on the M12 Motorway - Central Package Detailed Design Impact Assessment of Sediment Control Basin Discharges to Waterways (GHD 2021).

The limits for discharges of pollutants set in the EPL only apply to the licensed monitoring and discharge points. The licensed monitoring and discharge points, along with and all sediment basins, must be identified in the map(s) and in a schedule submitted to, and approved in writing by, the EPA.

The concentration of a pollutant discharged at a Licenced Discharge Point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the Table 3-1.

Table 3-1: Water and/or Land Concentration Limits

Pollutant	Unit of Measure	Concentration Limit (100 percentile)
Oil and grease	Visible	Not visible
pH	pH	6.5-8.5
Turbidity	nephelometric turbidity units (NTU)	50

Exceeding the limits specified in Table 3-1 for discharges from licensed discharge points is only permitted when:

- the discharge occurs solely as a result of rainfall measured at the premises exceeding the design 5-day rainfall depth value (32.2mm) and,

- the sediment basins and other erosion and sediment controls corresponding to the discharge point(s) have been designed, constructed, operated and maintained in accordance in accordance with Managing Urban Stormwater – Soils and Construction, Volume 2D, Main Road Construction (DECC, 2008), to be read and used in conjunction with Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom, 2004).

In all other circumstances, Seymour Whyte must comply with section 120 of the *Protection of the Environment Operations Act 1997*.

3.4 Water treatment

The EWMS 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 ESR 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 ESR (or delegate) 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.

3.4.1 Using Gypsum (Calcium Sulphate)

Normally, gypsum should be applied at a rate of about 30 kilograms per 100 cubic metres of stored water. Annexure 2 has been prepared to calculate the application rate for the operation and temporary basins proposed for the project in the M12 Motorway - Central Package Detailed Design Erosion and Sediment Management Report (GDH 2021). This table will be maintained and updated as additional construction basins are designed and constructed.

The effectiveness of gypsum will vary based on site specific sediment type(s). As such the total quantity of gypsum applied to each basin in order to achieve the discharge criteria will be recorded during each discharge event to determine the appropriate application rate for future events. Bucket tests may also be completed to determine the appropriate application rate for the site-specific sediment type(s).

3.4.2 Using Flocculants or Coagulants Other Than Gypsum (Calcium Sulphate)

Seymour Whyte may propose to TfNSW for approval to use a flocculant or coagulant other than gypsum as recommended by the Contractor’s or TfNSW’s Soil Conservationist.

Prior to use of an alternate flocculant or coagulant, Seymour Whyte must provide evidence that the proposed flocculant or coagulant is suitable for use using the TfNSW template “Alternative flocculants and coagulants – template to propose use”. The template is available on the TfNSW Internet website (http://www.rms.nsw.gov.au/about/environment/soil-water-quality/index.html)

TfNSW will provide a written response to the proposal within ten working days. Submission of a proposal does not guarantee approval to use a flocculant or coagulant other than gypsum.

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).
- Approved Methods for Sampling and Analysis of Water Pollutants in NSW (EPA, 2022)

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 ESR (or delegate) who will issue a Permit to Discharge. The Permit to Discharge will only be issued once the water quality criteria have been met.

Prior to the commencement of dewatering, the ESR (or delegate) will inspect the entire system, including intakes and outlets, pumping and discharge locations.

The dewatering activities will be directly supervised by personnel trained in this Plan and the EWMS.

If the ESR proposes 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.

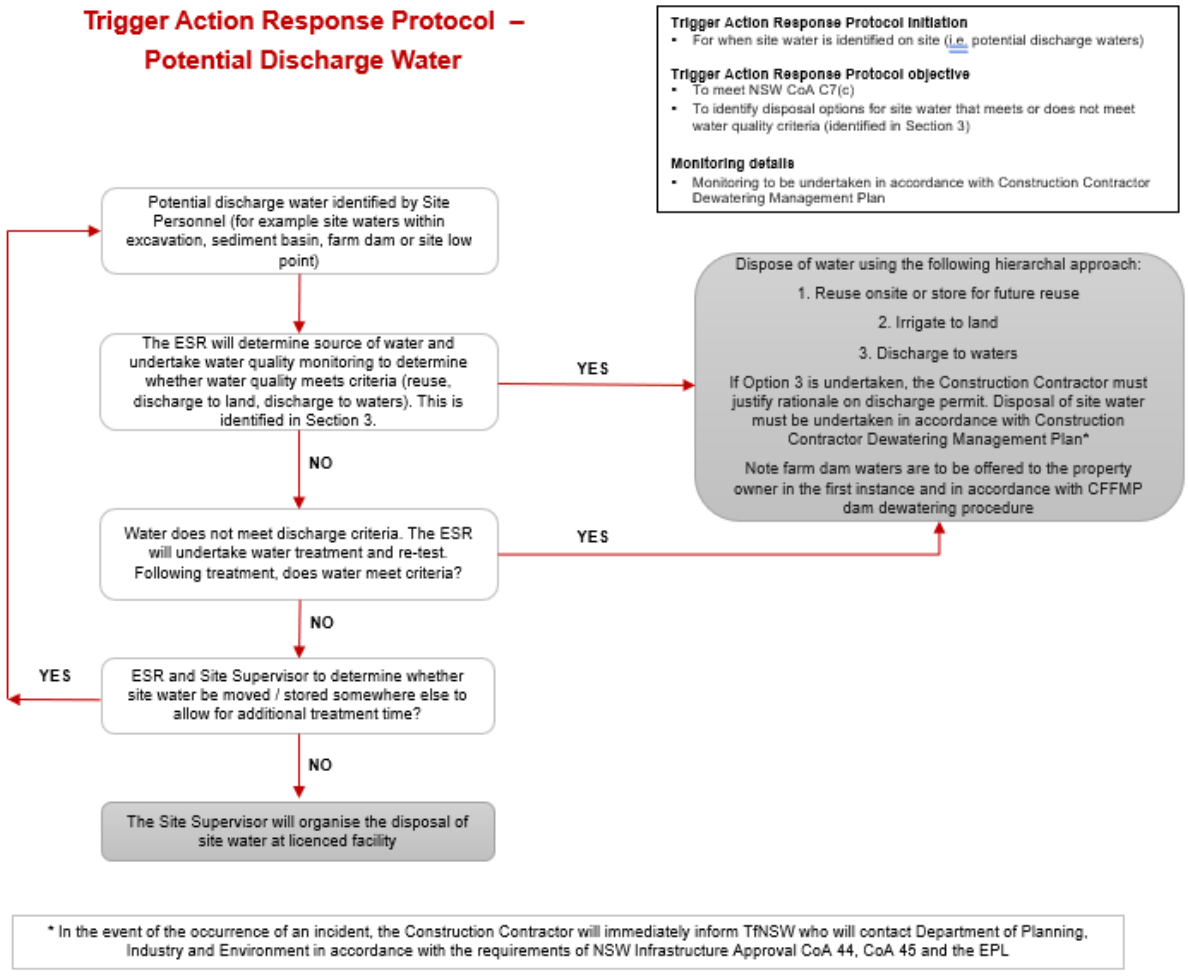

Figure 3-1: Trigger Action Response Protocol

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.

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 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 dewatering of Sydney Water infrastructure is required (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 ESR 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, time and name of person who tested the water prior to discharge
- 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.

A copy of the discharge permit pro-form is provided in Annexure A.

The ESR will report on site discharge monitoring results in the Soil and Water Monitoring Reports to be prepared for the Project including the EPL monitoring data. Details of the reporting are outlined in the Construction Soil and Water Monitoring Program (refer Appendix B of the CSWMP).

Annexure 1: Discharge Permit Pro-forma

Annexure 2: Gypsum application rates for basins

Basin ID	Permeant or temporary Basin	catchment area total (ha)	catchment area disturbed (ha)	LS-factor	Soll loss (T/ha/yr)	Catchment soil loss (T/yr)	Sediment basin storage (soil) volume (m3)	Sediment basin settling (water) volume (m3)	Total sediment basin volume (m3)	Gypsum application rate 30kg / 100 cubic metres	Discharge Point	
											X	y
20140E	Temporary	1.6	1.6	1.20	179	287.0	37	330	367	110	292999.496	6251213.122
20400E	Permanent (Bioretention) basin PB-020392-N	3.03	3.03	1.30	194	588.9	75	624	699	210	293309.617	6251182.763
21060W	Permanent (Bioretention) basin PB-021098-S	13.4	13.4	3.20	478	6410.6	822	2761	3583	1075	293885.350	6250976.851
22100W	Temporary	4.56	4.56	1.35	202	921.1	118	940	1058	317	294879.658	6250567.451
22200E	Temporary	2.19	2.19	1.47	220	481.8	62	451	513	154	295139.977	6250817.674
22240E	Temporary	4.24	4.24	2.17	324	1375.5	176	874	1050	315	295202.478	6250821.863
22820W	Temporary	1.43	1.43	1.04	155	222.3	29	295	324	97	295399.595	6250137.774
22840W	Permanent (Bioretention) basin PB-022945-S	1.31	1.31	1.02	153	200.3	26	270	296	89	295476.405	6250068.669
22850E	Permanent (Bioretention) basin PB-022950-N	2.64	2.64	0.91	136	359.2	46	544	590	177	295527.774	6250098.121
22880E	Temporary	6.86	6.86	0.91	136	933.3	120	1414	1534	460	295569.909	6250120.672
23020E	Temporary	6.40	6.4	0.77	115	736.7	94	1319	1413	424	295588.432	6250093.752
23040E	Permanent (Bioretention) basin PB-023035-N	5.19	5.19	0.83	124	644.0	83	1070	1153	346	295539.89	6250079.615
23800E	Permanent (Bioretention) basin PB-023810-N	3.30	3.3	2.19	327	1080.4	139	680	819	246	296052.878	6249434.139
23840W	Temporary	1.23	1.23	2.19	327	402.7	52	253	305	92	296027.201	6249340.943
23900W	Temporary	1.61	1.61	1.19	177	285.0	37	332	369	111	296053.894	6249299.958
24050E	Permanent (Bioretention) basin PB-024057-N	2.40	2.4	2.00	299	717.6	92	495	587	176	296246.909	6249308.636
24320E	Temporary	3.11	3.11	1.14	170	528.7	68	641	709	213	296399.928	6249217.594

Basin ID	Permeant or temporary Basin	catchment area total (ha)	catchment area disturbed (ha)	LS-factor	Soll loss (T/ha/yr)	Catchment soil loss (T/yr)	Sediment basin storage (soil) volume (m3)	Sediment basin settling (water) volume (m3)	Total sediment basin volume (m3)	Gypsum application rate 30kg / 100 cubic metres	Discharge Point	
											X	y
24400W	Permanent (Bioretention) basin PB-024434-S	4.37	4.37	0.56	*84*	365.9	47	901	*948*	284	296493.826	6249126.665
24900W	Temporary	3.76	3.76	2.14	320	1203.2	154	775	929	279	296845.206	6248952.572
25160E	Temporary	0.95	0.95	2.90	434	411.9	53	196	249	75	297346.185	6248854.662
25160W	Permanent basin PB-025120-S	1.63	1.63	3.27	489	796.9	102	336	438	131	297132.371	6248873.486
25200W	Temporary	4.22	4.22	3.51	525	2215.5	284	870	1154	346	297156.356	6248743.963
25300E	Permanent basin PB-025345-N	1.70	1.7	2.90	434	737.1	94	350	444	133	297378.155	6248839.995
25300W	Temporary	2.71	2.71	3.51	525	1422.1	182	558	740	222	297310.555	6248756.935
25620E	Permanent basin PB-025598-N	0.43	0.43	3.20	478	205.7	26	89	115	35	297664.368	6248746.505
25640W	Temporary	2.79	2.79	3.46	517	1443.2	185	575	760	228	297600.509	6248667.588
25700E	Permanent basin PB-025682-N	0.99	0.99	2.97	444	439.6	56	204	260	78	297763.556	6248746.16
25850E	Temporary	1.95	0.97	2.06	308	298.8	38	402	440	132	297886.293	6248724.858
25880E	Permanent basin PB-025898-N	3.33	3.33	3.04	454	1513.4	194	686	880	264	297921.788	6248742.389
26100W	Permanent basin PB-06083-S	2.64	2.06	3.46	517	1065.6	137	544	681	204	298100.895	6248656.752
26340W	Temporary	2.02	1.33	4.22	631	839.1	108	416	524	157	298394.81	6248761.491
26420W	Temporary	7.40	5.3	5.88	879	4660.3	597	1525	2122	637	298478.225	6248780.579
26740W	Temporary	2.39	1.83	4.35	650	1190.1	153	493	*646*	194	298738.37	6248968.965
27060E	Temporary	4.23	3.21	3.19	477	1530.9	196	654	850	255	298954.256	6249271.734
27140E	Temporary	3.27	2.02	3.44	514	1038.9	133	421	554	166	299024.599	6249316.826
27310E	Temporary	2.39	2.39	3.58	535	1278.7	164	493	657	197	299138.546	6249410.294
27460E	Temporary	2.92	2.92	3.34	499	1457.1	187	602	789	237	299297.329	6249463.919

Appendix D - Erosion and Sediment Control Procedure

Appendix D

Erosion and Sediment Control Procedure

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
Title	M12 Central CEMP: Appendix B4 Construction Soil and Water Management Sub-plan Appendix D: Erosion and Sediment Control Procedure
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000013

Approval and authorisation

Plan reviewed by:	Plan endorsed by:
[redacted]	[redacted]
Seymour Whyte Environmental Site Representative	Seymour Whyte Project Manager
18/01/2025	18/01/2025
	

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	-	Internal draft
C	29/06/2022	Updated in response to TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	28/08/2023	Updated in response to OCEMP update
F	18/01/2025	Updated in response to OCEMP update

Contents

Tables

Glossary/ Abbreviations

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

1 Introduction

1.1 Purpose

This Erosion and Sediment Control Procedure (the Procedure) provides guidance to for the progressive review and update of Erosion and Sediment Control Plans (ESCP) for the M12 Central package whenever the contract program or work methods change, and whenever the work methods and control structures are found to be ineffective or are no longer required.

1.2 Objective

The objectives of this Plan include:

- Ensure compliance with environmental requirements of the Project
- Implement industry standard methods for erosion and sediment controls
- Provide a clear methodology for the preparation, implementation, inspection and review of management of erosion and sediment plans for the M12 Central package.

1.3 Scope

This Erosion and Sediment Control Procedure is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Plan has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

1.4 Induction / training

All site personnel involved in the preparation, implementation, review or inspections of erosion and sediment control plans will be trained and inducted in this Procedure.

ESCPs may be produced in conjunction with EWMS to provide more detailed site-specific environmental mitigation measures and will be developed before commencing activities within each catchment for the M12 Central package.

Additional training will be provided personnel involved in dewatering activities. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and responsibilities

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

The following specialised roles are required for M12 Central package relating to this Plan:

- The ESR (or delegate) is responsible for ensuring ESCPs are prepared by suitably qualified personnel that have completed training in Blue Books 1 and 2D and erosion and

sedimentation control (with a certificate as proof of training) and have suitable on site, hands on experience in preparing such plans, including refresher training as appropriate.

- The Soil Conservationist appointed by Seymour Whyte that is on the TfNSW list of registered contractors for erosion, sedimentation and soil conservation consultancy services will be responsible for reviewing each revision of the ESCPs and undertaking inspections of their implementation.
- Site supervisors are responsible for maintaining erosion and sediment controls in accordance with approved ESCPs.

1.6 Review

Updates of this Procedure will be and reviewed by the Soil Conservationist appointed by Seymour Whyte 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 QA Specification G38 – Soil and Water Management
- TfNSW Technical Guideline EMS-TG-011: Environmental Management of Construction Site Dewatering (RTA, 2011)
- PS311 – Environmental Design and Compliance, specifically:
  - M12 Motorway - Central Package Detailed Design - Erosion and Sediment Management Report (Rev E) (GHD 2021).

3 Design Criteria

3.1 Design guide

In preparing the ESCPs, comply with the following design requirements:

- estimate peak flows and other parameters needed to design drains and drainage structures using the methods described in Australian Rainfall and Runoff
- use the Average Recurrence Interval (ARI) shown in Table 3-1 for the design of erosion and sediment control measures, unless site conditions or risks to life, property or the environment suggest that other values are applicable
- superimpose the drawings accompanying the plans on A3 sized drainage drawings of the Works and include an aerial base with contour on these drawings.

Table 3-1: Design average recurrence intervals

Control Measure	Estimated Design Life	
	0-12 months	>12 Months
Diversion bank	10	20/100*
Level spreader	10	20/100*
Waterway	10	20/100*
Sediment basin:		
Primary outlet	5	10
Emergency outlet (overflow)	20	100
Sediment trap	5	10
Outlet protection	20	50
Grade stabilising structure	20	50
Detention basin:		
Primary outlet	5	10
Emergency outlet (overflow)	20	100
Waterway diversion	2	5/100*

* Note: Where two ARI values are shown, the first number refers to the minor flow and the second to the major flow as defined in ARR. Source Annexure G38/E

3.2 Soil loss constraints and characteristics

The size and location of construction sediment basins will be included in the earthworks design for catchments where soil loss is predicted (based on RUSLE) to exceed 150 tonnes per annum. Catchment size and soil loss will be reviewed throughout construction based on the maximising capture of run-off from construction areas.

The key soil loss constraints and characteristics for the project site to calculate the soil loss are provided in Table 3-1.

