PROJECT MANAGEMENT PLAN

Soil and Water Management Plan

Sydney Metro West – Western Tunnelling Package

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TABLE OF CONTENTS

Document Details 2
Document Authorisation 2

DOCUMENT CONTROL 5
Revision History 5
Terms and Definitions 6

1 INTRODUCTION 8
1.1 Project Description 8
1.2 Context 10
1.3 Environmental Management System Overview 10
1.4 Consultation Requirements 10
1.5 Certification and Approval 11

2 PURPOSE AND SCOPE 12
2.1 Purpose 12
2.2 Scope 12

3 OBJECTIVES AND TARGETS 13

4 ENVIRONMENTAL REQUIREMENTS 16
4.1 Legislation and Standards 16
4.2 Approvals, Licences and Permits 17
4.3 IS Rating Tools Requirements 17

5 EXISTING ENVIRONMENT 19
5.1 Topography 19
5.2 Soil Landscapes and Geology 19
5.3 Salinity 23
5.4 Acid Sulfate Soils 23
5.5 Contamination 24
5.6 Groundwater 26
5.7 Surface Water 26
5.8 Climate 29
5.9 Flooding 29

6 ENVIRONMENTAL ASPECTS AND IMPACTS 31
6.1 Construction Activities 31
6.2 Impacts 32

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT MEASURES 35
7.1 Standard Mitigation and Management Measures 35
7.2 Erosion and Sediment Control Plans 42
7.3 Contamination Management 42
7.4 Water Quality and Discharge 49
7.5 Instream structures 51
7.6 Groundwater Management 52

7.7 Flooding 53

8 COMPLIANCE MANAGEMENT 54
8.1 Roles and Responsibilities 54
8.2 Training 56
8.3 Monitoring, Reporting and Inspections 56
8.4 Obtaining and managing compliance with the Environmental Protection Licence (EPL) 60
8.5 Auditing 61
8.6 Environmental Incidents 61
8.7 Complaints Register 63

9 REVIEW AND IMPROVEMENT 64
9.1 Continuous Improvement 64
9.2 Document Updates 64
9.3 Distribution 64

ATTACHMENTS 65
Attachment 1 – Compliance Matrix 65
Attachment 2 – Stakeholder Consultation 83
Attachment 3 – Erosion and Sediment Control (ESCP) Procedure 90
Attachment 4 – Unexpected Contaminated Land and Asbestos Finds Procedure 94
Attachment 5 – Construction Site Water Reuse and Dewatering Procedure 95

DOCUMENT CONTROL

The current document version number and date of revision are shown in the document footer. All changes made to the Management Plan during its implementation on a live project are to be recorded in the amendment tables below.

Revision History

Revision	Date	Description of changes	Prepared by	Approved by
A	28/01/2022	Early Works Submission	Approvals Manager	Construction Director
B	24/03/2022	Revised draft for stakeholder consultation	Approvals Manager	Construction Director
C	22/04/2022	Revised draft for stakeholder consultation following review from Sydney Metro and the Environmental Representative	Approvals Manager	Construction Director
D	1/06/2022	Revised draft in response to Stakeholder comments	Approvals Manager	Construction Director
E	21/11/2022	Updates following Site Auditor Review	Approvals Manager	Construction Director
F	1/11/2023	Updates to include SOP scope and annual review.	Snr Approvals Advisor	Construction Director
G	6/12/2023	Updated to address SM/ER Comments	Snr Approvals Advisor	Construction Director
H	15/04/2024	Updated to include spoil removal (not excavation) at S.O.P	Snr Approvals Advisor	Construction Director

Terms and Definitions

Term	Definition
ASS	Acid Sulfate Soils
ASSWMS	Acid Sulfate Soils Work Method Statement
ANZECC / ARMCANZ	Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), 2000 Water Quality Guidelines
ANZG	Australian and New Zealand Government (ANZG), 2018 Water Quality Guidelines
BCD	Biodiversity and Conservation Division of DPE (Formerly EES)
CCMS	(Sydney Metro) Construction Complaints Management System
CEMF	(Sydney Metro) Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
Clyde MSF	Clyde Maintenance and Stabling Facility
CoA	(Minister's) Conditions of Approval
CPESC	Certified Professional in Erosion and Sediment Control
CSSI	Critical State Significant Infrastructure
DECCW	NSW Department of Environment, Climate Change and Water
DPI Fisheries	Department of Primary Industries – Fisheries
DPHI	Department of Planning Housing and Infrastructure (Formerly DPE)
DSI	Detailed Site Investigation
ECM	Environmental Control Map
EES	Environment, Energy and Science (NSW) (Division of DPE)
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environmental Protection License
ERSED	Erosion and Sediment
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
ESR	Environmental Site Representative
EWMS	Environmental Work Method Statements
GEA	Gamuda Engineering (Australia)
GLC	Gamuda Engineering (Australia) and Laing O'Rourke Consortium
GDE	Groundwater Dependent Ecosystems
MSF	Maintenance and Stabling Facility
NSW WQO	New South Wales Water Quality Objectives
OCCS	(Sydney Metro) Overarching Community Communications Strategy

Term	Definition
PESCP	Progressive Erosion and Sediment Control Plan
PFAS	Per- and Poly-fluoroalkyl Substances
PIRMP	Pollution Incident Response Management Plan
PMF event	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
PPE	Personal Protection Equipment
(the) Project	Western Tunnelling Package
RAP	Remediation Action Plan
REMM	Revised Environmental Management Measures
SAQP	Sampling and Analysis Quality Plan
SDS	Safety Data Sheet
SES	NSW State Emergency Services
SMW	Sydney Metro West
SOP	Sydney Olympic Park
SOPA	Sydney Olympic Park Authority
SWMP	Soil and Water Management Plan
TBM	Tunnel Boring Machine
TSS	Total Suspended Solids
VOC	Verification of Competency
WTP	Western Tunnelling Package

1 INTRODUCTION

1.1 Project Description

The scope of the work being undertaken under the Sydney Metro West (SMW) Western Tunnelling Package works (WTP) (the Project) includes but is not limited to, the following:

- Westmead Station box excavation, including temporary support, stub tunnels, partially mined station cavern and crossover cavern including permanent lining and support
- Parramatta Station, including excavation of station box and associated support
- Clyde Maintenance and Stabling Facility (MSF), including permanent dive structure, portal, spur running tunnels, spur tunnel junction cavern, bulk earthworks, civil structures, utilities corridor, road crossing and creek diversion.
- Rosehill Services Facility, including shaft excavation, permanent lining and lateral support
- A precast segment manufacturing facility at Eastern Creek
- Demolition and site clearance works.
- Tunnelling between Sydney Olympic Park (SOP) and Westmead. Tunnelling will be undertaken by placing the tunnel boring machines (TBMs) at the Rosehill Services Facility box and retrieved out at the SOP Station Box and then placed back at the Rosehill Services Facility and retrieved at the Westmead Station Box. Within SOP, some station box works would be required for site establishment, TBM retrieval and spoil load out to facilitate cross passage construction. These activities would include crane set up and operations, plant and material deliveries, spoil load out, and concreting.

Refer to Figure 1 for the location of the WTP project.

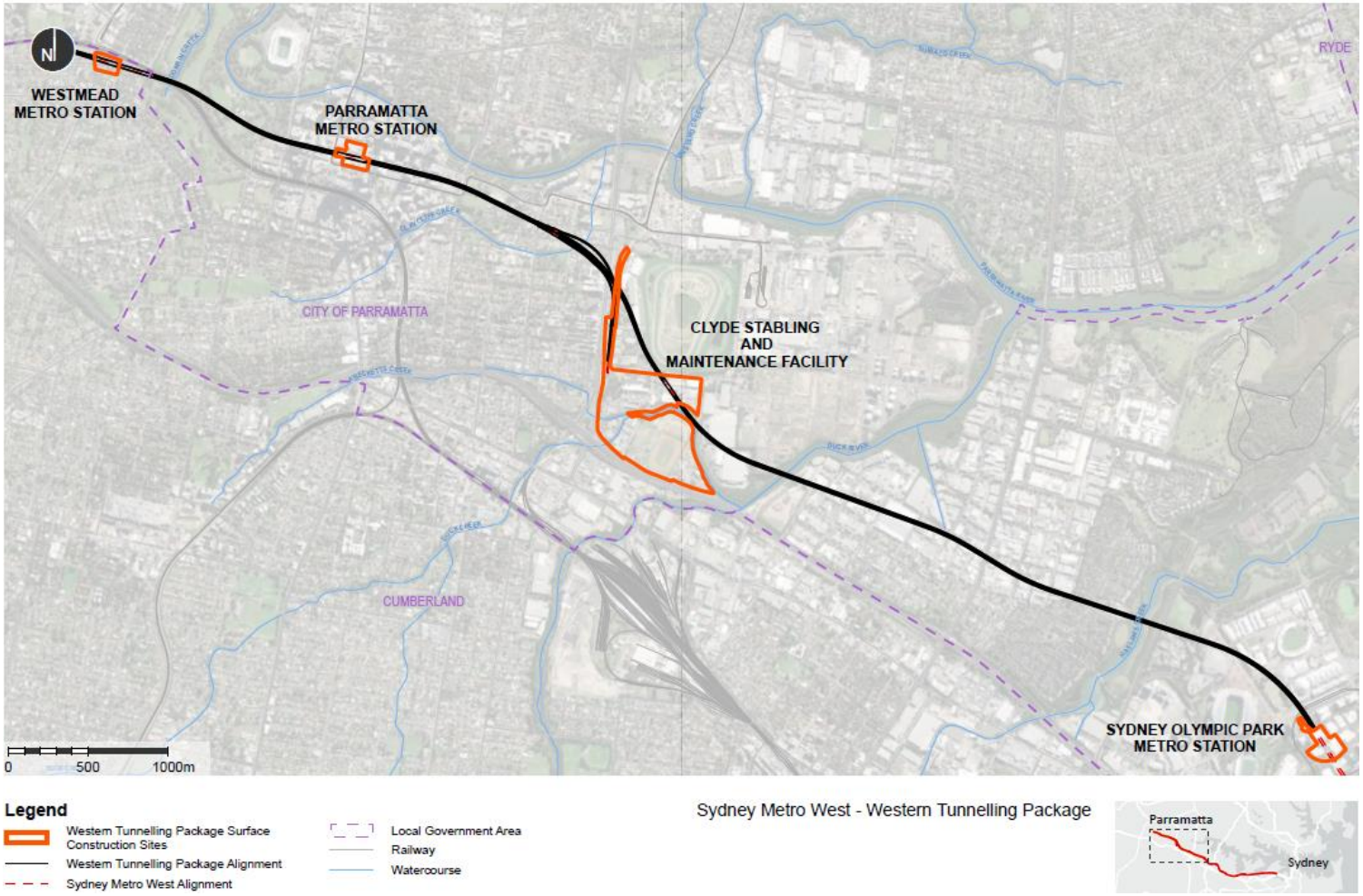

Figure 1: WTP Project

1.2 Context

The Construction Environmental Management Plan (CEMP) and sub-plans have been developed for the WTP, which will be delivered by Gamuda Engineering (Australia) Laing O'Rourke Consortium (GLC). This Soil and Water Management Plan (SWMP) forms part of the CEMP (GA-PLN-ENV-001-Construction Environmental Management Plan).

Sydney Metro West – Westmead to The Bays Concept and Stage 1 received planning approval on 11 March 2021 (SSI 10038). The Project comprises the WTP, which is the western portion of Stage 1 of SSI 10038, from Sydney Olympic Park to Westmead. This SWMP has been prepared to address requirements of the Minister's Conditions of Approval (MCoA), Revised Environmental Management Measures (REMMs) listed in the Sydney Metro West – Submissions Report, dated 20 November 2020, the Construction Environmental Management Framework (CEMF) requirements and all applicable legislation as they relate to the Project.

1.3 Environmental Management System Overview

An overview of the Environmental Management System (EMS) is provided in the CEMP Section 3.

Key interactions for this sub-plan with other management plans in the EMS include:

- Site Establishment Management Plan
- Surface Water Quality Monitoring Program
- Groundwater Management Sub-plan
- Air Quality Management Sub-plan
- Flora and Fauna Management Sub-plan
- Waste Management Sub-plan
- Spoil Management Sub-plan.

1.4 Consultation Requirements

In accordance with MCoA C5, this SWMP has been prepared in consultation with relevant government agencies including:

- Department of Planning and Environment (DPE) (Now DPHI) – Environment, Energy, and Science (ESS),
- Sydney Olympic Park Authority (SOPA) (in respect of Sydney Olympic Park)
- City of Parramatta Council, and
- Cumberland City Council
- Sydney Water (where assets are affected).

An introductory meeting was held on 24 March with City of Parramatta Council, 1 April with SOPA and 7 April with Cumberland City Council, which was organised by Sydney Metro and delivered by GLC. At the introductory meeting, GLC introduced themselves, the project team and outlined the scope of the WTP. The consultation approach was presented, and feedback invited on that approach. No issues were raised on the consultation approach during the introductory meetings.

Consultation on this SWMP was undertaken over a 21-day period, commencing on 26 April 2022 with the submission of the Plan. The Consultation approach was applied across all plans and stakeholders and included issuing of the document to stakeholders accompanied by an

introductory workshop. Following receipt of comments two weeks later, an offer was made to hold a comment review workshop to discuss and close comments directly with the stakeholder the following week. A second workshop would also be made available should there be any outstanding or technical issues requiring further discussion.

None of the stakeholders took the offer of a comment review workshop in relation to their review of this SWMP.

Details of issues raised by stakeholders during consultation is provided in Attachment 2, including copies of correspondence in accordance with MCoA A6. City of Parramatta Council and Sydney Water did not provide comments within the 21 day consultation period. Further consultation details are provided in Attachment 2. The approach to consultation is further outlined in the CEMP.

1.5 Certification and Approval

Sydney Metro West – Westmead to The Bays Concept and Stage 1 was subject to environmental impact assessment under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). It was also declared a Critical State Significant Infrastructure (CSSI) by the Minister for Planning & Public Spaces (the Minister).

An Environmental Impact Statement (EIS) has been prepared under Division 5.2 of the EP&A Act and in accordance with Part 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. Following exhibition of the EIS, an Amendment Report and Submissions Report were also prepared. After an assessment was carried out, the Minister determined that the Sydney Metro West – Stage 1 would be approved subject to conditions.