Table 3-3-2 Soil Loss Constraints and characteristics

Constraint / characteristic	Value / Rating	Source
Rainfall erosivity (**R-factor**)	2183	$R = 164.74(1.1177)^{S}$ S0.6444 Where S = 2-year, 6-hour storm
IFD: 2-year, 6-hour storm (s)	9.93	http://www.bom.gov.au/cgi-bin/hydro/has/CDIRSWebBasic Location 33.850 S 150.750 E
Rainfall zone	1	Blue Book Figure 4.9 [p4-16]
Runoff coefficient (Cv)	0.64	Blue Book Table F2 [pF4]
85th %-ile, 5-day rainfall event	35.0	35.0mm (Penrith) Blue Book Table 6.3 [6-24]
Soil erodibility (**K-factor**)	0.046	Blue Book Appendix C, Table 20
Soil texture group	Type D	
Soil Hydrologic Group	Group D	
Slope ratio	Variable	Maximum10:1
Slope Gradient	5-10%	Locally varying
Slope length	80m	Maximum assumed slope length for disturbed sites >1000m^2
LS-factor	Variable	Blue Book Table A1 [pA-9]
Erosion Control Practice Factor (**P-factor**)	1.3	Default factor for construction Blue Book Table A2 [pA-11]
Cover Factor (**C-factor**)	1	Default factor for construction site for areas with not stabilisation

3.3 Key management principles

Managing Urban Stormwater: Soils and Construction (Landcom, 2004) Volume 1 and Volume 2 and Volume 2D: Main Road Construction, DECC, 2008 is a comprehensive guideline that will be used as reference in the planning and implementation of the erosion and sediment control measures. Table B-2 provide a summary of the key principles of the Blue Book. It is acknowledged that this table does not cover all the requirements of the Blue Book.

Table B-3-3 Key erosion and sediment control principles

Key principle	Control measures
Minimise extent and duration of disturbance	• Limit the extent of disturbance to the area required for construction. • Clearly delineate the limits of disturbance on ESCP. • Program works to minimise the duration of works in sensitive environments (e.g. in stream works)
Divert non-site water away from disturbed areas	• Intercept, divert and safely dispose of 'clean' run-on water from undisturbed areas so that it does not flow onto the works • Pass 'clean' water through the site without mixing it with 'dirty', sediment-contaminated runoff from the works. This may require temporary solutions to convey water across a working site.
Conserve topsoil	• Strip and stockpile topsoil for use in reinstatement.
Minimise Extent and Duration of Disturbance	• Before clearing commences, identify the limits of clearing as shown on the Design Documentation drawings, such as with clearly visible markers placed at 25m intervals • Staging of clearing operations were possible • Maximising and maintaining surface vegetative cover • Special emphasis on management of construction activities adjacent to creeks or areas of concentrated flows (e.g. drains) • Use of temporary covers on stockpiles and temporarily exposed soil surfaces.

Key principle	Control measures
Erosion control: management of soils	Protection of disturbed areas as soon as practical. Short to medium term protection (0-3 months) may include: • Geotextile or plastic linings / covers • Soil polymer application Longer term protection may include: • Geotextile linings or • Topsoil, jute matting and seeding with cover crop • Hydromulching / hydroseeding. • Geotextile or plastic linings areas of concentrated flow such as flow channels or batter chutes. • The siting of stockpiles of soil material in low hazard areas clear of watercourses. • Additional protection to be afforded with vegetation, diversion banks and sediment fences if required.
Sediment control	• Utilisation of cleared/mulched vegetation for sediment traps and filters. • Installation of diversion bunds or sediment fences around the perimeter or work areas. • Used of sand bags / coir logs / rock checks to break slopes. • Construction of control measures as close to the potential source of sediment as possible. • Controlling the deposition of mud and soil material onto local road (wheel wash / rumble grids).
Sediment basins	Sediment basins will be designed by a hydrologic engineer. Sediment basin management of turbid water immediately after rain as required with one or a combination of: • Flocculation with gypsum (or approved alternative flocculant) • Pump-out for construction purposes or dust control • Water will not be released from sediment basins prior to achieving acceptable water quality standards • Regulating water quality during dewatering activities (e.g. filtering techniques and flocculation with gypsum or approved alternative flocculant).
Stormwater pit controls	Installation of stormwater pit control around live stormwater pits.
Rapid stabilisation of disturbed areas	Progressive revegetation of disturbed areas utilising appropriate species at the completion of works.

4 Sediment Basins

4.1 Operational Basins

Seymour Whyte will construct operational basins in accordance with the Drawings, or as directed by the TfNSW. Operational basins will be constructed as soon as practicable within the construction program and used for construction phase sediment control where ever possible.

Construction of operational basins will involve:

- Clear and grub the entire storage and embankment foundation area of the operational basin and strip the area of topsoil. Removal of unsuitable material under embankments in accordance with TfNSW R44.
- Prepare the Site under proposed embankments by ripping to a depth of 100 mm and excavating a trench at least 600 mm deep by 1200 mm wide along the centreline of the proposed embankment.
- Backfill the trench and construct the embankment in layers not exceeding 200 mm and compacted so that the relative compaction, determined by Test Method TfNSW T166, is not less than 95.0 per cent using material with a Plasticity Index not less than 15 and not more than 30, and a grading such that at least 20 per cent by mass of material passes the 425 micron sieve.
- Where material from excavations is unsuitable for the embankments and trench backfill, materials may be borrowed or imported in accordance with TfNSW R44. Dispose of surplus materials in accordance with TfNSW R44.
- Install pipes and fittings for draining the sediment basins as shown on the Drawings. You may propose alternative methods of draining the sediment basins for the removal of sediment, subject to the agreement of the Principal.
- Install bioretention media immediately prior to completion of the operational basin construction and ensure that the operational basin is sediment free at completion of the operational basin.
- Stabilise with vegetation the area disturbed by the construction of the operational sediment basins (except the inner surfaces below the spillway levels and the areas covered by rock mattresses) as specified in TfNSW R178, TfNSW R179 and/ or as shown on the Drawings.

Operational basins and drainage structures must be cleaned out before Actual Completion.

4.2 Construction Sediment Basins

Seymour Whyte will design and locate construction sediment basins, including geotechnical stability, prevention of seepage out of basins, scour protection, inlet and outlet structures plus emergency spillways in accordance with the requirements of TfNSW QA Specification G38 and BLUE BOOK guidelines. The design and construction must include for appropriate fencing to prevent unauthorised people from entering the basins. Low flow pipe outlets will not be accepted in sediment basin designs.

At least 14 days before commencing construction of each construction sediment basin and connecting drainage, the construction sediment basin design drawings will be submitted to TfNSW for acceptance with a report that lists design parameters, including confirmation by Seymour

Whyte's Soil Conservationist that construction sediment retention basin designs (and restoration and revegetation proposals) conform to the requirements of the TfNSW QA Specification G38.

Where sediment basins are required for water treatment, as determined by for a ESCP that has been approved by TfNSW, install the construction sediment basins including connecting drainage and other water quality structures in each catchment together with associated connecting stormwater drainage (temporary/permanent pipes and/or catch drains) and fencing prior to commencement of any construction activities within the identified catchment for the basin. Direct water from each catchment to the sediment basins via stabilised controls such as catch drains.

Locate all basins within the M12 Central construction footprint (as per the approved design drawings M12CDD-GHDA-ALL-SP-DRG-605101 - M12CDD-GHDA-ALL-SP-DRG-605121). The design should minimise any clearing in threatened or endangered ecological communities.

Seymour Whyte's Soil Conservationist must undertake site inspections as required, but at least monthly and prepare a report detailing findings from these inspections. Issues identified in these inspection reports must be acted on and reported to the Principal within 5 working days.

Construction of construction sediment basins will be in accordance with the requirements of TfNSW QA Specification G38 for operational basins, unless alternative designs using alternative materials and construction methods are proposed and approved by the Principal. If such alternative designs are used, the details of the alternative design must be provided of in the ESCP. The alternative design must be prepared by a suitably qualified engineer experienced in the type of work, and its use is subject to the agreement of the Principal.

Sediment basins inlets, outlets and spillways will be constructed as soon as possible using rock filled woven galvanised steel mattresses laid on a needle punched, mechanically bonded, non-woven geotextile filter fabric. The rock filled mattresses must comply with Specification TfNSW R55 and the geotextile must comply with the requirements of Specification TfNSW R63 for Application Category G4, unless shown otherwise on the Drawings.

Design construction sediment basins and other water quality control structures so they are easily maintainable. During the construction of each basin, a depth meter must be installed, as well as basin identification signage which clearly identifies the basin number and whether it has an EPL licenced discharge point. In addition, the basin depth meter must also clearly show the 60 percent sediment storage zone so that the maintenance trigger is easily identifiable.

If operational basins are proposed for sedimentation control during the duration of the Contract, the environmental requirements specified for any discharge must be complied with. Remove or convert to operational water quality basins as required by stormwater management design, all construction sediment retention basins and sediment traps before Completion, but not before all upstream areas have been vegetated or otherwise stabilised in accordance with BLUE BOOK.

4.3 Inlets, Outlets and Spillways

Inlets, outlets and spillways will be constructed soon as possible using rock filled woven galvanised steel mattresses laid on a needle punched, mechanically bonded, non-woven geotextile filter fabric. The rock filled mattresses must comply with Specification TfNSW R55 and the geotextile must comply with the requirements of Specification TfNSW R63 for Application Category G4, unless shown otherwise on the Drawings.

Alternative methods for constructing the inlets, outlets and spillways, may be proposed by Seymour Whyte to TfNSW and will be subject to the agreement of the TfNSW.

4.4 Maintenance of Sediment Basins

Suitable access to sediment basins and sediment traps to allow cleaning out in all weather conditions will be provided and maintained. Sediment basins will be cleaned out, at a minimum, whenever the accumulated sediment exceeds 60% of the sediment storage zone.

This will involve removal of accumulated sediment from sediment basins, water diversions, associated facilities and traps. The sediment removed from sediment basins will be appropriately manage and dispose of (including potentially contaminated sediment) both during and immediately prior to Completion of the project.

On-site disposal locations must ensure that sediment will not be conveyed back into the construction areas, into watercourses or off site.

4.5 Removal of Sediment Basins

All construction sediment retention basins and sediment traps will be removed or converted to operational water quality basins as required by stormwater management design, before Completion, but not before all upstream areas have been vegetated or otherwise stabilised in accordance with BLUE BOOK (i.e. 70 % of the disturbed area beyond the pavement is stabilised or as otherwise agreed with TfNSW).

Restore the ground disturbed by the construction of the sediment basins/traps to a similar condition to that previously existing. Include the following in the restoration work:

- removal of all redundant mattresses from the inlets and spillway(s) and their subsequent burial into the basin area or their use as scour protection or their removal from Site
- spreading and compaction of the embankment material into the basin area
- removal of access roads
- removal and appropriate disposal/reuse of sediment (including potentially contaminated sediment).

Compact the disturbed ground to at least the relative density of the material in the ground adjacent to it.

5 ESCP Procedure

5.1 ESCP preparation

Erosion and sediment control plans (ESCP) will be prepared for each worksite in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) Volume 1 and Volume 2 and Volume 2D: Main Road Construction, DECC, 2008. showing contours, drainage paths, extent of disturbance and location of all erosion and sediment controls and identifying any constraints to making drainage paths.

ESCPs will be established prior to the commencement of construction in each work area and be updated and managed throughout as relevant to the activities during construction.

ESCPs will be prepared and maintained by Environmental Coordinators that have completed training in the application of the Blue Book.

Include on the ESCP drawings construction project boundaries, environmentally sensitive areas and exclusion zones, vegetation within the site to be retained, north arrow, scale, complete legend, version number and date the plan was last updated, locations of all ancillary activities and/or areas and activities that may impact on water quality, such as:

- access and haulage;
- borrow pits;
- stockpile and storage areas;
- temporary work areas;
- materials processing areas;
- compound areas;
- concrete and asphalt batching areas and location(s) of concrete wash-outs;
- known (or site identified areas) of contamination.

Each revision of the ESCP must be recorded on an up-to-date ESCP register (this may be a sub-category of the environment document register).

5.2 ESCP content

In accordance with TfNSW QA G38, Section 2.2 the ESCP must identify all erosion and sediment control risks and describe how these will be addressed during construction.

The ESCP must include details of the following where relevant:

- erosion and sediment control measures required for each stage of construction, including:
  - before clearing and grubbing of the Site
  - before removal of topsoil and commencement of earthworks within the catchment area
- how upstream water will be managed so it is not polluted by the construction activities
- method of tree removal in intermittent watercourses, leaving grasses and small understorey species undisturbed wherever possible
- scour protection measures for haul roads and access tracks when these are an erosion hazard due to either their steepness, soil erodibility or potential for concentrating runoff flow

- measures for promptly stabilising disturbed areas and temporary drains
- measures to minimise erosion during construction of embankments
- measures to minimise erosion and control sedimentation from stockpiles
- methods of constructing batters to assist the retention of topsoil on the batter slopes
- measures to temporarily trap sediment in median areas at regular intervals
- controls in runoff flow paths to reduce flow velocities and minimise the potential for erosion
- measures for controlling waste water discharge on or around the Site from dewatering (refer to Clause 3.4), surface washing, grit blasting, saw cutting, drilling, activities associated with concrete washouts, 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 when rainfall above a certain trigger level is predicted including a procedure:
  - for monitoring Bureau of Meteorology forecast heavy rainfall events in order to allow sufficient time to vacate and prepare the Site prior to the commencement of heavy rainfall events
  - to allow for programming of construction work to minimise the risk of erosion and sedimentation by staging of work and programming of high risk soil and erosion activities to avoid high rainfall or wind events
- 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 (include as a minimum: weekly and pre and post rainfall inspections)
- mapping and description of locations of construction sediment retention basins, their catchments and drainage structures directing water to the basins
- controls to be implemented at Site entry and exit points to minimise tracking of soil and particulates onto pavement surfaces and for the removal of any materials transported onto adjacent road pavement surfaces (such as sweeping) as soon as practical or at a minimum at the end of each working day
- additional controls to be implemented ahead of forecast rainfall events (see Clause 3.9) and ahead of Site shutdown of greater than two calendar days
- staged plans for construction erosion and sediment control measures over waterways where culverts and/ or bridges will be constructed
- measures to manage contaminated soil and/or water that may be present and/or identified during the implementation of erosion and sediment control measures, including existing drainage
- design and construct drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions in accordance with relevant guidelines by your suitably qualified and experienced person in consultation with DPI Fisheries.

5.3 ESCP update and amendment

The ESR is responsible for updating the ESCPs to reflect current and planned changes in site conditions. The ESCP will be updated under the following circumstances:

- whenever the contract program or work methods change
- whenever the work methods and control structures
- when erosion/sedimentation control measures, stabilisation control measures and other soil and water control measures are found to be ineffective or are no longer required
- to reflect decommissioning of construction sediment basins and traps
- quarterly where update of the plan is not triggered by the above events.

A copy of the current relevant ESCP will be available at each fortnightly environmental inspection with TfNSW.

The ESCP updates will include review of each basins catchment size and design parameters used for BLUE BOOK calculations to ensure the basins capacity is sufficient for the catchment size.

New ESCPs or major revisions will be reviewed by the Soil Conservationist (Certified Professional in Erosion and Sediment Control).

Each revision of the ESCP must be recorded on an up-to-date ESCP register (this may be a sub-category of the environment document register).

6 Implementation

The implement the erosion and sediment control plans will be done with in accordance with the following requirements:

- placing the locations of site compounds, access tracks, stockpile sites and temporary work areas to minimise erosion;
- staging of work and programming of construction activities to minimise the duration and extent of soil that is left exposed. This includes minimising the time between clearing and initial earthworks and commencement of subsequent works in intermittent and permanent watercourses;
- temporary modification of operational basins during the construction period for additional Capture of stormwater runoff;
- installing and lining catch drains and diversion banks in accordance with the requirements of Specification TfNSW R11 before earthworks commence;
- installing scour protection at the base of permanent and temporary drainage inlets and outlets;
- constructing drains to direct runoff from disturbed areas to sediment basins or to areas with adequate sediment trapping/filtering devices and away from watercourses;
- filtering of sediment prior to water entering any pit and management of stormwater discharge through any pit;
- staged re-vegetation of the Site as work proceeds, progressively undertaking topsoiling and vegetation work as specified in TfNSW R178;
- procedure for collecting, treating and disposing of any wastewater or water generated on the Site during construction processes;
- procedure for maintaining, regularly trimming and compacting disturbed surfaces, access tracks, road formations and the edge of small batters to ensure durable surfaces and minimise erosion;
- designing disturbed areas not directed to construction sediment retention basins to comply with the requirements of the Blue Book to ensure potential sediment load is less than 150m3 per year (refer section 6.3.2 in the Blue Book);
- immediately after forming swales and catch drains and any temporary drains, installing and maintaining temporary lining to the satisfaction of the Principal in the swales and catch drains and temporary drains until permanent lining or vegetation is applied;
- promptly using jute mesh or similar to provide scour protection for any earthen areas of waterways that have been disturbed and that do not have a permanent vegetative or water cover and are likely to experience flows of a minimum 1:5 year flow event until long-term stabilisation measures are established as shown on the Drawings;
- providing erosion and sediment controls on approach to and/or departure of entry/exits points from stockpile sites and construction areas onto public roads to minimise the tracking of soil and particulates onto public roads and reduce the generation of dust at such locations (see also Clause 3.7.2 (for tracking in waterway crossings) and TfNSW G36);

- providing designated impervious bunded washdown facilities for concrete trucks and other vehicles at least 100 metres from areas prone to flash flooding or 50 metres away from other natural and built drainage lines (see also TfNSW G36).