- Modification 1 of the Project Approval, which sought to amend Conditions of Approval A11d, C10 and D25 and propose a new Condition A39.1, was approved on 28 July 2021.
- Modification 2 of the Project Approval, relating to the relocation and extension of the Rosehill dive structure and realignment of Kay Street and Unwin Street, was approved on the 3 June 2022.
- Modification 3 of the Project Approval, to amend Conditions of Approval C-B10, D10, D11, D18, D37, D63 and D66, was approved on the 4 July 2022.
- Modification 4 of the Project Approval, which sought to amend Conditions of Approval D26 and D122, was approved on 23 December 2022.
- Modification 5 of the Project Approval sought an administrative change to the total amount of Plant Community Type 920 (PCT 920) that could be removed, increasing the clearing limit by an additional 0.40 ha. This Modification also sought to amend Conditions of Approval D4, D6 and add D6A and D6BIt was approved on 20 September 2023.

The planning approval (Infrastructure Approval SSI 10038) and related environmental assessment documents are located at: https://www.planningportal.nsw.gov.au/major-projects/project/25631.

Revision D of this SWMP was approved by the Planning Secretary (DPE) on the 11 July 2022 following ER endorsement on 7 June 2022. This SWMP was submitted to the Planning Secretary for approval on 7 June 2022, no later than one (1) month before the commencement of construction, which commenced on the 19 July 2022.

This SWMP, as submitted to the ER and DPE, including any minor amendments endorsed by the ER, will be implemented for the duration of construction.

2 PURPOSE AND SCOPE

2.1 Purpose

The SWMP describes the soil and water management approach that will be utilised by GLC employees and its subcontractors during construction of the Project. This sub-plan forms an integral part of the project CEMP. It applies to all works associated with Sydney Metro West Western Tunnelling Package works and establishes the environmental management controls to be implemented by GLC employees and its subcontractors.

The SWMP addresses the soil, surface water and groundwater requirements of the:

- Sydney Metro Construction Environmental Management Framework (CEMF)
- Minister for Planning and Public Space's Conditions of Approval for the Project (MCoA)
- Revised Environmental Mitigation Measures (REMMs)
- SSI Modifications – Modification 1 Administrative Modification
- SSI Modifications – Modification 2 Clyde Stabling and Maintenance Facility
- SSI Modifications – Modification 3 Administrative Modification
- SSI Modifications – Modification 4 Administrative Modification
- SSI Modifications – Modification 5 Administrative Modification
- Infrastructure Sustainability Council (ISC) Infrastructure Sustainability (IS) rating tool.

2.2 Scope

The SWMP outlines the mitigation and management GLC will use to address potential soil and surface water quality impacts during the construction of the Project, while complying with relevant approvals, statutory and contract requirements.

Specifically, this sub-plan will address the impacts relating to the following environmental aspects, except for contaminated stockpile management, which is addressed in the SpMP:

- Earthworks
- Spoil management
- Surface water reuse and discharge
- Construction phase flooding
- Saline soils
- Acid sulfate soils
- Chemical storage and spill response.

This sub-plan also makes reference to the following environmental monitoring program:

- Surface Water Quality Monitoring Program (SWQMP).

Note – this sub-plan does not address the environmental aspects and impacts associated with dewatering groundwater activities. These are assessed and dealt with in a separate sub-plan, the Groundwater Management Plan (GWMP).

3 OBJECTIVES AND TARGETS

The key objective of the SWMP is to describe how GLC will manage and protect soils and water within the permitted criteria during the construction of the Project. Table 3.1 outlines GLC's soil and water objectives and targets for the Project. These objectives and targets have been developed with consideration of key performance outcomes within the EIS. Specific CEMF construction objectives in relation to soil and water management have been outlined in Table 3.1.

Table 3.1: Soil and water targets and performance criteria

Objective	Target	Performance Indicators
Soil and Water		
Minimise pollution of surface water through appropriate erosion and sediment control	• Prepare and implement Erosion and Sediment Control Plans in accordance with *Managing Urban Stormwater: Soils and construction* (Landcom, 2004; the Blue Book) at all sites	• Weekly inspections checklist (i.e. inspection of erosion and sediment control measures with controls rectified as soon as practicable. • Audit reports • Weather monitoring records • Pre and Post rainfall inspections/checklists
Minimise leaks and spills from construction activities	• Zero leaks or spills resulting in environmental harm	• Plant maintenance records, pre-delivery inspection report, and prestart inspection records • Internal weekly inspections checklist (i.e. spill kits are well stocked)
Maintain existing water quality of surrounding surface watercourses	• Surface water quality monitoring in receiving waterways demonstrates the NSW Water Quality Objectives are improved and maintained (where values are not achieved) • No discharging without completing a permit to discharge (GA-FRM-HSE-138 Permit to Discharge Water)	• Monitoring program and associated reporting
Source construction water from non-potable sources, where feasible and reasonable.	• >50% of construction water is sourced from non-potable sources	• Sustainability monitoring program and associated reporting • Water balance study

The EIS also identified construction performance outcomes for the Project. Table 3.2 summarises those relevant to this SWMP.

Table 3.2: EIS construction performance outcomes

Performance Outcome Requirement	SMW Construction Performance Outcomes	Proposed method to achieve outcome
Spoil generated during the construction is effectively stored, handled, treated (if necessary), reused, and/or disposed of lawfully and in a manner that protects environmental values.	• 100% of useable spoil is reused in accordance with the spoil hierarchy • The use of potable water for non-potable purposes is avoided if non-potable water is available • The reuse of water is maximised, either onsite of offsite	Spoil would be classified in accordance with Waste Classification Guidelines (NSW Environment Protection Authority, 2014). Spoil that is classified as virgin excavated natural material, excavated natural material, subject to a resource recovery order/resource recovery exemption under the Protection of the Environment Operations (Waste) Regulation 2014 or is otherwise reusable would be reused (consistent with the 100 per cent beneficial reuse performance outcome). The water treatment plant would minimise water use and use non-potable water where feasible
To protect the NSW Water Quality Objectives where they are currently being achieved and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	• The discharge water quality requirements outlined in applicable environment protection licence(s) are met • Existing water quality of receiving surface watercourses is maintained	Wastewater would be treated, and standard erosion and sediment control measures would be implemented for all surface works areas to minimise pollutant loading to the downstream waterways during construction. Wastewater would be treated to comply with the ANZECC/ARMCANZ (2000) and ANZG (2018) guidelines and runoff from construction works would be designed to meet the standards outlined in the Blue Book. Discharges from construction would be monitored for compliance with the discharge criteria in environmental protection licence No. 21676.

GLC's approach to managing spoil also includes the IS rating tool requirements for waste management. GLC's targets and measurement tools are detailed in Table 3.3.

Table 3.3: IS Rating Tool Targets applicable to soil and water quality management

Objective	Targets	Measurement Tools
Meet IS rating tool requirements and objectives applicable to spoil management detailed in the Sustainability Management Plan	Level 3 for credit IS Lan-3 'Contamination and remediation', demonstrating that site assessments follow the recommended approach, remediation options are identified and selected based off the sustainability indicators in Table 4.3 of 'A Framework for Assessing the Sustainability of Soil and Groundwater Remediation' (SuRF 2009) Level 3 for credit IS Dis-1 'Receiving water quality', demonstrating water discharges and receiving water, monitored at appropriate intervals, show no adverse impact on receiving water environmental values, infrastructure does not increase peak stormwater flows for rainfall events of up to a 1.5 year ARI event discharge, and measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented.	Contamination Reports Remediation Action Plan Audit reports and auditor qualifications Design Report As-built Drawings This plan Monitoring Reports

4 ENVIRONMENTAL REQUIREMENTS

4.1 Legislation and Standards

GLC obligations include satisfying the requirements and complying with the provisions of the relevant legislation, guidelines, and policies, as well as international and Sydney Metro standards. Details are provided in Table 4.1.