Attachment A Sediment Basins Register

Appendix E - Concept Erosion and Sediment Control Plan

BASIN ID	Catchment area total (ha)	Catchment area disturbed (ha)	LS-factor	Soil loss (t/ha/yr)	Catchment soil loss (t/yr)	Is a basin required? Y/N	Is a sediment basin feasible? (Y/N) Refer to Plan for details	Sediment basin storage (soil) volume (m^3)	Sediment basin settling (water) volume (m^3)	Total sediment basin volume (m^3)	Comments or recommendations	Discharge Point	
												X	Y
20060E	1.96	1.96	0.93	139	272.5	Refer to plan	-	35	404	439		292967.388	6251215.96
20060W	0.4	0.4	1.30	194	77.7	N	-	-	-	-			
20140E	1.6	1.6	1.20	179	287.0	Y	Y	37	330	367		292999.496	6251213.122
20140W	0.28	0.28	1.30	194	54.4	N	-	-	-	-			
20400E	3.03	3.03	1.30	194	588.9	Y	Y	75	624	699		293309.617	6251182.763
21060W	13.4	13.4	3.20	478	6410.6	Y	Y	822	2761	3583		293885.350	6250976.851
22000W	0.86	0.86	0.81	121	104.1	N	-	-	-	-			
22100W	4.56	4.56	1.35	202	921.1	Y	Y	118	940	1058		294879.658	6250567.451
22200E	2.19	2.19	1.47	220	481.8	Y	Y	62	451	513		295139.977	6250817.674
22230E	0.52	0.52	0.82	123	63.8	N	-	-	-	-			
22240E	4.24	4.24	2.17	324	1375.5	Y	Y	176	874	1050		295202.478	6250821.863
22300E	0.87	0.87	1.47	220	191.4	N	-	-	-	-			
22800W	0.54	0.54	0.63	94	50.8	N	-	-	-	-			
22820W	1.43	1.43	1.04	155	222.3	Y	Y	29	295	324		295399.595	6250137.774
22840W	1.31	1.31	1.02	153	200.3	Y	Y	26	270	296		295476.405	6250068.669
22850E	2.64	2.64	0.91	136	359.2	Y	Y	46	544	590		295527.774	6250098.121
22880E	6.86	6.86	0.91	136	933.3	Y	Y	120	1414	1534		295569.909	6250120.672
22900W	1.46	1.46	0.89	134	195.6	N	-	-	-	-			
22910W	0.77	0.53	1.01	151	80.0	N	-	-	-	-			
23020E	6.4	6.4	0.77	115	736.7	Y	Y	94	1319	1413		295588.432	6250093.752
23020W	0.3	0.3	0.41	61	18.4	N	-	-	-	-			
23040E	5.19	5.19	0.83	124	644.0	Y	Y	83	1070	1153		295539.89	6250079.615
23730E	0.2	0.2	0.91	136	27.2	N	-	-	-	-			
23800E	3.3	3.3	2.19	327	1080.4	Y	Y	139	680	819		296052.878	6249434.139
23810E	0.3	0.3	0.91	136	40.8	N	-	-	-	-			
23840W	1.23	1.23	2.19	327	402.7	Y	Y	52	253	305		296027.201	6249340.943
23900W	1.61	1.61	1.19	177	285.0	Y	Y	37	332	369		296053.894	6249299.958
24050E	2.4	2.4	2.00	299	717.6	Y	Y	92	495	587		296246.909	6249308.636
24320E	3.11	3.11	1.14	170	528.7	Y	Y	68	641	709		296399.928	6249217.594
24400W	4.37	4.37	0.56	84	365.9	Y	Y	47	901	948		296493.826	6249126.665
24900W	3.76	3.76	2.14	320	1203.2	Y	Y	154	775	929	A basin in this catchment might not be practical because it would overflow towards Elizabeth Drive, thereby potentially causing a flooding risk. Stormwater drainage must be verified by the construction contractor	296845.206	6248952.572
24910W	0.72	0.72	0.41	61	43.9	N	-	-	-	-			
25160E	0.95	0.95	2.90	434	411.9	Y	Y	53	196	249		297346.185	6248854.662
25160W	1.63	1.63	3.27	489	796.9	Y	Y	102	336	438		297132.371	6248873.486
25170W	0.74	0.74	0.41	61	45.1	N	-	-	-	-			
25200W	4.22	4.22	3.51	525	2215.5	Y	Y	284	870	1154		297156.356	6248743.963
25300E	1.7	1.7	2.90	434	737.1	Y	Y	94	350	444		297378.155	6248839.995
25300W	2.71	2.71	3.51	525	1422.1	Y	Y	182	558	740		297310.555	6248756.935
25620E	0.43	0.43	3.20	478	205.7	Y	Y	26	89	115		297664.368	6248746.505
25640W	2.79	2.79	3.46	517	1443.2	Y	Y	185	575	760		297600.509	6248667.588
25700E	0.99	0.99	2.97	444	439.6	Y	Y	56	204	260		297763.556	6248746.16
25850E	1.95	0.97	2.06	308	298.8	Y	Y	38	402	440		297886.293	6248724.858
25880E	3.33	3.33	3.04	454	1513.4	Y	Y	194	686	880		297921.788	6248742.389
25880W	0.72	0.72	3.78	565	406.9	Y	N	52	148	200	Sediment basin not constructible. Enhanced erosion controls proposed instead.		
26100W	2.64	2.06	3.46	517	1065.6	Y	Y	137	544	681		298100.895	6248656.752
26340W	2.02	1.33	4.22	631	839.1	Y	Y	108	416	524		298394.81	6248761.491
26420W	7.4	5.3	5.88	879	4660.3	Y	Y	597	1525	2122		298478.225	6248780.579
26740W	2.39	1.83	4.35	650	1190.1	Y	Y	153	493	646		298738.37	6248968.965
27060E	4.23	3.21	3.19	477	1530.9	Y	Y	196	654	850	A composite Cv of 0.48 has been adopted for this catchment to account for the undisturbed (pasture) catchment	298954.256	6249271.734
27140E	3.27	2.02	3.44	514	1038.9	Y	Y	133	421	554	A composite Cv of 0.4 has been adopted for this catchment to account for the undisturbed (pasture) catchment	299024.599	6249316.826
27200E	0.17	0.17	3.19	477	81.1	N	-	-	-	-			
27280E	1.25	1.25	3.58	535	668.8	Y	N	86	258	344	Sediment basin not constructible. Enhanced erosion controls proposed instead.		
27310E	2.39	2.39	3.58	535	1278.7	Y	Y	164	493	657	Sediment basin may need to be cascading series of connected basins due to space and steep topography	299138.546	6249410.294
27440E	1.11	1.11	3.71	555	616.1	Y	N	79	229	308	Sediment basin not constructible. Enhanced erosion controls proposed instead.		
27460E	2.92	2.92	3.34	499	1457.1	Y	Y	187	602	789		299297.329	6249463.919

Notes:
x-day, y-precentile is 32.2mm for all basins
R factor is 2500 for all basins
K factor is 0.046 for all basins
P factor is 1.3 for all basins
C factor is 1.0 for all basins
Cv is 0.64 for all basins (unless noted otherwise)
LS-factor varies in each catchment and a composite LS-factor has been adopted for each based on existing and proposed catchment conditions.

GDA 2020

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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

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APPROVED	MARK ELVIDGE 26/08/2021
PROJECT MNGR	ALEX HORTON 26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
BASIN SUMMARY TABLE
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 1 OF 1 | A1
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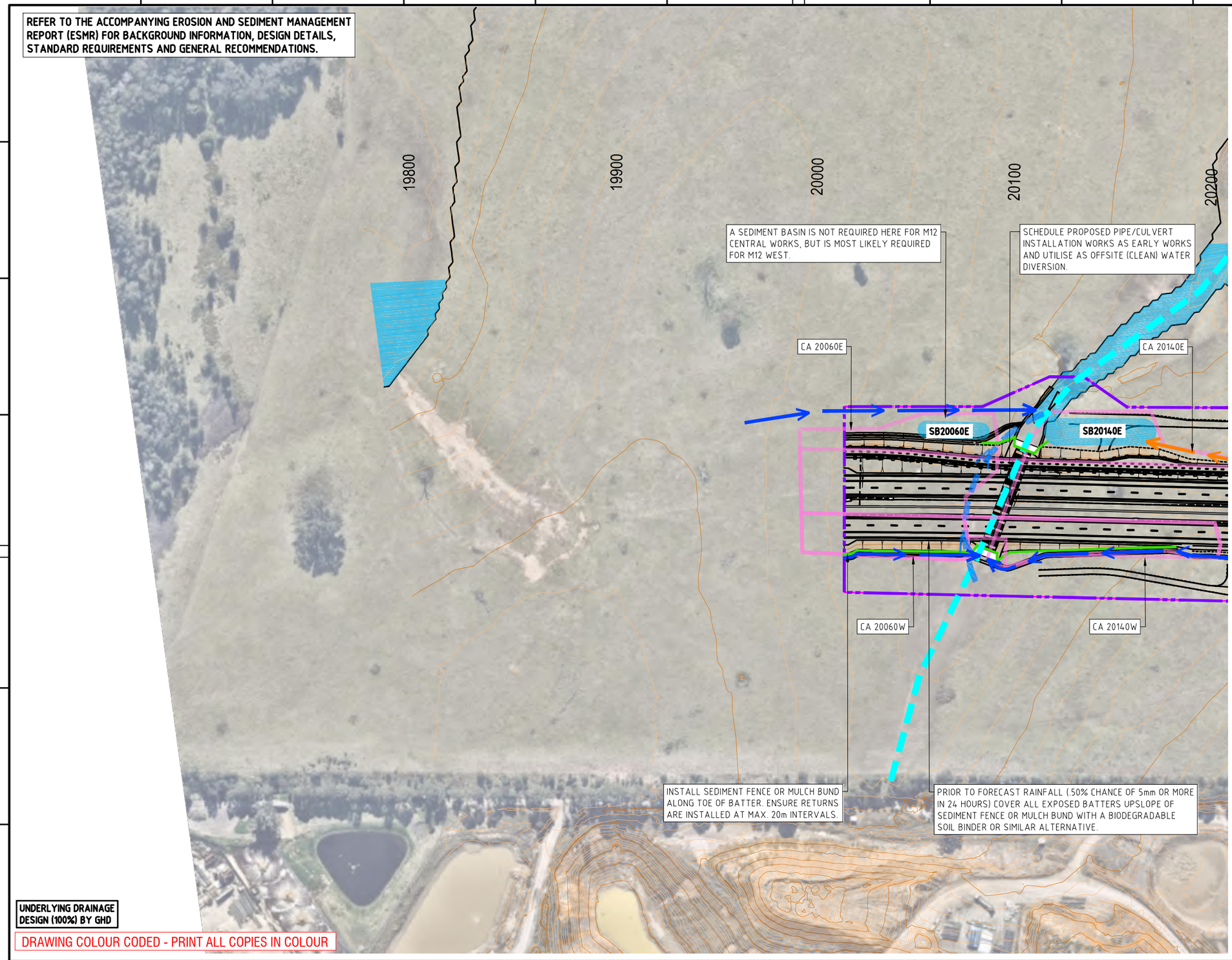

LEGEND

GDA 2020

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PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

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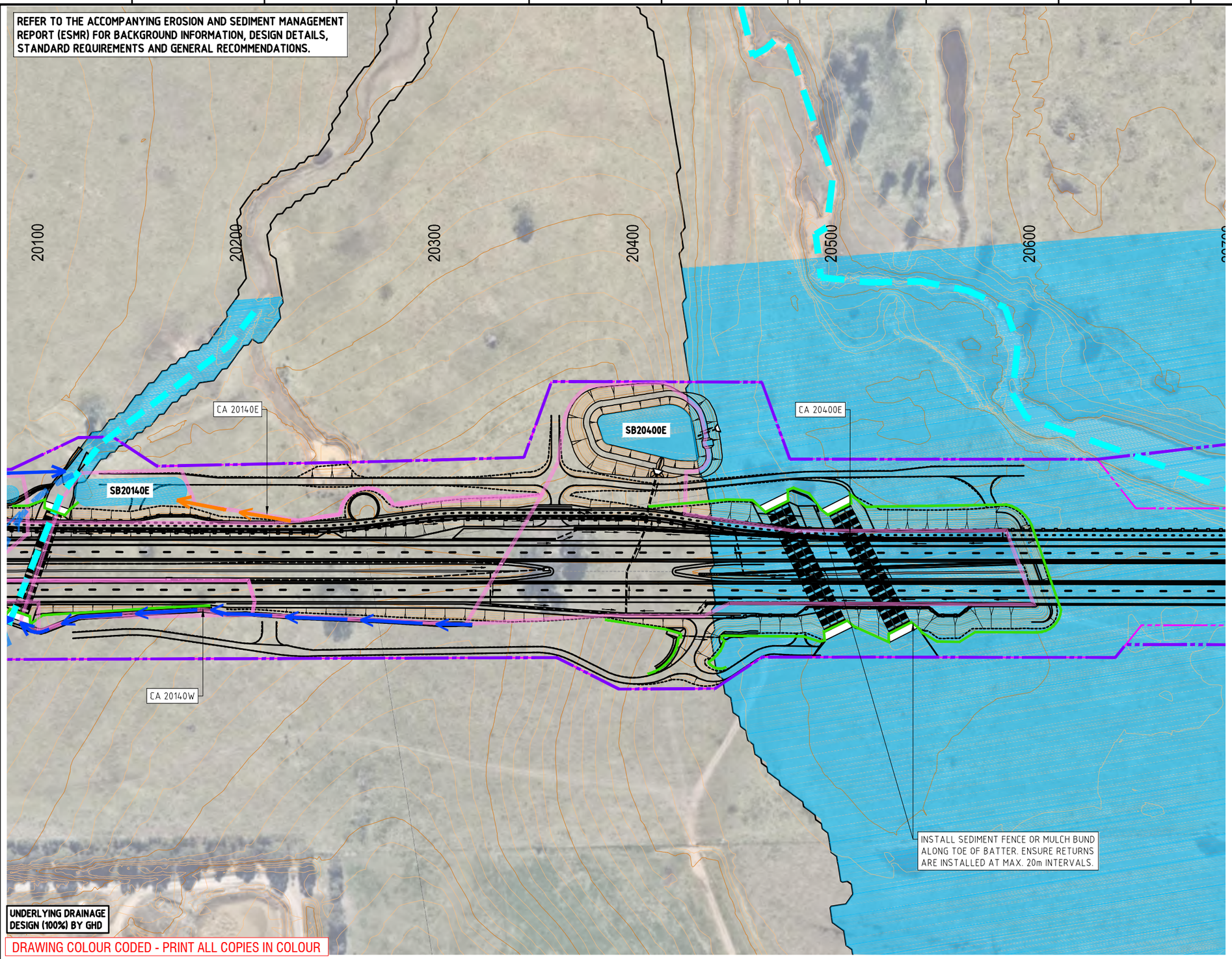

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LEGEND

GDA 2020

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0 10 20 30 40 50m
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PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

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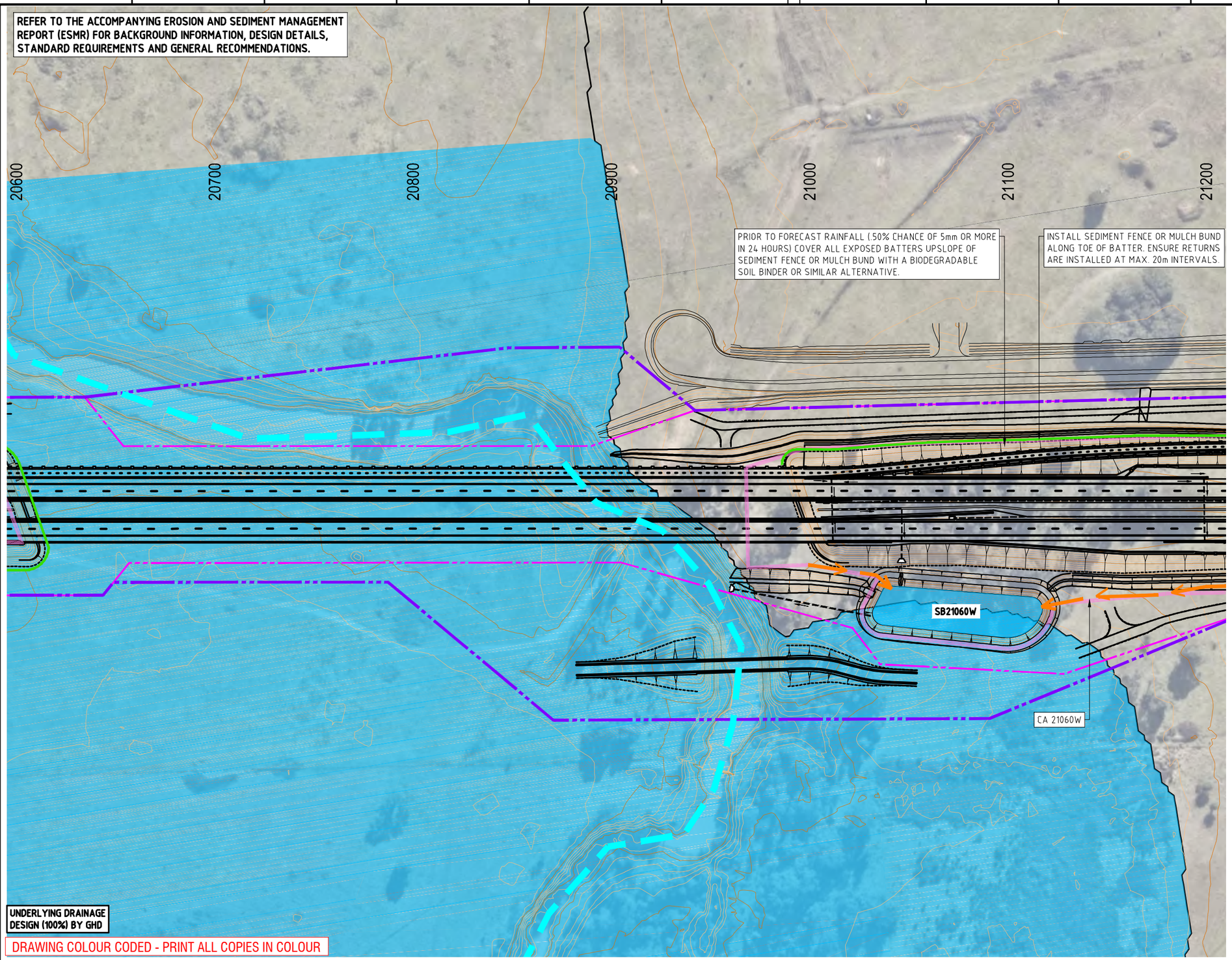

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LEGEND

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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
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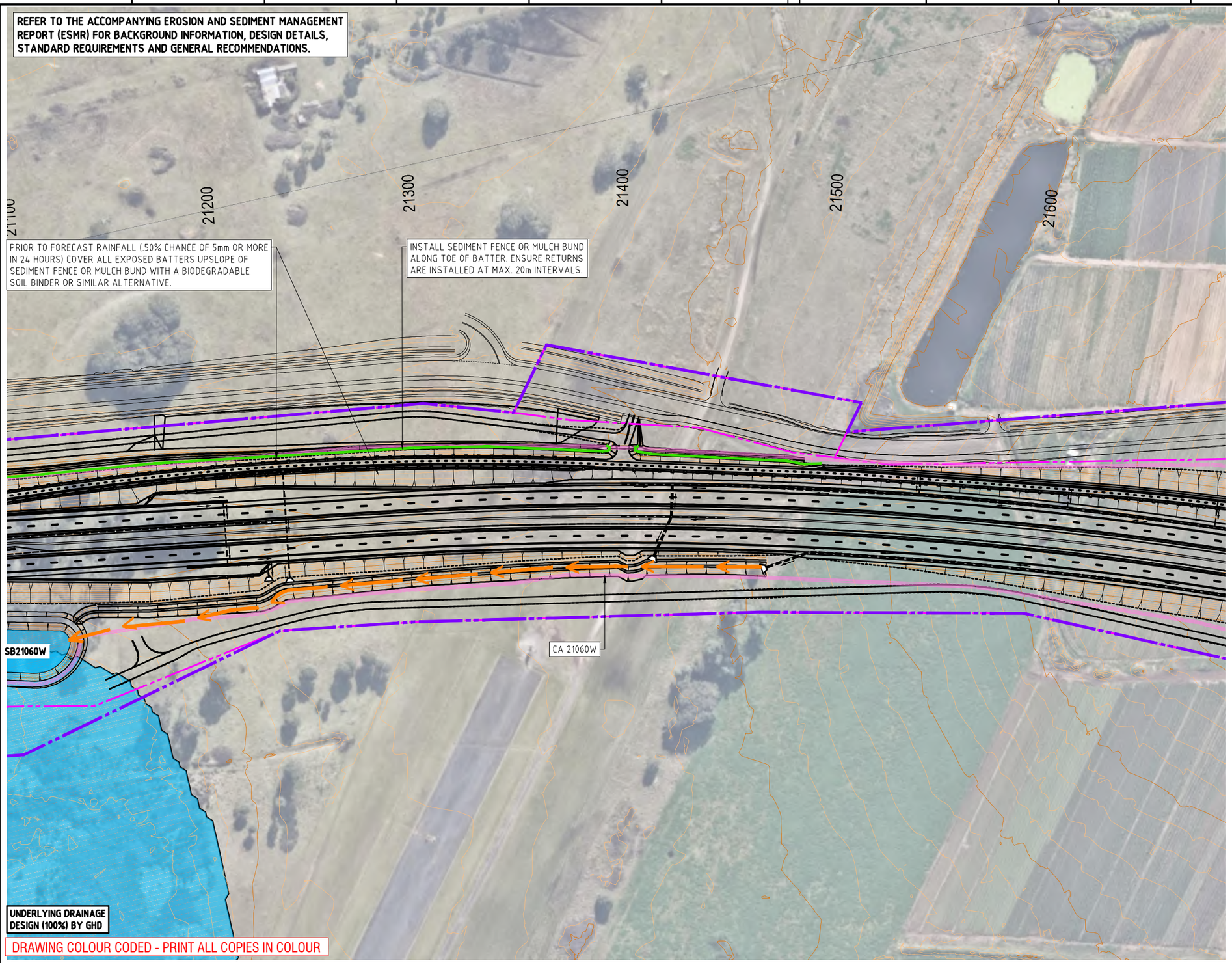

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LEGEND

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B	ISSUED FOR 80% DETAILED DESIGN	L.O. 04/02/2021	A.M. 04/02/2021	A.M. 04/02/2021
A	ISSUED FOR 50% DETAILED DESIGN	L.O. 18/09/2020	A.M. 18/09/2020	A.M. 18/09/2020

COORDINATE SYSTEM: GDA2020 — HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

GHD Pty Ltd
GHD
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DRAWN	LIAM O'ROURKE	26/08/2021
DESIGNED	LIAM O'ROURKE	26/08/2021
DRG CHECK	ANDREW MACLEOD	26/08/2021
DESIGN CHECK	ANDREW MACLEOD	26/08/2021
APPROVED	MARK ELVIDGE	26/08/2021
PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

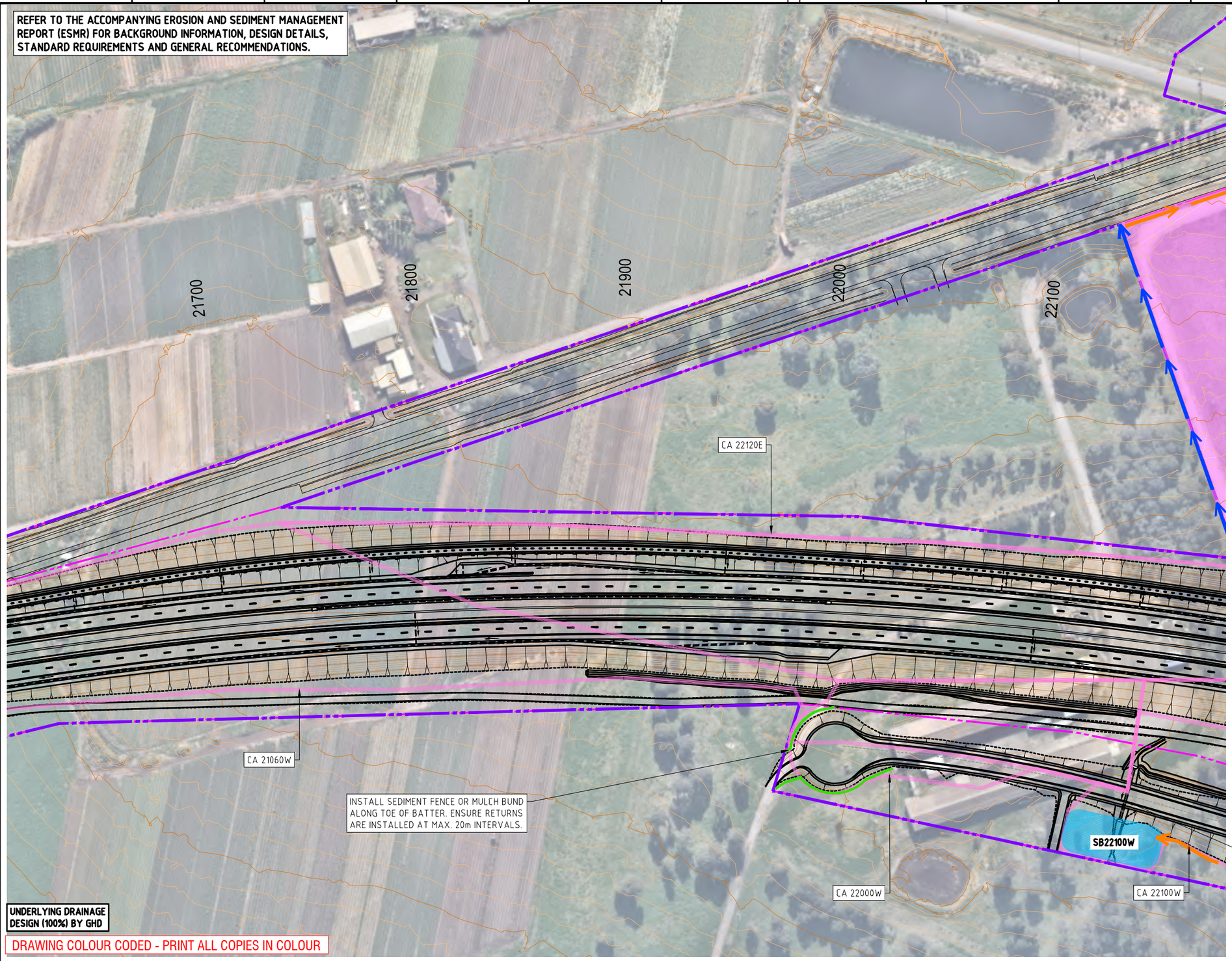
PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 4 OF 17 | A1
STATUS: 100% DETAILED DESIGN ©

DRG No.	REV	VER	EDMS No.	AMD No.
M12CDD-GHDA-ALL-SD-DRG-606704	D	0		

Plot Date & Time 26/2021 12:00 PM
Plotted by LOROURKE

REFER TO THE ACCOMPANYING EROSION AND SEDIMENT MANAGEMENT REPORT (ESMR) FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
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- ONSITE (DIRTY) WATER DIVERSION
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- TEMPORARY DIVERSION ACROSS WORKS AND/OR AROUND CULVERT WORKS
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- OPERATION BOUNDARY - PROVIDED TO SEEC ON THE 26/08/2021
- EXCLUSION ZONE
- EXISTING WATERWAY/FLOWPATH
- CA 25000W — CATCHMENT AREA
- 100YR ARI FLOOD EXTENT (PROVIDED BY OTHERS)
- FABRIC WRAPPED BUND (MIN. 0.6m HIGH)
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	REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE / APPROVED INITIAL/DATE
	COORDINATE SYSTEM: GDA2020		HEIGHT DATUM: AHD	

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

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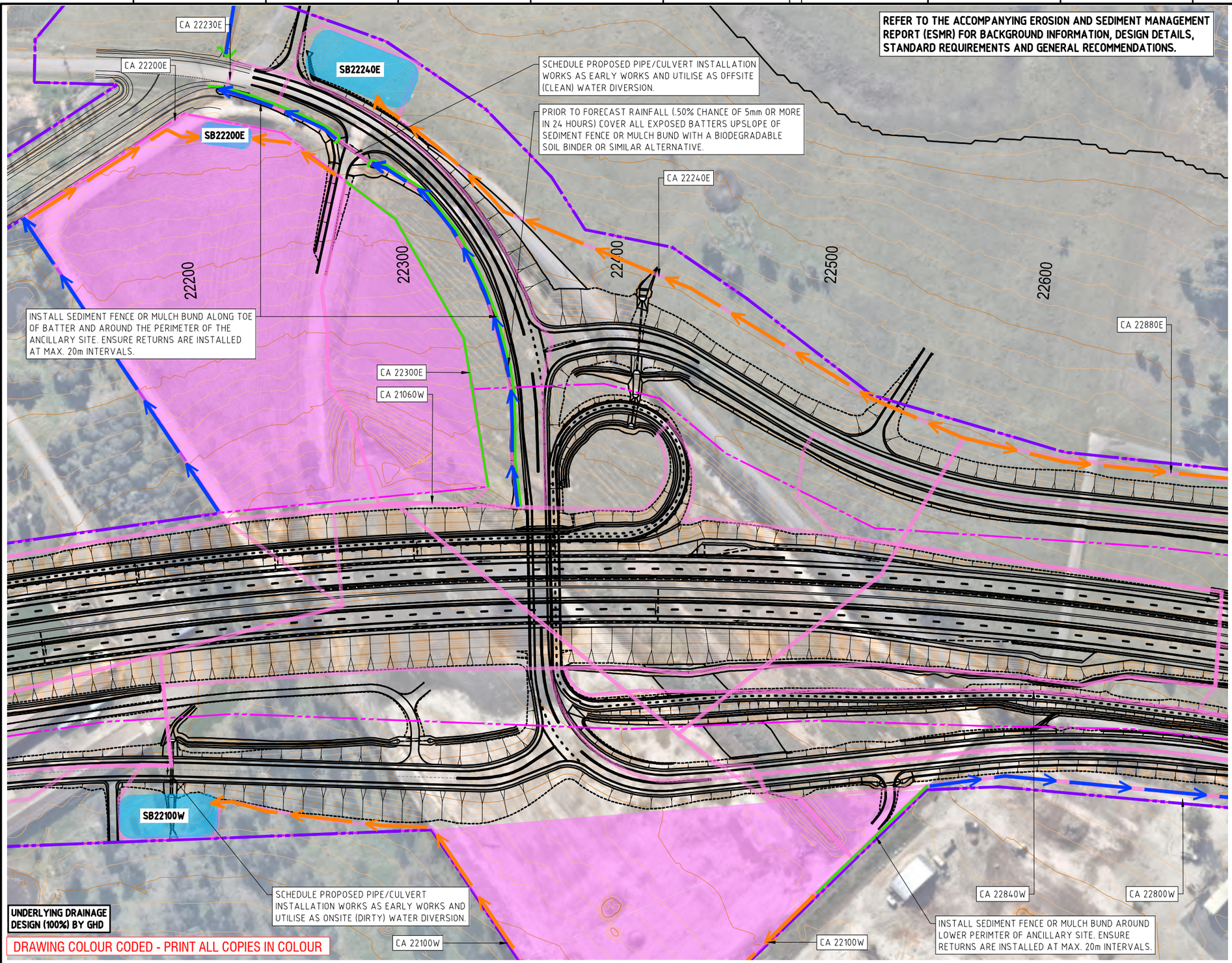
PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 5	OF 17	A1
STATUS: 100% DETAILED DESIGN				©
DRG No. M12CDD-GHDA-ALL-SD-DRG-606705	REV D	VER 0	EDMS No.	AMD No.

Plotted by:LORDURKE



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UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

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- ONSITE (DIRTY) WATER DIVERSION
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- CA 25000W — CATCHMENT AREA
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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

GHD Pty Ltd
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CIVIL

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DESIGN CHECK	ANDREW MACLEOD	26/08/2021
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PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

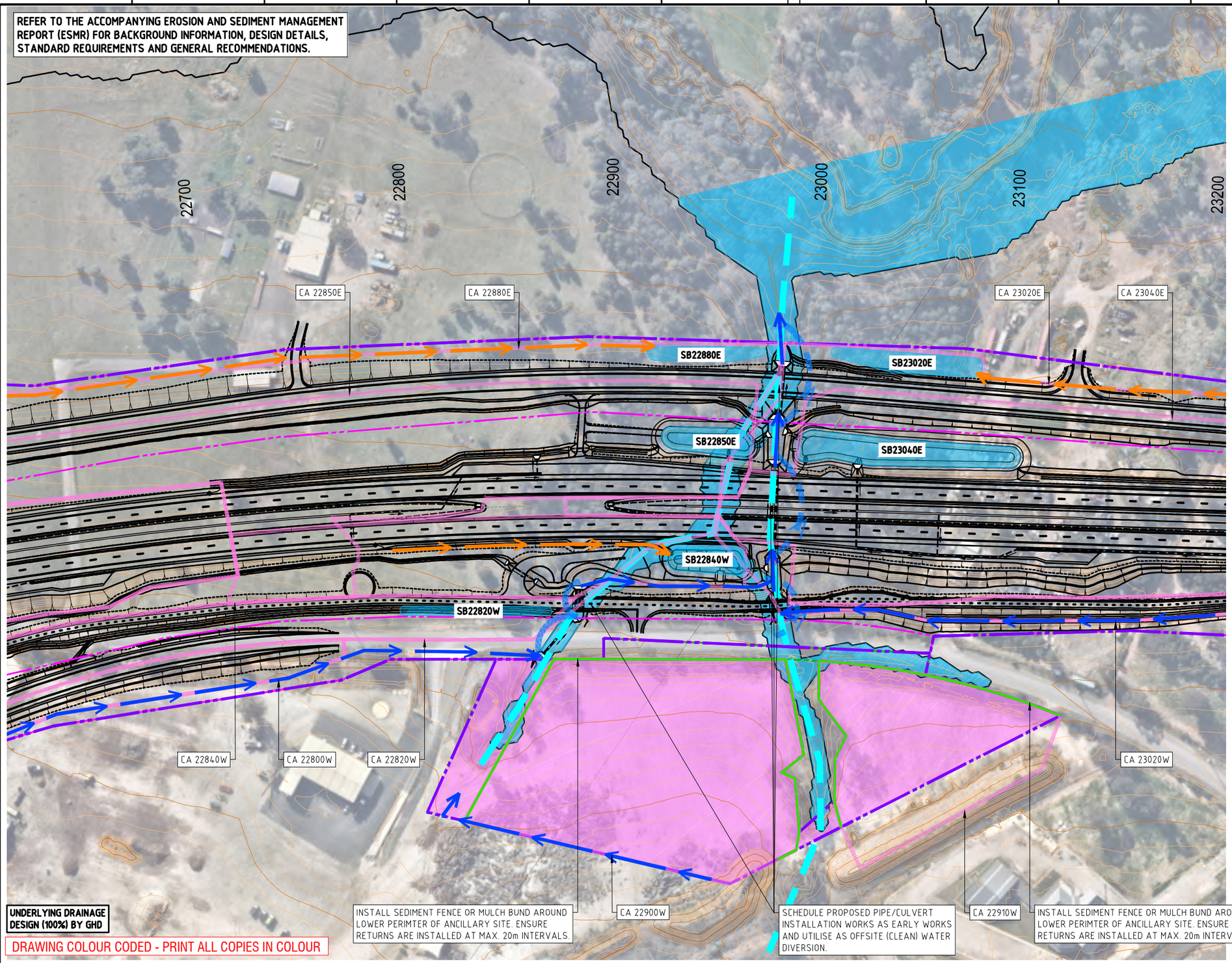
PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 6	OF 17	A1
STATUS: 100% DETAILED DESIGN				©