Table 4.1: Legislation, standards, policies and guidelines relevant to the Project

Legislation	*(NSW) Protection of the Environment Operations Act 1997 (POEO Act)* *(NSW) Protection of the Environment Operations (General) Regulation 2009* *(NSW) Protection of the Environment Operations (Waste) Regulation 2014* *(NSW) Contaminated Land Management Act 1997 (CLM Act)* *(NSW) Environmental Trust Act 1998* *(NSW) Water Management Act 2000 (WM Act)* *Sydney Water Act 1994* *Environmental Planning and Assessment Act 1979 (where modification require assessment)* *Dangerous Goods (Road and Rail Transport) Regulation 2009*
Standards	AS/NZS ISO 14001:2015 Environmental Management AS 1940-2017: The Storage and Handling of Flammable and Combustible Liquids AS 4452-1997: The Storage and Handling of Toxic Substances
Guidelines and specifications	A Framework for Assessing the Sustainability of Soil and Groundwater Remediation (SuRF-UK 2010) Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA 2022) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) Consultants Reporting on Contaminated Land – Contaminated Land Guidelines (EPA 2020) Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers – Technical section "Bu" November 1997 Guidelines for the Assessment and Management of Groundwater Contamination (DEC 2007) Guidelines on the Duty to Report Contamination under the *Contaminated Land Management Act 1997* (EPA 2015) Guidelines for the NSW Site Auditor Scheme, 3rd edition (EPA 2017) Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (Landcom 2004) (the “Blue Book”).

	National Environment Protection Council (NEPC) 1999 (amended 2013), National Environment Protection (Assessment of Site Contamination) Measure (NEPM) NSW Acid Sulfate Soil Manual (ASSMAC 1998) NSW Groundwater Dependent Ecosystem Policy (DLWC 2002) NSW Groundwater Policy Framework Document (DLWC 2002) NSW Groundwater Quality Protection Policy (DLWC 1998) NSW Groundwater Quality Management Policy (DLWC 2007) NSW Water Extraction Monitoring Policy (DWE 2007) NSW Aquifer Interface Policy (NoW 2012) PFAS National Environmental Management Plan 2.0 (HEPA, 2020). Requirements for publishing pollution monitoring data (EPA 2013) Water Sharing Plan, Greater Metropolitan Reginal Groundwater Sources Background Document, Sydney (NoW 2011).

4.2 Approvals, Licences and Permits

This SWMP has been developed to satisfy the requirements of MCoA C1. A full list of applicable MCoAs, REMMs, CEMF requirements and Environment Protection License (EPL) condition requirements are provided in Attachment 1.

Other legislation relevant to this SWMP is included in Attachment 2 of the CEMP.

4.3 IS Rating Tools Requirements

Requirements listed in Table 4.2 will be independently verified by ISC as part of the Projects IS Rating commitments.

Table 4.2 IS Rating tool requirements.

ID	IS Rating Tool Requirement	Document Reference
Lan-3 L1	• Site assessment follows the recommended approach in Schedule A 'Recommended general process for assessment of site contamination' of National Environment Protection (Assessment of Site Contamination) Measure 1999. • Remediation options are identified and selected using a sustainability hierarchy.	Section 7.3 Section 4.1 Table Section 7
Lan-3 L2	• Requirements for L1 are achieved. • Sustainability appraisal of remediation options is undertaken against the sustainability indicators in Table 1 of 'A Framework for Assessing the Sustainability of Soil and Groundwater Remediation'.	Section 7.3.2
Lan-3 L3	• Requirements for L2 are achieved. • The effectiveness and durability of the remedial solution, and maintenance and monitoring, have been considered over the lifetime of the infrastructure and beyond.	Section 7.3.2 Section 7.3.3

ID	IS Rating Tool Requirement	Document Reference
Dis-1 L1	• Measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented. • Monitoring of water discharges and receiving waters is undertaken at appropriate intervals and at times of discharge during construction	Section 7 Section 8.3
Dis-1 L2	• Requirements for L1 are achieved. • Monitoring and modelling of water discharges and receiving waters demonstrates no adverse impact on receiving water environmental values. • The infrastructure does not increase peak stormwater flows for rainfall events of up to a 1.5 year ARI event discharge.	Section 8.3 Section 7.7
Dis-1 L3	• Requirements for L2 are achieved. • Opportunities to improve receiving water environmental values have been identified and implemented. • Monitoring and modelling demonstrates improvement of receiving water environmental values.	Section 7.4 Section 8.3

5 EXISTING ENVIRONMENT

The existing environment relevant to this SWMP is detailed in the Sydney Metro West Concept and Stage 1 EIS (April 2020) including the following chapters and technical papers:

- Chapter 18 – Groundwater and ground movement
- Chapter 19 – Soils and surface water quality
- Chapter 20 – Contamination
- Chapter 21 – Hydrology and flooding
- Technical Paper 8 – Contamination
- Technical Paper 9 – Hydrology and flooding

The following sections summarise the existing environment with respect to soil and water.

5.1 Topography

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

5.2 Soil Landscapes and Geology

The Project covers a large diverse set of geologic units. The geology of the Sydney Metro West footprint is dominated by Quaternary Age alluvial/fluvial sediments and fill, along with Wianamatta Group Ashfield Shale and Hawkesbury Sandstone – refer to EIS Chapter 18 (Groundwater and ground movement). The Soil Landscapes of Sydney 1:100,000 Sheet (Tille et al., 2009) and Penrith 1:100,000 Sheet (Hazelton et al., 2010) identifies a number of soil types within the Project footprint derived from the underlying geological units. The soil units and their characteristics are described in Table 5.1 below. Soil units are shown in Figure 2.

Table 5.1: Soil Units

Soil Unit	Location	Description
Birrong	Present along the entire alignment and at all construction sites	• Landscape: found on level to gently undulating alluvial floodplain draining Wianamatta Group shale, with slopes less than three per cent. Broad valley flats and extensively cleared tall open forest and woodland • Soil: deep soils (less than 250 centimetres) on older alluvial terraces and current floodplain • Limitations: localised flooding, high soil erosion hazard, saline subsoils, seasonal waterlogging, and very low soil fertility
Blacktown	Present along the entire alignment and at all construction sites	• Landscape: found on gently undulating rises on Wianamatta Group shales, with slopes of less than five per cent and local reliefs of up to 30 metres • Soils: strongly acidic and hard setting soils