DRG No.	REV	VER	EDMS No.	AMD No.
M12CDD-GHDA-ALL-SD-DRG-606706	D	0		

Plot Date & Time 26/08/2021 12:03 PM
Plotted by LOROURKE

REFER TO THE ACCOMPANYING EROSION AND SEDIMENT MANAGEMENT REPORT (ESMR) FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
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WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

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M12 MOTORWAY

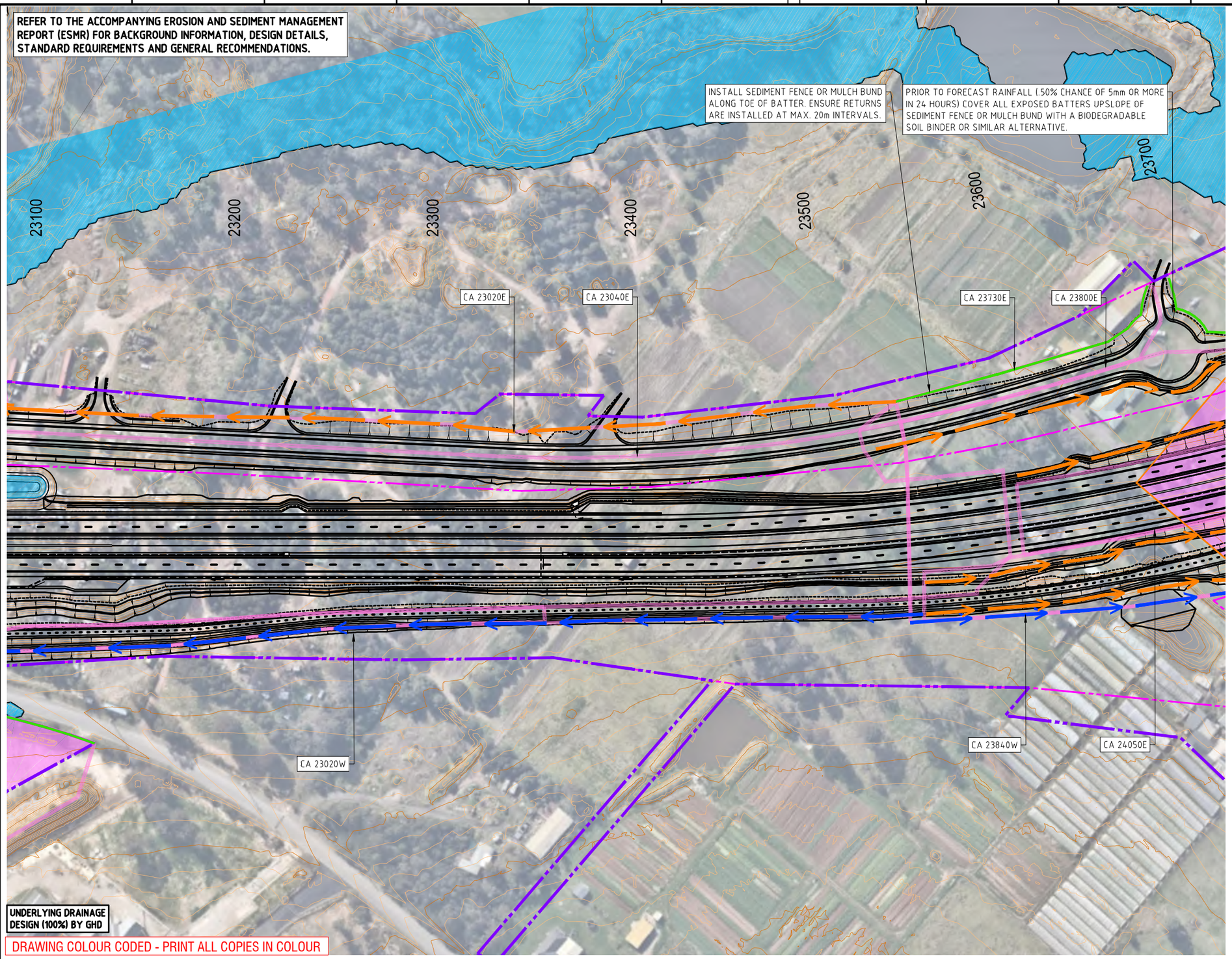
PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 7 OF 17 | A1
STATUS: 100% DETAILED DESIGN ©

DRG No.	REV	VER	EDMS No.	AMD No.
M12CDD-GHDA-ALL-SD-DRG-606707	D	0		

Plot Date & Time 8/26/2021 12:04 PM
Plotted by LOROURKE

REFER TO THE ACCOMPANYING EROSION AND SEDIMENT MANAGEMENT REPORT (ESMR) FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.



UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 8 OF 17 | A1
STATUS: 100% DETAILED DESIGN ©
DRG No. M12CDD-GHDA-ALL-SD-DRG-606708 | REV D | VER 0 | EDMS No. | AMD No.

Plot Date & Time@26/2021 12:05 PM
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PRIOR TO FORECAST RAINFALL (.50% CHANCE OF 5mm OR MORE IN 24 HOURS) COVER ALL EXPOSED BATTERS UPSLOPE OF SEDIMENT FENCE OR MULCH BUND WITH A BIODEGRADABLE SOIL BINDER OR SIMILAR ALTERNATIVE.

INSTALL SEDIMENT FENCE OR MULCH BUND ALONG TOE OF BATTER. ENSURE RETURNS ARE INSTALLED AT MAX. 20m INTERVALS.

23600 23700 23800 23900 24000 24100 24200

CA 23800E CA 23730E CA 23810E

SB23800E SB24050E SB23840W SB23900W

CA 23840W CA 23900W CA 24050E

SCHEDULE PROPOSED PIPE/CULVERT INSTALLATION WORKS AS EARLY WORKS AND UTILISE AS ONSITE (DIRTY) WATER DIVERSION.

SCHEDULE PROPOSED PIPE/CULVERT INSTALLATION WORKS AS EARLY WORKS AND UTILISE AS OFFSITE (CLEAN) WATER DIVERSION.

PRIOR TO FORECAST RAINFALL (.50% CHANCE OF 5mm OR MORE IN 24 HOURS) COVER ALL EXPOSED BATTERS UPSLOPE OF SEDIMENT FENCE OR MULCH BUND WITH A BIODEGRADABLE SOIL BINDER OR SIMILAR ALTERNATIVE.

UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
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A	ISSUED FOR 50% DETAILED DESIGN	L.O. 18/09/2020	A.M. 18/09/2020	A.M. 18/09/2020

COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
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GHD Pty Ltd
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DRAWN	LIAM O'ROURKE	26/08/2021
DESIGNED	LIAM O'ROURKE	26/08/2021
DRG CHECK	ANDREW MACLEOD	26/08/2021
DESIGN CHECK	ANDREW MACLEOD	26/08/2021
APPROVED	MARK ELVIDGE	26/08/2021
PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 PART 2 SHEET: 9 OF 17 A1
STATUS: 100% DETAILED DESIGN ©

DRG No.	REV	VER	EDMS No.	AMD No.
M12CDD-GHDA-ALL-SD-DRG-606709	D	0		

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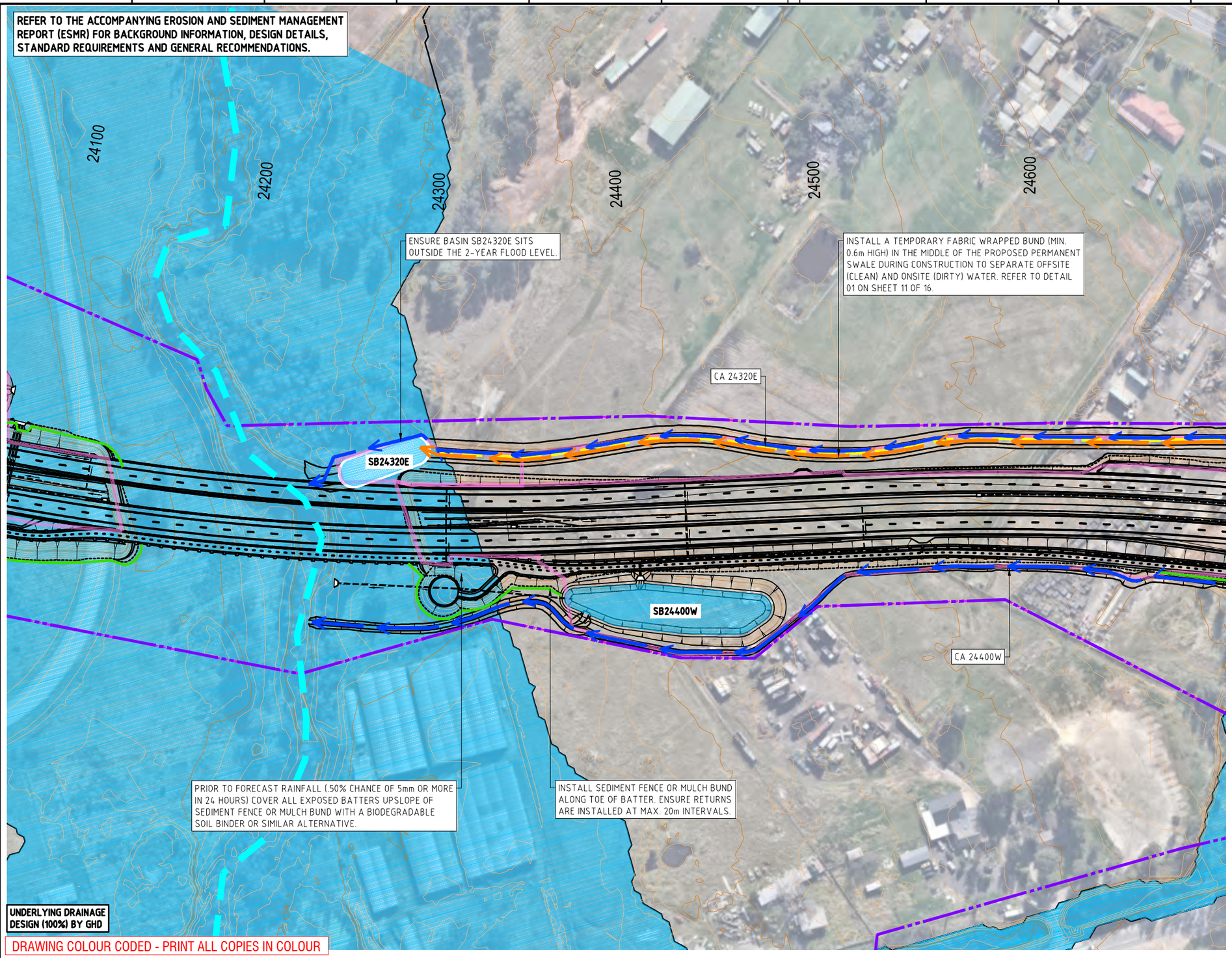

UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
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- ONSITE (DIRTY) WATER DIVERSION
- SB8760W — SEDIMENT BASIN [1] (BLUE BOOK SD 6-4)
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- 100YR ARI FLOOD EXTENT (PROVIDED BY OTHERS)
- FABRIC WRAPPED BUND (MIN. 0.6m HIGH)
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THESE CONCEPT EROSION AND SEDIMENT CONTROL PLANS HAVE BEEN PREPARED BY:

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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

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SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
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CIVIL

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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 10 OF 17 | A1
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DRG No. M12CDD-GHDA-ALL-SD-DRG-606710 | REV D | VER 0 | EDMS No. | AMD No.

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REFER TO THE ACCOMPANYING EROSION AND SEDIMENT MANAGEMENT REPORT (ESMR) FOR BACKGROUND INFORMATION, DESIGN DETAILS, STANDARD REQUIREMENTS AND GENERAL RECOMMENDATIONS.

24700

INSTALL A TEMPORARY FABRIC WRAPPED BUND (MIN. 0.6m HIGH) IN THE MIDDLE OF THE PROPOSED PERMANENT SWALE DURING CONSTRUCTION TO SEPARATE OFFSITE (CLEAN) AND ONSITE (DIRTY) WATER. REFER TO DETAIL 01 BELOW.

24800

INSTALL SEDIMENT FENCE OR MULCH BUND ALONG TOE OF BATTER. ENSURE RETURNS ARE INSTALLED AT MAX. 20m INTERVALS.

24900

25000

INSTALL SEDIMENT FENCE OR MULCH BUND AROUND LOWER PERIMTER OF ANCILLARY SITE. ENSURE RETURNS ARE INSTALLED AT MAX. 20m INTERVALS.

5100

SCHEDULE PROPOSED PIPE/CULVERT INSTALLATION WORKS AS EARLY WORKS AND UTILISE AS OFFSITE (CLEAN) WATER DIVERSION.

CA 24320E

CA 24320E

CA 25160E

SB25160W

CA 24400W

CA 24900W

SB24900W

CA 24910W

CA 25160W

CA 25170W

SB25200W

A SEDIMENT BASIN IN THIS CATCHMENT MIGHT NOT BE PRACTICAL BECAUSE IT WOULD OVERFLOW TOWARDS ELIZABETH DRIVE, THEREBY POTENTIALLY CAUSING A FLOODING RISK. STORMWATER DRAINAGE MUST BE VERIFIED BY THE CONSTRUCTION CONTRACTOR.

INSTALL SEDIMENT FENCE OR MULCH BUND AROUND LOWER PERIMTER OF ANCILLARY SITE. ENSURE RETURNS ARE INSTALLED AT MAX. 20m INTERVALS.

DURING CONSTRUCTION PROVIDE A TEMPORARY PIPE EXTENSION HERE TO ENSURE OFFSITE (CLEAN) WATER OUTLETS DOWNSLOPE OF THE ONSITE (DIRTY) WATER DIVERSION.

PROVIDE A TEMPORARY PIPE OR LINED DIVERSION THROUGH THE ANCILLARY SITE TO MAINTAIN AN OFFSITE (CLEAN) WATER FLOWPATH AT ALL TIMES.