Soil Unit	Location	Description
		• Limitations: low fertility, high aluminium toxicity, localised salinity and sodicity, low wet strength
Disturbed terrain	Clyde MSF Tunnelling between Westmead and The Bays Station	• Landscape: found on a variety of landscapes ranging from level plain to hummocky terrain that has been extensively disturbed by human activity. Slopes are typically less than five per cent and local reliefs of less than 10 metres • Soils: the original soil has been completely disturbed, removed or buried. Landfill may include soil, rock, building and waste material with a cap of sandy loam. Soil may by strongly acidic to strongly alkaline • Limitations: low fertility, low wet strength, low availability water capability, high permeability, localised toxicity/acidity and/or alkalinity, potential mass movement hazard
Glenorie	Present along the entire alignment and at all construction sites	• Landscape: found on undulating to rolling low hills on Wianamatta Group shales, with slopes typically between five per cent and 20 per cent • Soils: shallow to moderately deep on crests (less than 100 centimetres) moderately deep on upper slopes (70 centimetres to 150 centimetres) and deep on lower slopes (greater than 200 centimetres • Limitations: high soil erosion hazard, localised impermeable soil and moderate soil reactivity

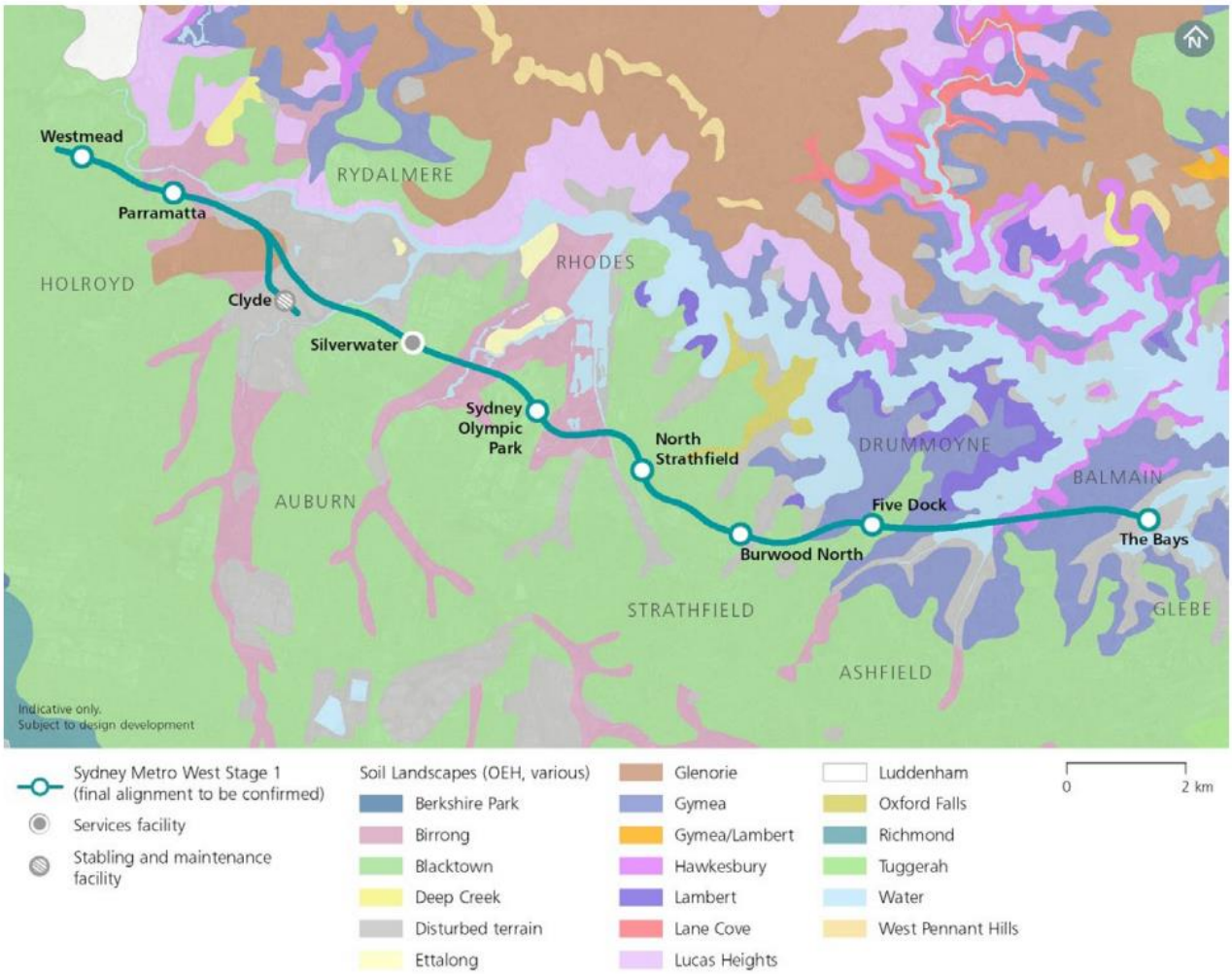

Figure 2: Soil units along the entire alignment for the Sydney Metro West (EIS, 2020) (note – Silverwater has subsequently been removed from the scope)

The Sydney 1:100,000 Geological Series Sheet 9130 (NSW Department of Mineral Resources, 1983) and the Penrith 1:100,000 Geological Sheet 9030 (NSW Department of Mineral Resources, 1991) indicate that most of the Project construction footprint is underlain by geological units associated with the Wianamatta Group. Ashfield Shale underlies most of the Project construction footprint and tunnel alignment, with occurrences of Hawkesbury Sandstone and Mittagong Formation. In addition, significant areas of disturbed ground (imported fill) are known to be present within the Project at Rosehill. A description of the geological formations is presented in Table 5.2 and shown in Figure 2. The geological long section is provided in Technical Paper 7 (Hydrogeology).

Figure 3 shows the regional geological context for Sydney Metro West sites.

Table 5.2: Geological units at the Project Construction Sites

Geological Unit	Description	The Project Construction Sites
Fill	Material comprising waste, emplaced material and engineered fill.	• Clyde MSF

Geological Unit	Description	The Project Construction Sites
Quaternary deposits (residual and alluvial soils)	Alluvial and marine sediments associated with gullies, valleys, and former drainage channels.	• Westmead metro station • Parramatta metro station • Clyde MSF • Sydney Olympic Park
Mittagong Formation	Interbedded dark siltstone and fine-grained sandstone beds and laminae of varying thickness.	• Westmead metro station • Parramatta metro station • Clyde MSF • Sydney Olympic Park
Ashfield Shale	Black to dark grey shale and laminate.	• Westmead metro station • Parramatta metro station • Clyde MSF • Sydney Olympic Park
Hawkesbury Sandstone	Medium to Coarse-grained quartz sandstone.	• All Sydney Metro West construction sites