LEGEND

GDA 2020

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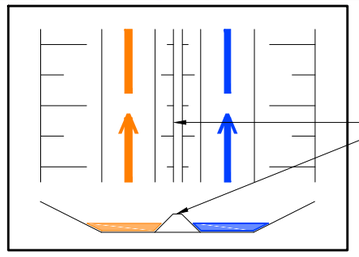

DETAIL 01: FABRIC WRAPPED EARTH BUND LOCATED IN PROPOSED PERMANENT SWALE DURING CONSTRUCTION

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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672 | PART 2 | SHEET: 11 OF 17 | A1
STATUS: 100% DETAILED DESIGN ©

DRG No.	REV	VER	EDMS No.	AMD No.
M12CDD-GHDA-ALL-SD-DRG-606711	D	0		

Plot Date & Time 26/08/2021 12:10 PM
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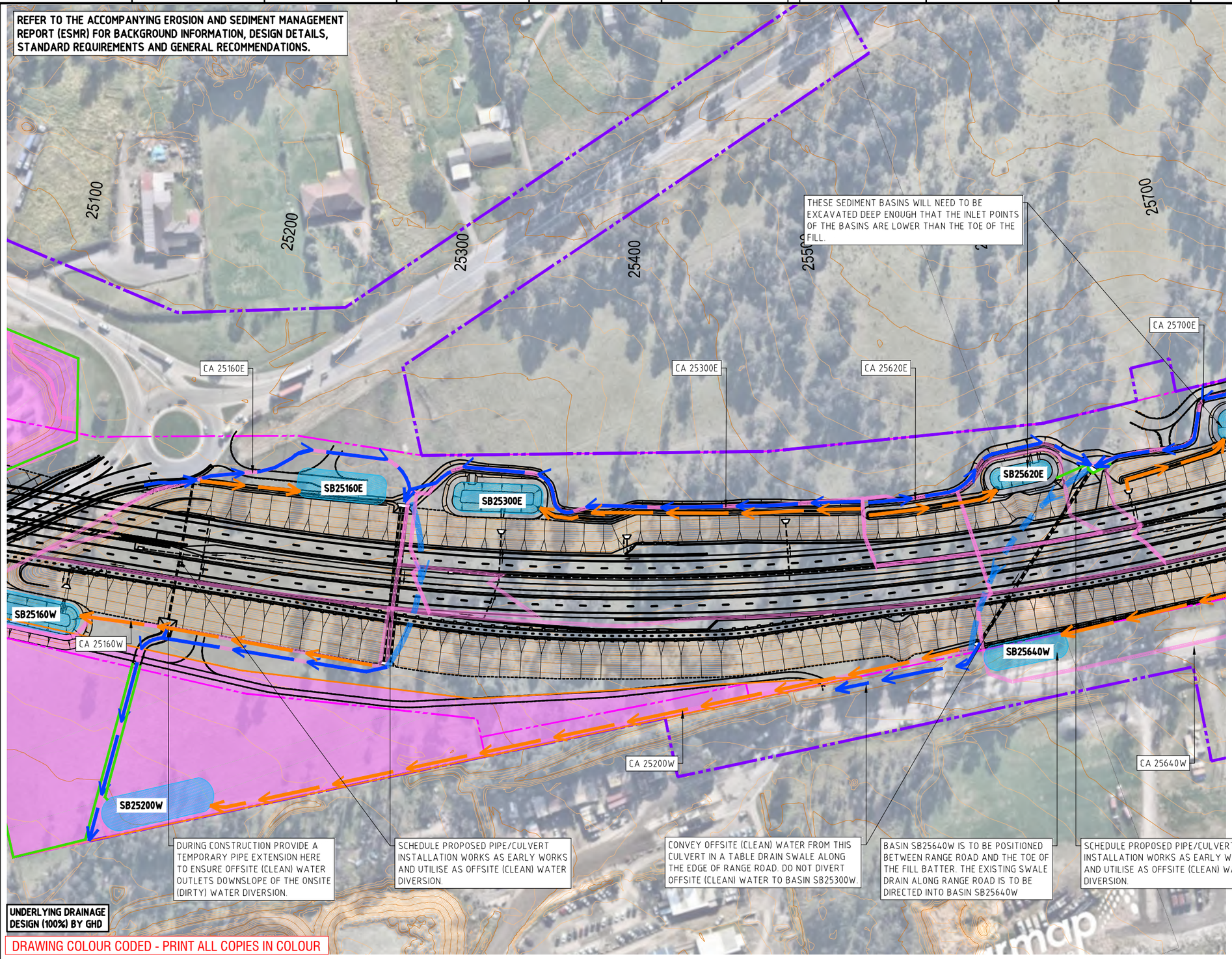

UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

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		0 10 20 30 40 50m SCALE: 1:1000 (A1 SHEET)	NSW GOVERNMENT Transport for NSW PREPARED FOR: SYDNEY PROJECT DELIVERY WESTERN SYDNEY PROJECT OFFICE WESTERN SYDNEY PROGRAM 1-2

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COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 12	OF 17	A1
STATUS: 100% DETAILED DESIGN				©
DRG No. M12CDD-GHDA-ALL-SD-DRG-606712	REV D	VER 0	EDMS No.	AMD No.

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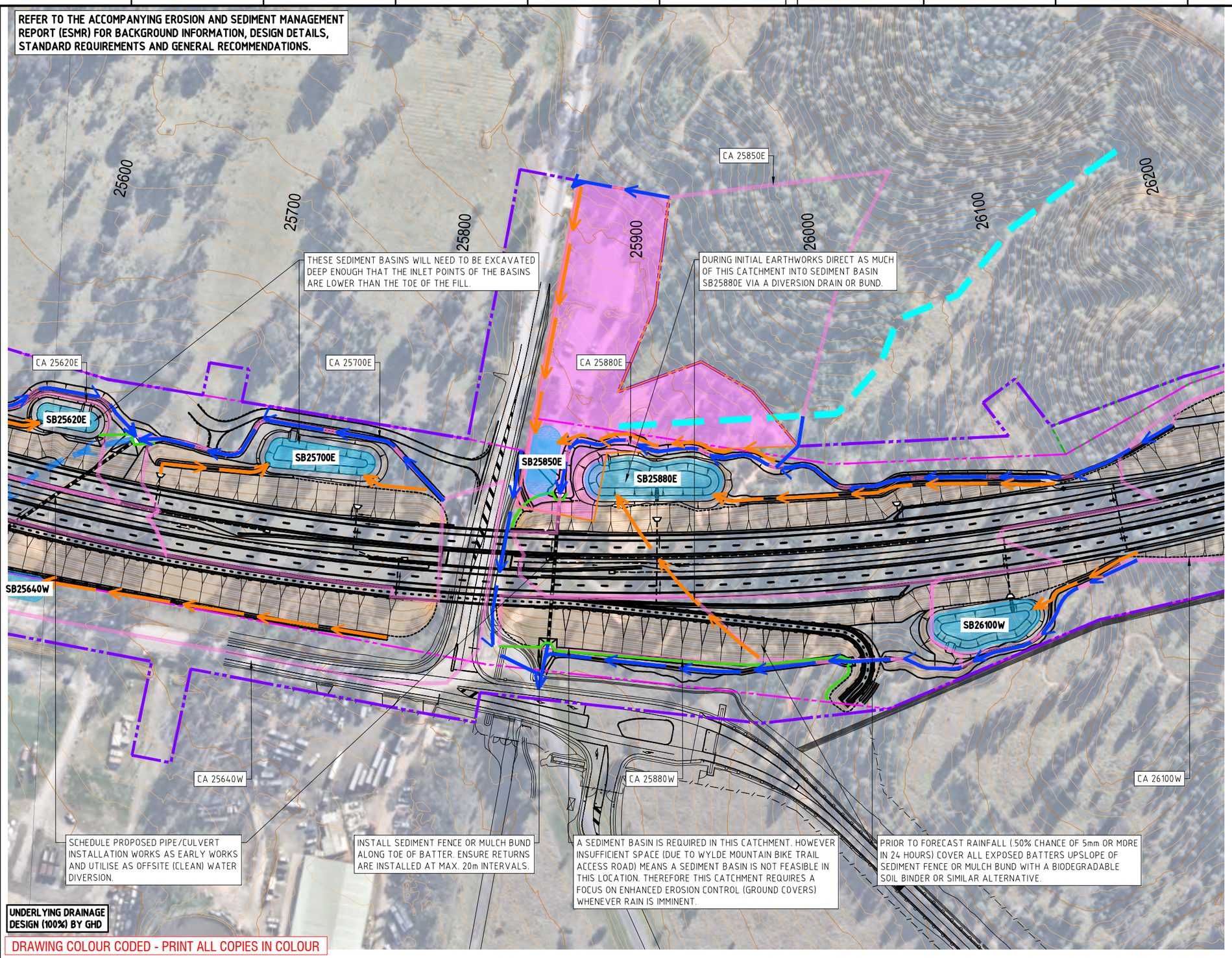

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LEGEND

GDA 2020

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	COORDINATE SYSTEM: GDA2020		HEIGHT DATUM: AHD		

SCALE: 1:1000

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SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 13 OF 17	A1
STATUS: 100% DETAILED DESIGN			©
DRG No. M12CDD-GHDA-ALL-SD-DRG-606713	REV D	VER 0	EDMS No.	AMD No.

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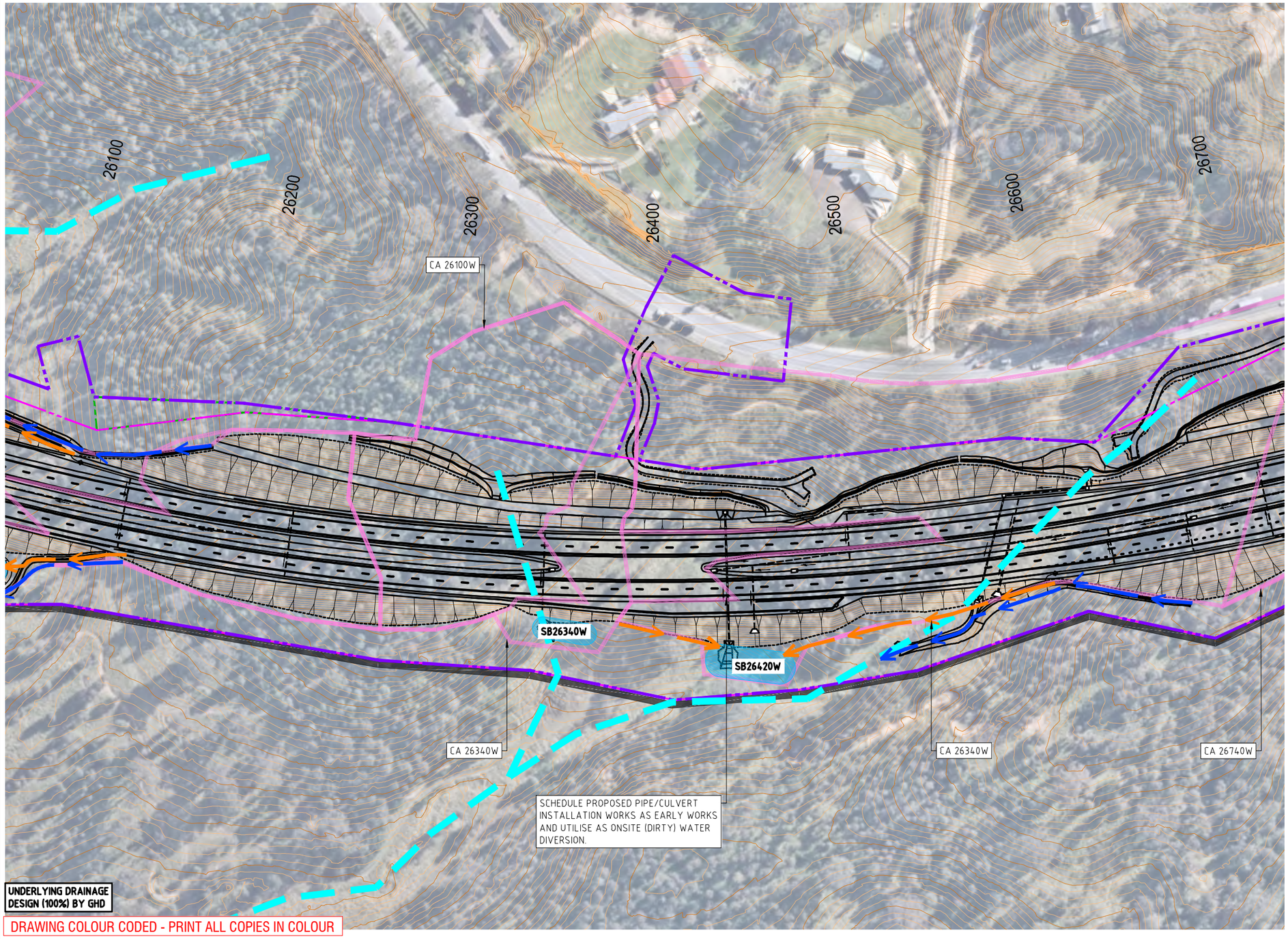

UNDERLYING DRAINAGE DESIGN (100%) BY GHD

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LEGEND

GDA 2020

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SCALE: 1:1000

0 10 20 30 40 50m

SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

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WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

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DRAWN	LIAM O'ROURKE	26/08/2021
DESIGNED	LIAM O'ROURKE	26/08/2021
DRG CHECK	ANDREW MACLEOD	26/08/2021
DESIGN CHECK	ANDREW MACLEOD	26/08/2021
APPROVED	MARK ELVIDGE	26/08/2021
PROJECT MNGR	ALEX HORTON	26/08/2021

M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 14	OF 17	A1
STATUS: 100% DETAILED DESIGN				©
DRG No. M12CDD-GHDA-ALL-SD-DRG-606714	REV D	VER 0	EDMS No.	AMD No.

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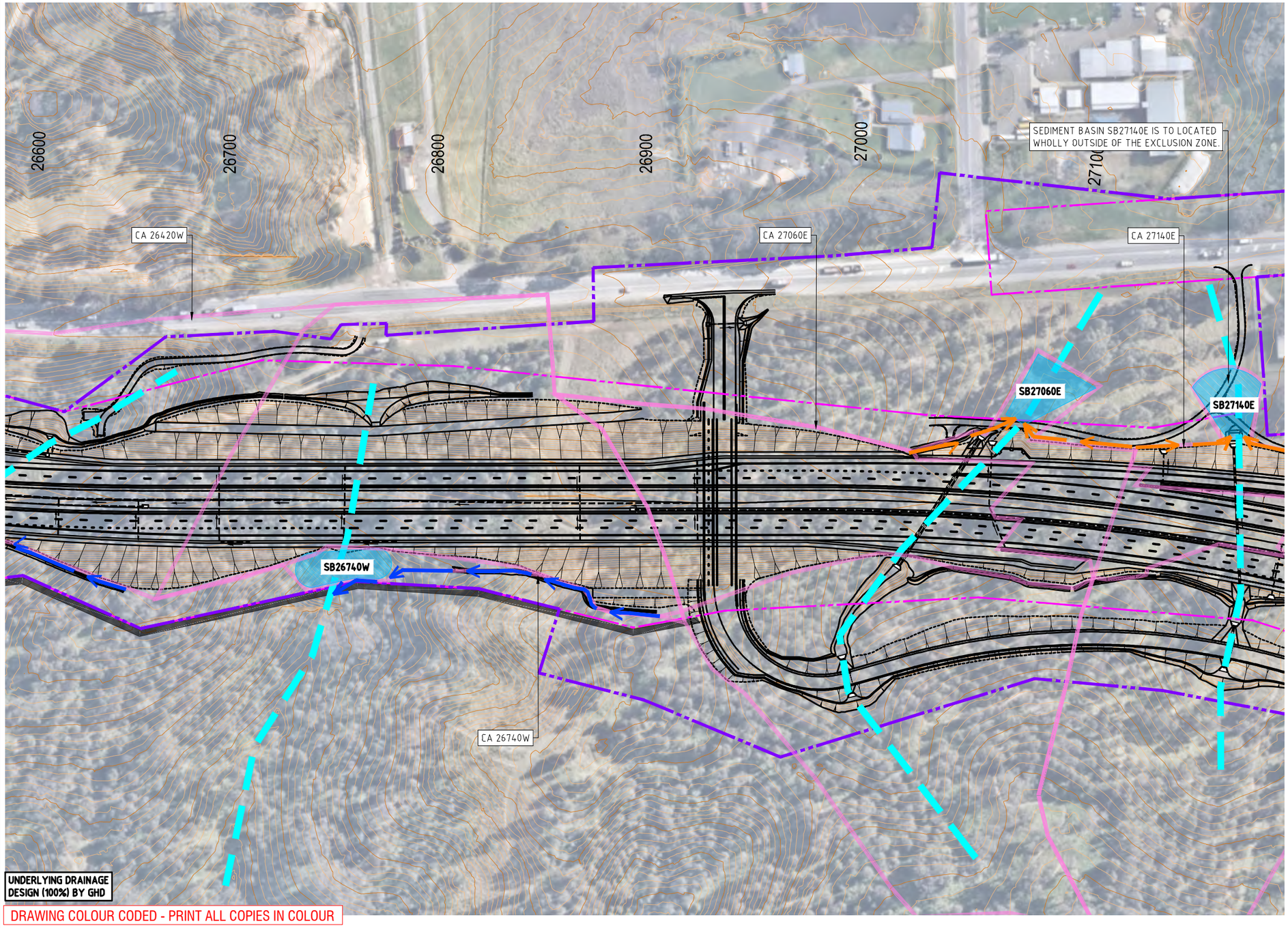

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LEGEND

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
- OFFSITE (CLEAN) WATER DIVERSION
- ONSITE (DIRTY) WATER DIVERSION
- SB8760W — SEDIMENT BASIN [1] (BLUE BOOK SD 6-4)
- TEMPORARY DIVERSION ACROSS WORKS AND/OR AROUND CULVERT WORKS
- CONSTRUCTION BOUNDARY - PROVIDED TO SEEC ON THE 26/08/2021
- OPERATION BOUNDARY - PROVIDED TO SEEC ON THE 26/08/2021
- EXCLUSION ZONE
- EXISTING WATERWAY/FLOWPATH
- CA 25000W — CATCHMENT AREA
- 100YR ARI FLOOD EXTENT (PROVIDED BY OTHERS)
- FABRIC WRAPPED BUND (MIN. 0.6m HIGH)
- ANCILLARY SITE

[1] THE SEDIMENT BASIN FOOTPRINTS SHOWN ARE INDICATIVE ONLY AND MUST BE VERIFIED VIA SURVEY/MODELLING TO ACHIEVE THE REQUIRED SEDIMENT BASIN VOLUMES. SEDIMENT BASIN VOLUMES AND DESIGN DETAILS ARE PROVIDED WITHIN TABLE 1 ON DRG No. M12CDD-GHDA-ALL-SD-DRG-606651.

THIS IS A CONCEPT EROSION AND SEDIMENT CONTROL PLAN (ESCP) SHOWING MAJOR EROSION AND SEDIMENT CONTROLS ONLY (I.E. SEDIMENT BASINS, MAJOR DIVERSION DRAIN LOCATIONS AND ALTERNATIVE REQUIREMENTS WHERE SEDIMENT BASINS CANNOT BE PROVIDED). CONSTRUCTION PHASE ESCPs WILL BE REQUIRED PRIOR TO WORKS TO DETAIL ALL ADDITIONAL EROSION AND SEDIMENT CONTROLS (E.G. SEDIMENT TRAPS, SEDIMENT FENCES, ADDITIONAL DIVERSION DRAINAGE DEVICES, STAGING DETAILS AND WORKS IN WATERWAYS).

THESE CONCEPT EROSION AND SEDIMENT CONTROL PLANS HAVE BEEN PREPARED BY:

SEEC
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FOR INFORMATION

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	C	ISSUED FOR 100% DETAILED DESIGN	L.O. 13/07/2021	A.M. 13/07/2021	A.M. 13/07/2021
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	REV	DESCRIPTION	DESIGNER INITIAL/DATE	VERIFIED INITIAL/DATE	APPROVED INITIAL/DATE
	COORDINATE SYSTEM: GDA2020		HEIGHT DATUM: AHD		

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SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
WESTERN SYDNEY PROJECT OFFICE
WESTERN SYDNEY PROGRAM 1-2

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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

FILE No. DS2020/000672	PART 2	SHEET: 15	OF 17	A1
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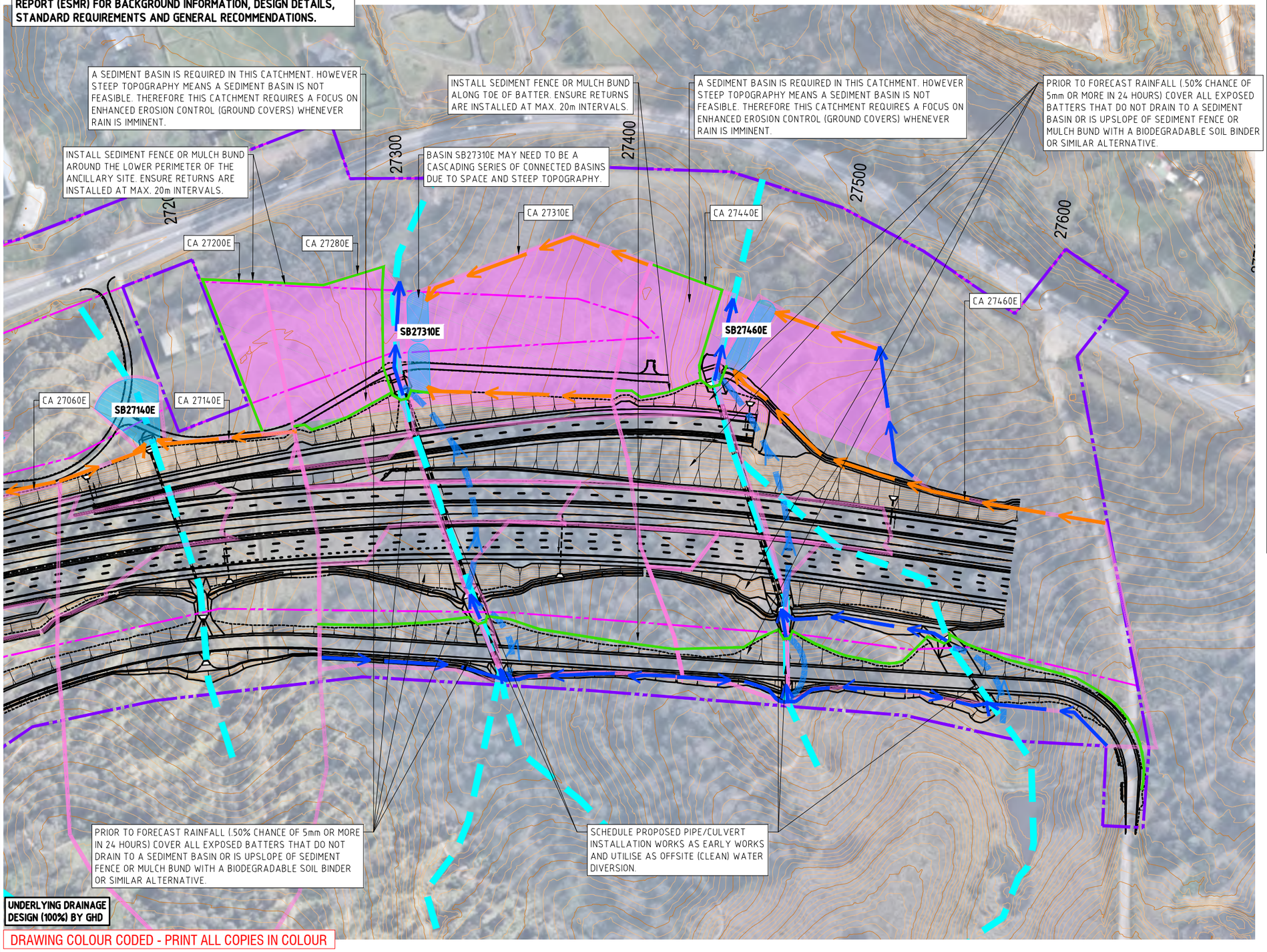

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LEGEND

GDA 2020

- SEDIMENT FENCE (BLUE BOOK SD 6-8) OR MULCH BUND (IECA SD MB-01)
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D	ISSUED FOR 100% DETAILED DESIGN (FINAL)	L.O. 26/08/2021	A.M. 26/08/2021	A.M. 26/08/2021
C	ISSUED FOR 100% DETAILED DESIGN	L.O. 13/07/2021	A.M. 13/07/2021	A.M. 13/07/2021
B	ISSUED FOR 80% DETAILED DESIGN	L.O. 04/02/2021	A.M. 04/02/2021	A.M. 04/02/2021
A	ISSUED FOR 50% DETAILED DESIGN	L.O. 18/09/2020	A.M. 18/09/2020	A.M. 18/09/2020

COORDINATE SYSTEM: GDA2020 HEIGHT DATUM: AHD

SCALE: 1:1000

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SCALE: 1:1000 (A1 SHEET)

CLIENT: NSW GOVERNMENT Transport for NSW

PREPARED FOR:
SYDNEY PROJECT DELIVERY
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M12 MOTORWAY

PACKAGE 2 - CENTRAL
MAIN ALIGNMENT
EROSION AND SEDIMENT CONTROL PLAN
ESCP

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Appendix F - Tannin Management Procedure

Appendix F

Tannin Management Procedure

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
Title	M12 Central CEMP: Appendix B4 Construction Soil and Water Management Sub-plan Appendix F: Tannin Management Procedure
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000013

Approval and authorisation

Plan prepared by:	Plan reviewed by:	Plan endorsed by:
[redacted]	[redacted]	[redacted]
Seymour Whyte Environment and Sustainability Manager	Seymour Whyte Environmental Site Representative	Seymour Whyte Project Manager
27/07/2022	18/01/2025	18/01/2025
		

Revision history

Revision	Date	Description
A	18/02/2022	First draft for TfNSW review
B	-	Internal draft
C	29/06/2022	Updated in response to TfNSW review
D	29/06/2022	Updated document control page for CSWMP Rev D
E	18/01/2025	Updated document control page for CSWMP Rev F

Contents

Glossary/ Abbreviations

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

1 Introduction

1.1 Purpose

Tannins are naturally occurring plant compounds that can leach out of mulched vegetation stockpiled in areas that are subject to inundation. Tannin impacts may result in dark coloured water discharge from construction sites. This impact can be obvious and may raise the concern of the community and other stakeholders including regulatory authorities.

Once discharged to the environment, tannins may reduce visibility and light penetration, increase the biological oxygen demand (BOD) and change the pH of receiving waters. These impacts may affect aquatic ecosystems in receiving environments.

The following procured has been prepared in accordance with the RMS Environmental Direction Management of Tannins from Vegetation Mulch (2012). The primary objective is to minimise tannin generation on construction sites.

1.2 Objective

The objectives of this Plan include:

- To minimise tannin generation on construction sites
- Provide minimum management measures for the handling, stockpiling and application of mulch during the construction of the M12 Central package to prevent pollutions of receiving waters with tannins.

1.3 Scope

This Tannin Management Procedure is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Plan has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

1.4 Induction / training

All site personnel involved in construction of the M12 Central package will be trained and inducted in this Procedure.

Additional training will be provided personnel involved in handling, stockpiling and application of mulch to minimise and contain tannins from mulch. All site staff will be trained about how to identify potential tannins leachate or spontaneous combustion and how to report it.

Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and responsibilities

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

All personnel involved in activities that involve the handling, stockpiling and application of mulch are responsible for undertaking works in accordance with this Plan.

1.6 Review

This Plan will be and reviewed by 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 Procedure

2.1 Planning and works staging

Prior to commencement of clearing, suitable areas will be identified to stockpile the mulch required for M12 Central from the landscape schedule or use during landscape planting under the Contract in accordance with TfNSW R179. Mulch stockpile areas will be identified on the Progressive Erosion and Sediment Control Plans (PESCPs) prior to commencement of clearing.

Mulch in excess of the quantity required for landscape planting must not be stockpiled on site.

2.2 Mulch stockpile locational considerations

The location of mulch stockpiles should be selected with consideration of the following:

- All mulch stockpiles must be on the site of the Works as described elsewhere in the documents. Any proposed stockpile site not shown on the Drawings, must be approved by TfNSW. The application for an alternate site must be submitted at least ten working days before stockpiling is due to commence and include the maximum dimensions of the proposed stockpile.
- Mulch stockpile sites should only be established on elevated ground that are not subject to inundation
- Stockpile sites must be located away from drainage lines and watercourses and must be arranged to minimise damage to natural vegetation and trees.
- Mulch stockpiles should not be proposed within the flood prone land of South Creek or Kemps Creek.
- The stockpile sites must be positioned so that the stockpiled material may be transported away at any time. Access should be readily available to the RFS in the event of spontaneous combustion (refer to 2.5).
- Stockpile sites with a duration of not more than 1 month should be constructed not less than 20 metres from a watercourse, including floodplains
- Stockpile sites with a duration of more than 1 month should be constructed not less than 50 metres from a watercourse, including floodplains.

2.3 Mulch stockpile management measures

The following controls and management measures should be implemented when stockpiling mulch on site:

- Mulch stockpile sites should be established with appropriate controls in place before the main site clearing activities commence
- Mulch stockpiles should be designed and constructed with upslope bunds or catch drains to divert upgradient water around the stockpile and prevent it from entering the stockpile site
- Mulch stockpiles should incorporate an impermeable bund to capture stockpile leachate or tannin impacted water
- Impervious bunds must be a minimum of 300 mm high, to capture tannin impacted water

- All bunded stockpiles that are in place for a period longer than one month must include a lined discharge point for overflow in extreme rainfall events
- Stockpiles established on sloping sites must be designed to provide temporary stormwater containment equivalent to a 300 mm minimum height bund on a flat site.

2.4 Management of tannin leachate

Tannin impacted water should be pumped out of bunded stockpiles within 5 days of the end of a rainfall event to maintain the storage capacity. This water should be used for on-site purposes including dust suppression and landscape watering. These activities must be managed to prevent any pooling or runoff of tannin impacted water.

2.5 Mitigation of spontaneous combustion

Stockpiles must be regularly monitored and turned over as required to avoid spontaneous combustion.

Stockpiles are at risk of spontaneous combustion when the internal temperature is above 80°C. Indicators of elevated temperatures in mulch stockpiles include mushrooms, presence of steam and discolouration.

Where the above indicators are observed, temperature monitoring is to be undertaken of known hotspots and random sample locations within the entire mulch stockpile.

If stockpile is smoking or temperature is greater than 80°C the stockpile must be aerated and cooled.

Appendix G – Stockpile Management Procedure

Appendix G

Stockpile Management Procedure

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
Title	M12 Central CEMP: Appendix B4 Construction Soil and Water Management Sub-plan Appendix G: Stockpile Management Plan
Document Number (Teambinder)	M12CCO-SYW-ALL-EN-PLN-000013

Approval and authorisation

Plan prepared by:	Plan reviewed by:	Plan endorsed by:
[redacted] Seymour Whyte Environment and Sustainability Manager	[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Director
27/07/2022	18/01/2025	18/01/2025
		

Revision history

Revision	Date	Description
A	29/06//2022	First draft for TfNSW review
B	-	Not issued
C	-	Not issued
D	27/07/2022	Updated in response to TfNSW and ER review
E	18/01/2025	Updated in response to OCEMP update

Contents

Glossary/ Abbreviations

Abbreviations	Expanded text
CoA	Conditions of Approval
Construction Ancillary Facility	A temporary facility for construction of the CSSI including an office and amenities compound, construction compound, material crushing and screening plant, concrete and asphalt batching plant, materials storage compound, maintenance workshop, testing laboratory, material stockpile area, access and car parking facilities and utility connections to the facility. Note: Where an approved CEMP contains a stockpile management protocol, a material stockpile area located within the construction boundary is not considered to be an ancillary facility.
CSWMP	Construction Soil and Water Management Plan
ESCP	Erosion and Sediment Control Plan
ESM	TfNSW Environment and Sustainability Manager
ESR	Environment Site Representative (Seymour Whyte)
EWMS	Environmental Work Method Statement
OCEMP	Overarching Construction Environmental Management Plan
POEO Act	*Protection of the Environment Operations Act* 1997
QA	Quality Assurance
REMM	Revised Environmental Management Measures
TfNSW	Transport for NSW

1 Introduction

1.1 Purpose

This Stockpile Management Plan (the Plan) provides guidance relating to temporary and long-term stockpile management for the M12 Central package to prevent harm to the environment.

This Plan has been prepared under the Overarching Construction Environmental Management Plan (OCEMP) and relevant sub-plans developed for M12 Motorway (the Project), to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

1.2 Objective

The objectives of this Plan include:

- Ensure compliance with environmental requirements of the Project
- Provide a framework for suitable selection of stockpile locations and quantities throughout the construction phase of the M12 Central works
- Ensure all materials are stockpiled in segregated areas to ensure that materials are not cross contaminated, so as to maximise their suitability for re-use or recycling
- Outline the minimum management requirements for stockpile sites in the M12 Central package site.

1.3 Scope

This Stockpile Management Plan (the Plan) is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Plan has been prepared in accordance with accordance with the Stockpile Site Management Guideline EMS-TG-010 (RMS, 2015) and the following TfNSW Quality Assurance (QA) specifications:

- TfNSW QA G36 – Environmental Management
- TfNSW QA G38 – Soil and Water Management
- TfNSW QA R44 - Earthworks
- TfNSW QA 178 – Vegetation.

1.4 Induction / training

All site personnel involved in the M12 Central works activities will be trained and inducted on the requirements of this Plan.

Additional training will be provided personnel involved in stockpiling activities. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and responsibilities

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

The ESR is responsible for inspecting and monitoring the stockpile requirements outlined in this Plan.

1.6 Review

Updates of the Plan will be and reviewed by the Soil Conservationist appointed by Seymour Whyte 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 Stockpile locations

Stockpiles are to be located with the M12 Central construction footprint nominated in the Drawings or Specifications (refer to the Sensitive Area Plans in Appendix A6 of the CEMP). The M12 Central Earthworks Management Plan Section 3.2.7 provides details of the preliminary assessment of stockpiling requirements and the quantities that can be placed in nominated stockpile areas.

Any stockpile(s) that are proposed in areas outside of the M12 Central construction footprint, must be approved by TfNSW. Seymour Whyte must submit to TfNSW details of the maximum dimensions of the proposed stockpiles, for concurrence by the Principal, at least 10 working days before stockpiling is due to commence. Seymour Whyte is responsible to obtain all the necessary approvals and consents, including environmental approvals, and provide copies of them to the TfNSW. TfNSW will only consider requests for new stockpiles areas if all stockpile areas nominated in the Drawings or Specifications have already been allocated for full use.

Stockpiles will be set up in a manner that minimises any damage to natural vegetation and trees, maintaining the existing surface drainage and such that the stockpiled material is accessible for carting away at any time. Stockpiles will also be located:

- outside of the tree protection zone of trees or native vegetation identified for retention. Delineate the tree protection zone in accordance with AS 4970 and to ensure a zone of at least 5 metres from retained trees and outside the drip line.
- above 20-year flood levels
- away from key views and visual receptors where possible (unless being revegetated and used as part of boundary screening). Use appropriate screening measures and practices where this is not possible
- outside of utility easement corridors.

Since this CSWMP (CEMP Sub-plan) contains a stockpile management protocol (Appendix G Stockpile Management Procedure), a material stockpile area located within the construction boundary is not considered to be an ancillary facility.

3 Stockpile requirements

3.1 Minimum requirements for all stockpiles

3.1.1 Stockpile segregation

Various materials will be stockpiled on the site for the M12 Central works including:

- Topsoil
- Spoil including unsuitable material
- Contaminated soil / materials
- Imported natural materials (SMZ, UZF, aggregates, recycled materials, recycled bedding sand, lime, gypsum, stabilised sand)
- Mulch
- Wastes (e.g. concrete, asphalt)

Each stockpiled material must be clearly delineated to prevent mixing and cross contamination. All stockpiles of contaminated material, topsoil or any other long terms stockpiles (stockpiles left for more than 20 days) must be clearly signposted with a stockpile number, date established, material classification, origin and quantity.

3.1.2 Erosion and sediment controls

Erosion and sediment controls will be established and maintained to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles as required. Sediment and erosion control should be undertaken in accordance with the 4th edition of "Managing Urban Stormwater – Soils and Construction" Volume 1 (the Blue Book).

Erosion and sediment controls will include however not be limited to:

- Diversion bunds or catch drains upslope of the stockpiles to divert water around the stockpile
- sediment fences or mulch bunds downslope of stockpiles to catch sediment runoff
- stabilisation of stockpile that will left for more than 20 days (refer to Section 3.1.3).

Stockpile locations and the erosion and sediment controls around them will be included on the PESCPs. Erosion control and sediment capture measures must be installed prior to stockpiling material.