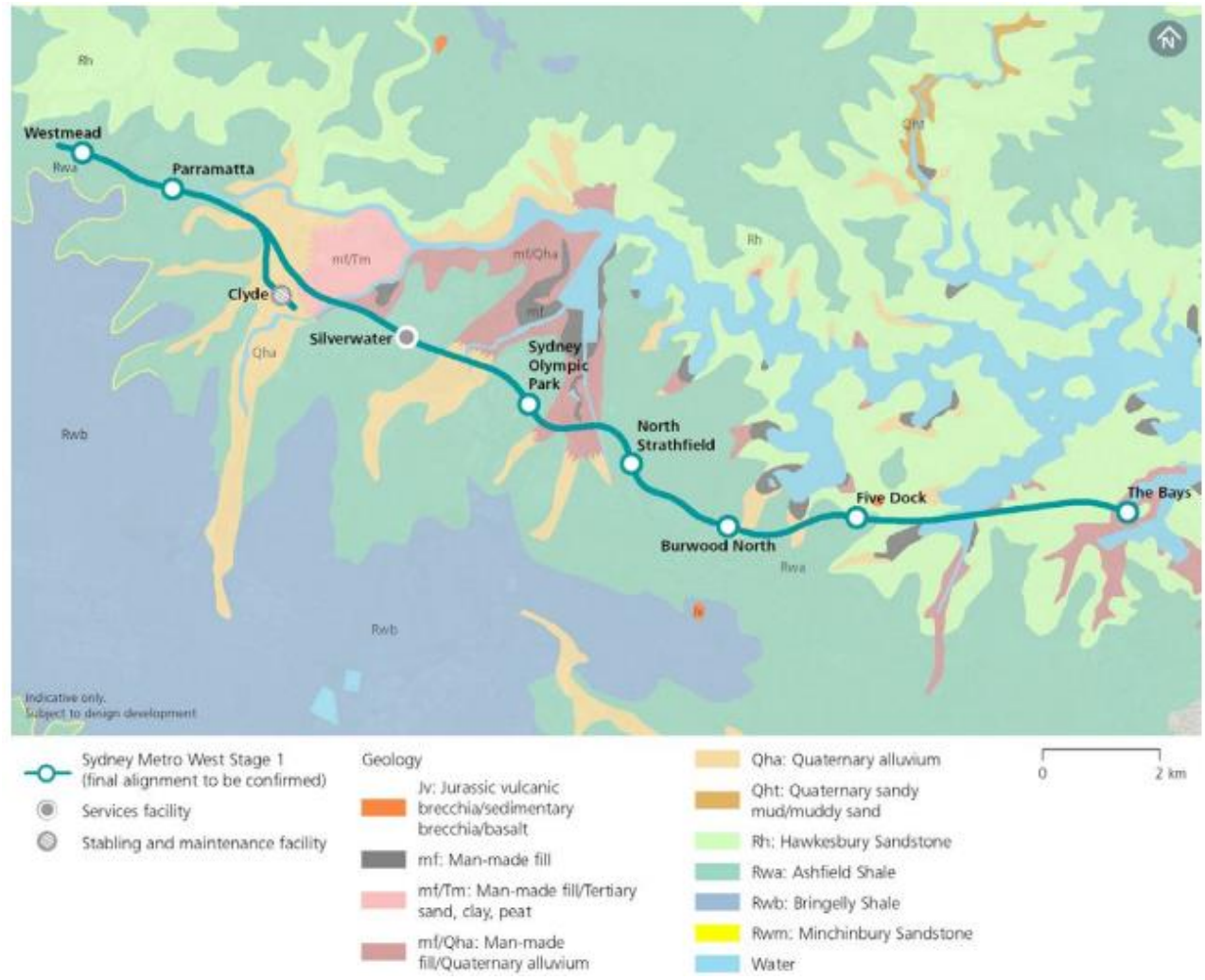

Figure 3: Regional geological context (EIS, 2020) (note – Silverwater has subsequently been removed from the scope)

5.3 Salinity

Soil salinity refers to the movement and concentration of salt in soils as a result of weathering rock materials, historic inland seas and deposition of salt from the ocean onto land by wind or rain. Saline soils can degrade ecosystems and habitats and reduce the productive agricultural capacity of land (Agriculture Victoria, 2017). The NSW Soil and Land Information System and the Salinity Hazard Report for Catchment Action Plan upgrade – Sydney Metropolitan Catchment Management Area (Winkler et al, 2012) were reviewed to identify the probability for saline soils to be present within the Sydney Metro West footprint.

There is a paucity of electrical conductivity data across the alignment at this stage. A small number of samples have been collected from the Clyde MSF and reported low concentrations of EC indicating low salinity levels. Further investigation is proposed and described in Section 7.3.6.

Table 5.3 shows the probability of saline soils within the Sydney Metro West alignment.

Table 5.3: Probability of saline soils within the Sydney Metro West alignment

Location	Probability for saline soils
Between Westmead metro station and Parramatta metro station sites	• High
Between Parramatta metro station and Burwood North Station sites	• Very High

5.4 Acid Sulfate Soils

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

Acid sulfate soils risk maps from the former NSW Office of Environment and Heritage (now part of NSW DPE) were reviewed to assess the probability of acid sulfate soils being present in proximity of the Project.

Areas around the Parramatta River and Rosehill are identified as “disturbed terrain”. These areas are often located on reclaimed land, within dredged/mined areas, or on fill and/or alluvium and are often associated with the potential presence of acid sulfate soils. Based on this information, there is potential to encounter acid sulfate soils at the Clyde MSF, and Parramatta Metro Station construction sites.

Figure 4 shows the acid sulfate soil classification risk for Sydney Metro West.

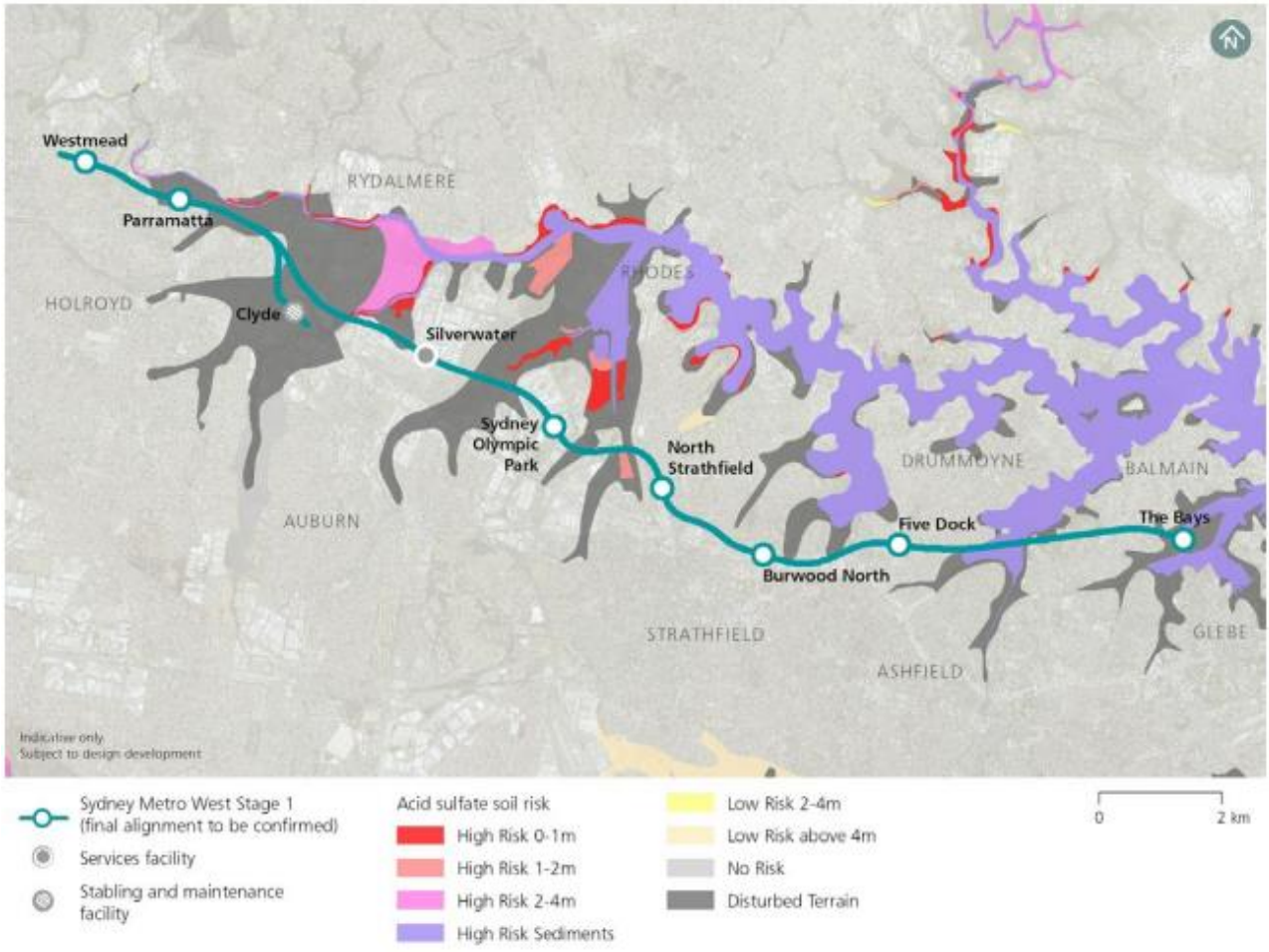

Figure 4: Acid sulfate soil classification risk for Sydney Metro West (EIS, 2020) (note – Silverwater has subsequently been removed from the scope)

5.5 Contamination

The EIS has identified potential to encounter contaminated land throughout the alignment of the Project. There is the potential to encounter land impacted by historical contaminating activities of varying nature. The construction sites all lie within historic and/or current commercial/industrial activities.

Key sites with the potential for contamination to exist, and require assessment include the following:

- Westmead metro station construction site
- Parramatta metro station construction
- Clyde MSF construction site.
- Sydney Olympic Park tunnel alignment

Historical activities that may have contaminated land across these sites are varied and include the following:

- Leaks and spills from fuel storage infrastructure (hydrocarbons and heavy metals)
- Processing of heavy end hydrocarbons, heavy metals and metalloids

- Land reclamation and other uncontrolled fill material (metals, hydrocarbons, pesticides, polychlorinated biphenyls [PCBs] and asbestos)
- Demolition of buildings that may contain hazardous materials such as asbestos
- Former and current industrial land uses including storage and uncontrolled landfilling (that may contain contaminants such as hydrocarbons, heavy metals and metalloids, solvents, phenolics, pesticides, heavy metals and metalloids and asbestos in soil)
- Existing or former railways and associated activities (that may contain contaminants such as metals, hydrocarbons, pesticides, nutrients, phenols, carbamates, pesticides, herbicides and asbestos in soils).

The number of areas of environmental interests (AEIs) requiring further review or assessment (moderate to very high contaminant risk) are tabulated below. It is noted that works related to power supply to each of the listed sites (shallow excavations) are listed as “moderate” also and require additional review and potential assessment. These are not listed as AEIs. Table 5.4 provides a summary of AEIs.

Table 5.4: Summary of AEIs

Location	Number of AEIs	Number of AEIs - moderate to very high contaminant risk	Potential contaminant risk
Westmead metro station construction site	5	4	Soil and groundwater
Parramatta metro station construction	4	4	Soil, groundwater and vapour
Clyde MSF construction site	12	10	Soil, groundwater and vapour
Sydney Olympic Park	9	9	Soil, groundwater and vapour

Contaminants of concern for the Project generally include the following:

- Hydrocarbons
- Heavy metals
- Pesticides
- Herbicides
- PCB
- PFAS.
- VOC
- Asbestos

Other contaminants of concern will be outlined in the site specific Sampling and Analysis Quality Plans (SAQP) and Detailed Site Investigations (DSI).

5.6 Groundwater

The project is located within the Cumberland Basin, forming part of the Sydney Basin, which is the southernmost part of the Sydney-Bowen Basin, a major structural basin which extends from Durras Lake near Batemans Bay to central Coastal Queensland.

The depth to groundwater is generally shallow across the construction sites for the Project. It ranges from between 1 metre below ground surface (mbgs) to 6 mbgs at most locations, and up to 12 mbgs at SOP.

It is noted that the proposed tunnel alignment travels below known landfills on the western edge of SOPA land. At this location the tunnel is 25 m below ground surface. It is noted that should leachate be intercepted it will require management in accordance with NSW EPA regulations. GLC notes that groundwater from tunnelling in this area will be pumped back to the water treatment plant at Rosehill Services Facility.

Groundwater aspects and impacts as well as management strategies are documented within the Groundwater Management Plan (GWMP) and Groundwater Monitoring Program (GWMoP).

If suspected or encountered, potential groundwater contamination will be notified to the Site Auditor and the environmental consultant to ensure appropriate inclusion in the Contaminated Site Audit.

5.7 Surface Water

5.7.1 Catchment

The four construction sites for the Project lie within the upper estuary of the Parramatta River Catchment, as well as Homebush Bay, both of which are a tributary of Sydney Harbour. The catchment is highly urbanised and altered from its natural state. There are some areas of open space and parkland which with pockets of open spaces and parkland which influence the water quality and quantity and speed of flows within the catchment. The catchment is estuarine downstream of the Charles Street Weir, adjacent to the business district of Parramatta. Upstream of the weir, it is a freshwater environment where there are no tidal effects. The catchment is relatively flat, ranging from sea level in the east to 140 mAHD in the north-west.

The four construction sites drain into the receiving sub-catchments of Parramatta River and Homebush Bay respectively. The watercourses relevant to the Project are listed in Table 5.5 and shown on Figure 5. These watercourses have generally been lined with concrete and channelised.

Table 5.5: Relevant watercourses

Construction Site	Watercourse	Receiving waters
Westmead metro station	Domain Creek	Parramatta River
Parramatta metro station	Paramatta River Clay Cliff Creek	Parramatta River
Clyde MSF	Duck River Duck Creek A'Becketts Creek	Parramatta River
Sydney Olympic Park	Haslams Creek	Homebush Bay

Figure 5: Relevant watercourses (note – Silverwater has subsequently been removed from the scope)

5.7.2 Water Quality

Table 5.6 shows the environmental values assigned to the watercourses relevant to the Project. These are taken from the NSW Water Quality and River Flow Objectives (NSW DECCW, 2006) for the Sydney Harbour and Parramatta River regional catchment. Note, that water quality and river flow objectives have not been assigned (by NSW DECCW) to A'Becketts Creek and Duck Creek.

Table 5.6: Environmental values assigned to watercourses

Watercourses and/or waterways	Environmental value				
	Aquatic ecosystems	Visual amenity	Primary contact recreation	Secondary contact recreation	Aquatic foods (cooked)
Domain Creek	X	X			
Parramatta River and Sydney Harbour	X	X	X	X	X
Clay Cliff Creek	X	X		X	
Duck River	X	X		X	

Watercourses and/or waterways	Environmental value				
	Aquatic ecosystems	Visual amenity	Primary contact recreation	Secondary contact recreation	Aquatic foods (cooked)
Haslams Creek	X	X		X	

The watercourses listed above have been affected by polluting activities and are generally in poor condition. They are influenced by current and historic polluting activities, stormwater and sewage overflows and leachate from adjacent contaminated sites or in some areas reclaimed land. Illegal dumping may also be affecting the water quality in some systems. The water quality of each watercourse as assessed against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000; Australian and New Zealand Governments and Australian state and territory governments, 2018) is summarised in Table 5.7. The data has been sourced from City of Parramatta, Sydney Water, Cumberland City Council and the WestConnex M4 East project.