Stockpile heights will not exceed 2 m, unless otherwise approved by the Principal, and slopes to no steeper than 2:1. Locate stockpiles so that any slump of the stockpile will not affect erosion and sediment control measures or infringe specified minimum clearance requirements.

3.1.3 Dust control

During stockpiling activities, watercarts will be used to suppress dust.

Stockpiles that will left for more than 20 days will be stabilised where feasible by seeding with a cover crop (refer to Section 3.1.4), tackifier agent or covered to supress dust and erosion. Any stockpiles that are susceptible to wind or water erosion, must be covered within 5 days of forming each stockpile.

Any stockpiles that do or may contain asbestos materials would need to be covered in accordance with the Asbestos Management Sub-Plan.

3.1.4 Temporary vegetation

Topsoil and spoil stockpiles and stockpile sites will be vegetated to control erosion and weed invasion with the following cover crop species:

- Rye Corn (during the months of April to August) at a rate of 35 kg per hectare;
- Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare.

Where directed by the TfNSW, native seed in accordance with the species listed in R178/A will be included.

Seymour Whyte will regularly revegetate the stockpiles to maintain a dense coverage of cover crop sufficient to minimise weed colonisation for the period of the stockpiling. Where weed cover becomes greater than 5% of the stockpile surface area, eradicate weeds in accordance with R178 Clause 3.1.1, and then re-seed disturbed areas with cover crop.

3.2 Topsoil

The Earthworks Management Plan (Section 6) provides estimated quantity of topsoil that will be stripped from each cut and fill area of the M12 Central site. Generally, topsoil will be stripped with a dozer or grader and transported to local stockpile sites identified in the Progressive Erosion and Sediment Control Plan (PESCPs). Topsoil will be stockpiled separately from other materials and clear of the Works for use in revegetation.

Topsoil will be stockpiled in piles not larger than 2m high to preserve the quality of the soil for grassing and planting on batters and to manage the environmental risk.

Before stockpiling topsoil, Seymour Whyte will carry out a survey in accordance with Specification TfNSW G71 to determine the surface levels at each stockpile area, at sufficient positions to later determine the volumes of topsoil placed at the location. When shown in Annexure R44/A1, the survey must be a joint survey in accordance with Clause 1.6.

Topsoil stockpiles must:

- be free from weeds, subsoil, other excavated materials, contaminated materials, refuse, clay lumps and stones, timber or other rubbish;
- be trimmed to a regular shape to facilitate quantity measurement, and with a height not exceeding 2 m and batter slopes not steeper than 2H:1V;
- have their batters track rolled or stabilised by other means acceptable to the Principal; and
- be seeded with a sterile cover crop in accordance with Specification TfNSW R178, to encourage vegetation cover. Seeding must be carried out progressively within seven days of completion of each 500 m2 of exposed batter face; and
- be less than 1,000 cubic metres each.

After removing the topsoil or after determining topsoil is to be retained, determine the surface levels in each cutting and embankment at sufficient locations to determine the volume of excavation for general earthworks and the volume of unsuitable material.

When shown in Annexure R44/A1, the survey must be a joint survey in accordance with Clause 1.6.

3.2.1 Weed contaminated topsoil

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.

Weed contaminated topsoil will be disposed of in accordance with the requirements for spoiling in Specification TfNSW R44 by the following means:

- flatter batter slopes being provided on embankments; or
- uniform widening of embankments; or
- stockpiling within the Site; or
- disposal at a TfNSW approved location outside the Site.

Bury the weed contaminated topsoil away from any pavement, structure, water course or drainage path and with a cover of inert fill of a minimum 500 mm compacted thickness. The inert fill must:

- be from the specified earthworks, or when authorised by the Principal, from borrow;
- be free of any material with a particle size exceeding 75 mm;
- have a Plasticity Index between 10 and 20 when tested in accordance with Test Method TfNSW T109; and
- be placed and compacted in accordance with the requirements for embankments in Specification TfNSW R44.

Uncontaminated topsoil must be spread over the burial area and revegetate within 7 days.

3.2.2 Restoration of the topsoil stockpile areas

After removing the topsoil, or after determining topsoil is to be retained, determine the surface levels in each cutting and embankment at sufficient locations to determine the volume of excavation for general earthworks and the volume of unsuitable material.

Following completion of the Works, carry out restoration of the stockpile areas in accordance with Specification TfNSW R178.

4 Inspection and monitoring

Inspections of stockpiles will occur in accordance with the inspection and monitoring program outlined in Section 7.3 of the CSWMP.

Appendix H – Site Stabilisation Sub-plan

Appendix H

Site Stabilisation Plan

M12 Motorway – Central

January 2025

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Document control

File Name	Appendix B04 Soil and Water MP
Title	M12 Central CEMP: Appendix B4 Construction Soil and Water Management Sub-plan Appendix HI: Site Stabilisation Plan
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Approval and authorisation

Plan prepared by:	Plan reviewed by:	Plan endorsed by:
[redacted] Seymour Whyte Environment and Sustainability Manager	[redacted] Seymour Whyte Environmental Site Representative	[redacted] Seymour Whyte Project Manager
27/07/2022	18/01/2025	18/01/2025
		

Revision history

Revision	Date	Description
A	29/06/2022	First draft for TfNSW review
D	27/07/2022	Updated in response to TfNSW and ER review
E	18/01/2025	Update in response to OCEMP update

Contents

Glossary/ Abbreviations

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

1 Introduction

1.1 Purpose

The purpose of this Site Stabilisation Plan (the Plan) is to describe the site stabilisation approach that will be employed by Seymour Whyte employees and its subcontractors during construction of the M12 Central package.

The following procured has been prepared in accordance with the RMS Guideline for Batter Surface Stabilisation using vegetation (2015). Background

1.2 Objective

The objectives of this Plan include:

- Provide a decision-making framework to guide the stabilisation of disturbed areas in a timely and effective manner
- Reduce incidents of erosion and downstream sedimentation and water quality impacts
- Prevent or minimise damage to the works from surface water flows
- Prevent or minimise requirement for rework of completed stabilisation works.

1.3 Scope

This Site Stabilisation Procedure is an appendix of the Construction Soil and Water Management Sub-plan (CSWMP) which forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway – Central package.

This Plan has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS), Amendment Report, and Amendment Report Submissions Report (ARSR), all applicable legislation, Transport for New South Wales (TfNSW) Quality Assurance (QA) Specifications.

The primary G38 requirement relevant to the development of this Plan are listed in Table 1-1.

Table 1-1: Primary requirement for the Site Stabilisation Sub-plan

G38	Requirement	Document reference
3.10	Prepare and implement a Site Stabilisation Sub-Plan as part of the CEMP (see TfNSW G36) for the staged stabilisation of the Works throughout Construction. The Site Stabilisation Sub-Plan must include:	This Plan
	(a) Site stabilisation objectives	Section 1.2
	(b) identification and mapping of areas along the length of the proposal requiring stabilisation;	Section 2.1
	(c) a risk assessment for disturbed areas and stockpiles;	Section 2.2
	(d) identification of timing for stabilisation;	Section 3.6

G38	Requirement	Document reference
	(e) detailed description of methods for stabilisation;	Section 3 Annexure A Annexure B
	(f) identification of areas and a program for progressive, permanent stabilisation such as implementation of landscaping;	Section 3.5
	(g) a procedure for regularly monitoring and assessing the performance and effectiveness of your stabilisation control measures against the site stabilisation objectives and for implementing improvements;	Section 4
	(h) a procedure to ensure all stabilisation risk areas would be stabilised within the periods listed in Clause 4; and	Section 3.6
	(i) a process for identifying additional stabilisation methods.	Section 2.3

1.4 Induction / training

All site personnel involved in construction of the M12 Central package will be trained and inducted in this Plan.

Additional training will be provided personnel involved in site stabilisation works. This will include:

- Existence and requirements of this Plan
- Roles and responsibilities under this Plan
- Planning and preparedness for high rainfall events.
- Lessons learnt from high rainfall periods.

Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.5 Roles and responsibilities

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

All personnel involved site stabilisation works are responsible for undertaking works in accordance with this Plan.

1.6 Review

This Plan will be and reviewed by 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 Procedure

During construction the natural soil profile is substantially disturbed by stripping, stockpiling and changing the landforms by cutting, filling, stockpiling and creating mounds and basins.

Respreading topsoil can mix multiple soil layers and significantly alter the physical, chemical and biological properties of the soils from those that existed pre-disturbance. Surface Stabilisation is therefore required to minimise potential impacts during the construction works.

This section outlines the procedure for the identification of identification of areas along the length of the proposal requiring stabilisation.

2.1 Site stabilisation plans

Site stabilisation plans (maps) will be prepared and maintained throughout construction. Initially the site stabilisation plans may be incorporated into the Progressive Erosion and Sediment Control Plans. Once batter stabilisation commences, separate maps should be prepared of the alignment to document the proposed and implemented stabilisation of the site.

2.2 Risk assessment

Relevant aspects and the potential for related impacts to site stabilisation will be added to and maintained in the risk assessment in Appendix A2 of the CEMP. Section 3 provides a suite of mitigation measures that will be implemented to avoid or minimise those impacts.

2.3 Additional stabilisation methods

Seymour Whyte will consider various factors to be utilized to select appropriate surface Stabilisation solutions for all disturbed areas. Works such as clearing, topsoil stripping, bulk excavation, stockpiling, piling without necessary stabilisation considerations can cause mobilisation of dust & sediment into sensitive receivers. Refer to the decision support table in Annexure A for additional stabilisation methods that may be implemented in addition to the specification requirements.

3 Stabilisation mitigation and management measures

Seymour Whyte will implement the following general techniques to stabilise disturbed surfaces during the construction works. Factors outlined in RMS Guideline for Batter Surface Stabilisation using vegetation will be considered to achieve Stabilisation requirements and targets. See Annexure A for batter surface Stabilisation decision table. Fact sheets describing fifteen batter stabilisation techniques referred to the decision table are provided in Annexure B.

3.1 Batter Stabilisation

The selection of a Stabilisation technique on the project will be based on evaluation of slope lengths and steepness of the respective batters where works are to be undertaken in consultation within the Contractor's Soil Conservationist.

The slope gradient influences the ability to apply and hold topsoil, type of erosion risk. while slope length determines the potential for erosion. Soil testing will be undertaken to ensure that soil is properly managed and ameliorated for the best chance of success and stabilisation where required. Where necessary, methods such as hydro mulching and hydroseeding will be augmented to assist in preparing the soil for vegetation upon required temporary stabilisation and completion of works.

Drainage control requirements onsite will be implemented to divert upstream surface flows away from batter slopes. On cut batters, this will generally be provided by the design surface drains that divert water around the top of cut batters. These will be reviewed with the initial Progressive Erosion and Sediment Control Plans and if required, addition temporary diversions will be added where the natural fall of the ground is towards the roadway in areas of cut.

On fill batters, +300mm diversion bunds will be maintained along the top of batter to prevent uncontrolled surface water spilling over the top of batter. During construction, until permanent drainage is installed to divert surface water away from the full batters, batter chutes will be maintained to provide controlled drop points for water from the top to toe of batter (see Standard Drawing R0100-06 in Annexure C).

Site won topsoil will be used predominantly for batter slope rehabilitation. Prior to application, the topsoil stockpiles and subsoils will be tested to determine what ameliorants are required to target soil deficiency.

Ameliorants include fertiliser, lime, sulphur, gypsum, compost, wetting agents and biological inoculants. Amelioration methods and products are dependent on the growing media quality for each project and may even vary between sections or stages of a project. Ameliorants must be mixed into the soil to be effective and may be added to both topsoil and subsoils. Soil amelioration is most effective if undertaken during the soil stripping phase. Ameliorants are applied to the soil prior to soil stripping and they are then easily incorporated during the stripping and stockpiling process. When this has not occurred, amelioration on batters >3:1 will typically involve use of a bulldozer working perpendicular to contours.

Vegetation cover will be established on batter surfaces temporarily and permanently as determined by length of exposure of batter to the elements. Stabilisation will be conducted for areas that remain unworked two weeks.

Rehabilitation will commence at the earliest opportunity to minimise erosion risk and stabilise the newly completed areas. The objective of the progressive rehabilitation is establish vegetation cover on topsoil during the construction period. This will reduce the erosion from exposed batter, reduce the period that topsoil stored in stockpiled, and allow easy access for watering, additional seeding or amelioration as required prior to opening the road to live traffic.

Routine inspections conducted by the ESR and the Soil Conservationist will help to identify opportunities to stabilise the batters. Areas identified for stabilisation can be updated on the PESCP's as the locations become available.

3.2 Stockpile Stabilisation

Stockpiles will be required for storage of construction materials including topsoil, spoil, vegetation and others. The Stockpile Management Plan provide in Appendix G of the CSWMP outlined the requirements for establishment stockpiles at the M12 Central package.

Stockpiles that will left for more than 20 days will be stabilised where feasible by seeding with a cover crop (refer to Annexure A), tackifier agent or covered to supress dust and erosion. Any stockpiles that are susceptible to wind or water erosion, must be covered within 5 days of forming each stockpile.

Topsoil stockpiles and stockpile sites (and other areas nominated by the Principal) will be vegetated to control erosion and weed invasion with the following cover crop species:

- Rye Corn (during the months of April to August) at a rate of 35 kg per hectare;
- Japanese Millet (during the months of September to March) at a rate of 35 kg per hectare.

Where directed by the TfNSW, native seed in accordance with the species listed in R178/A will be included. be seeded with a sterile cover crop in accordance with Specification TfNSW R178, to encourage vegetation cover. Seeding must be carried out progressively within seven days of completion of each 500 m2 of exposed batter face.

Seymour Whyte will regularly revegetate the stockpiles to maintain a dense coverage of cover crop sufficient to minimise weed colonisation for the period of the stockpiling. Where weed cover becomes greater than 5% of the stockpile surface area, eradicate weeds in accordance with R178 Clause 3.1.1, and then re-seed disturbed areas with cover crop.

3.3 Drainage lines

Drainage lines will be stabilised in accordance with the design drawings. Turf used in vegetated drainage channels must comply with recommendations in AS5181:2017 "Use and installation of turf as an erosion, nutrient and sediment control measure". Selected turf must be 25 mm thick of dense and well rooted grass. Turf must be verdant and fresh when delivered and be free of weeds, soil pests and disease and must be accompanied with a "Certificate of Authenticity" from the supplier. The turf must be mown and freshly cut in long lengths, of uniform width not less than 300 mm, and in sound unbroken condition.

Where temporary stabilisation is required, jute mesh (or similar), and where recommended by the Contractor's Soil Conservationist, with bitumen as per TfNSW standard drawing R0100-03 (refer to Annexure C) will be applied promptly.

3.4 Waterways

Disturbed waterways will be promptly and progressively stabilised to avoid potential scouring and sedimentation and permanent stabilisation measures will be implemented as soon as practicable.

This will consist of, however not be limited to using jute mesh or similar to provide scour protection for any earthen areas of waterways that have been disturbed and that do not have a permanent vegetative or water cover and are likely to experience flows of a minimum 1:5 year flow event until long-term stabilisation measures are established as shown on the Drawings;

3.5 Permanent stabilisation

Landscaping, or other permanent stabilisation works, will be completed progressively as early in the construction program as practical. Once earthworks are completed and access permits, areas will be stabilised with the permanent treatments and then further disturbance avoided. Areas of permanent stabilisation will be monitored and maintained until completion. Any damage as a result of the ongoing construction activities around stabilised areas will be rectified to prevent ongoing erosion and prior to completion.

3.6 Timing for stabilisation

Target timeframes for stabilisation works for the M12 Central works are summaries in Table 3-1.

Table 3-1: Timing for stabilisation

G38	Target timing for stabilisation
Hydromulching / hydroseeding	Within 2 days of completion of soil preparation or, if delayed by the weather conditions, as soon as weather conditions permit
Compost Blanket	Within 5 days of completion of subsoil preparation
Stockpiles (general)	Withing 20 days of being left inactive
Stockpiles that are susceptible to wind or water erosion	5 days
Open drains	Complete vegetation within 7 days of excavation
Waterways that have been disturbed and that do not have a permanent vegetative or water cover and are likely to experience flows of a minimum 1:5 year flow event	10 days or prior to rainfall following disturbance (whichever is first)
Vegetation of Areas with Slopes 5 to 1 or Flatter: where earthworks requiring vegetation have been completed over an area exceeding one hectare.	Carry out vegetation within 14 days
Vegetation of Areas with Slopes steeper than 5 to 1: where earthworks requiring vegetation have been completed over an area exceeding one hectare, carry out vegetation within 7 days.	Carry out vegetation within 7 days.
Removal of erosion and sediment control measures	Soil erosion and sediment control measures for any area must remain in place and be maintained at least until the new vegetation provides sufficient protection to keep erosion to a similar level to that of typical local natural bushland as agreed with the Principal.

4 Inspection and monitoring

Inspections of stabilisation will occur in accordance with the inspection and monitoring program outlined in Section 7.3 of the CSWMP. This will include, however not be limited to:

- TfNSW environmental inspection including review of the implementation of the current ESCPs, and
- Soil Conservationist site inspections.

During inspections of stabilisation, the performance and effectiveness of the stabilisation control measures will be assessed against the site stabilisation objectives. Where stabilisation is determined to have been ineffective or requiring improvement, recommendations will be made and the site stabilisation plans updated to document the measures to for implementing improvements.

Annexure A: Decision support table

Annexure B: Batter stabilisation techniques

Annexure C: TfNSW Standard Drawings