Table 5.7: Water quality characteristics

Watercourse	Water quality characteristics relevant to ANZECC/ARMCANZ (2000) indicators
Domain Creek	Low dissolved oxygen levels Elevated nutrient concentrations
Paramatta River (Johnsons Bridge/Cumberland Hospital)	Elevated contaminant concentrations Elevated nutrient concentrations High turbidity
Clay Cliff Creek	No existing data
Duck River	High turbidity Low dissolved oxygen levels Elevated nutrient concentrations
Duck Creek / A'Becketts Creek	Elevated concentrations of faecal coliforms Elevated nutrient concentrations
Haslams Creek	Elevated nutrient concentrations Elevated concentrations of faecal coliforms

5.7.3 Sensitive Receiving Environment

A sensitive receiving environment is an environment that has high conservation or community value, or that supports ecosystem or human uses of water, and that is particularly sensitive to pollution or degradation of water quality. Within the Project area, four of the watercourses listed have been identified as sensitive receiving environments due to their proximity to SEPP Coastal Wetlands and their mapping by DPE as Key Fish Habitat. These are listed in Table 5.8.

Table 5.8: Sensitive receiving environments

Watercourse	Reason for classification
Paramatta River / Sydney Harbour	Type 1 Key Fish Habitat Numerous SEPP Coastal Wetlands

Watercourse	Reason for classification
	Potential habitat for threatened aquatic species and protected aquatic vegetation
Duck River	Type 1 Key Fish Habitat SEPP Coastal Wetlands within 500 metres
Duck Creek	Type 1 Key Fish Habitat SEPP Coastal Wetlands within 500 metres
Haslams Creek	Type 1 Key Fish Habitat SEPP Coastal Wetlands within 500 metres

5.8 Climate

Climate statistics from the Bureau of Meteorology for site number 066124(Parramatta North) and 066195 (Sydney Olympic Park) since 1965 and 1995 respectively, are provided in Table 5.9 below.

Table 5.9: Climate statistics from Parramatta North (PAR) and Sydney Olympic Park (SOP) weather station.

Statistic		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Max Temp (C)	PAR	28.6	27.9	26.3	23.9	20.6	17.8	17.5	19.1	21.8	24.1	25.6	27.6
	SOP	28.4	28.1	26.6	23.9	20.8	18.3	17.6	19.5	22.5	24.3	25.3	27.4
Mean Min Temp (C)	PAR	17.7	17.6	15.9	12.8	9.9	7.5	6.3	7.1	9.3	12.0	14.1	16.3
	SOP	19.3	19.4	17.8	14.3	11.2	8.9	7.8	8.7	11.6	13.7	15.8	17.9
Mean Rainfall (mm)	PAR	100.7	126.2	117.0	87.1	66.5	90.9	45.6	55.9	49.6	68.5	84.4	72.8
	SOP	84.4	109.8	66.0	89.2	88.2	75.8	63.5	56.7	52.7	64.9	76.2	58.0
Mean days >1mm rainfall	PAR	8.9	9.2	9.9	7.0	6.8	7.6	5.4	5.2	5.8	7.5	8.7	7.7
	SOP	7.6	7.7	7.6	6.9	7.7	6.9	6.3	4.4	5.5	7.1	7.8	6.8

Parramatta and Sydney Olympic Park have a temperate climate (Köppen climate classification: Cfa) with mild to cool, short winters and warm, sometimes hot, prolonged summers, and moderate rainfall spread throughout the year. Parramatta and Sydney Olympic Park are warmer than Sydney CBD in the summer due to the urban heat island effect and their inland location.

Summer maximum temperatures are quite variable, often reaching above 35°C, on average 13.1 days in the summer season, and sometimes remaining in the low 20s, especially after a cold front or a sea breeze, such as the southerly buster. Northwesterlies can occasionally bring hot winds from the desert that can raise temperatures higher than 40°C mostly from November to February, and sometimes above 44 °C in January and early February during severe heatwaves.

5.9 Flooding

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

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

Table 5.10 summarises the existing flood behaviour for the Project construction sites as described in the EIS.

Table 5.10: Existing flood behaviour for Project construction sites

Project Construction Site	Existing Flood Behaviour
Westmead metro station	• The construction site and immediate surrounds are outside of flooding extents, flood hazard, floodway and flood storage areas in the one per cent AEP event and probable maximum flood (PMF) event • There are no overland flooding, mainstream flooding or Coastal inundation risks relevant to the construction site and immediate surrounds.
Parramatta metro station	• The construction site and immediate site surrounds are affected by overland flooding and mainstream flooding, with flood depths of about 0.15 metres in the one per cent AEP event and about one metre in the PMF event • The construction site and immediate surrounds are outside of high flood hazard, floodway and flood storage areas • There are no Coastal inundation risks relevant to the construction site and immediate surrounds.
Clyde MSF	• The construction site and immediate surrounds are affected by overland flooding and mainstream flooding. About one quarter of the site is flood-affected in the one per cent AEP event to depths of up to 2.4 metres. Most of the site is flood-affected in the PMF event to depths of about four metres • The construction site and immediate surrounds contain areas of high flood hazard, but is expected to be outside floodway and flood storage areas based on the terrain and flood behaviour • There are no Coastal inundation risks relevant to the construction site and immediate surrounds
Sydney Olympic Park	• One per cent AEP and PMF flood depths, flood hazards, floodway and flood storage areas for the construction site and immediate surrounds could not be determined from the available flood studies and reporting. The construction site appears to be outside the nearest floodplain and is expected to be outside of high hazard, floodway and flood storage areas. • There are no overland flooding, mainstream flooding or coastal inundation risks relevant to the construction site and immediate surrounds.

6 ENVIRONMENTAL ASPECTS AND IMPACTS

6.1 Construction Activities

The Project involves a range of construction activities incorporating various heavy machinery, plant and equipment that operate in several locations. The construction sites of the Project are highly urbanised with formalised kerbs and stormwater drains and systems. To assess the level of potential impact on soil and water, the broad categories of construction activity likely to have an impact are identified below and have been further documented in Attachment 4 of the CEMP (environmental risk assessment).

A summary of tasks where there are potential soil and water impacts is provided below and summarised in Table 6.1.

- Site establishment
  - Installation of environmental controls (temporary fencing/ hoardings etc.)
  - Site clearing including the removal of vegetation
  - Site drainage controls
- Earthworks including station and box excavation
- Spoil management (stockpiling, management, haulage between WTP sites, and removal)
- Minor utility works and connections
- Civil works
- Tunnelling:
  - Main alignment boring
  - Tunnel decline/shaft excavation
- Tunnel supporting activities:
  - Workshop, deliveries, maintenance, and storage
  - Spoil handling (including on-site truck movements)
  - Establishment and operation of water treatment plants
  - General worksite and on-site car parking
  - Construction of acoustic sheds and other mitigation measures
- Road header works and support
- Water treatment and discharge
- Chemical storage and refuelling activities
- Instream structures and crossings including stream diversion works.

Table 6.1: Construction activities at nominated construction sites

Site	Site Establishment	TBM launch and retrieval	TBM Support	Road header works and support	Spoil management and removal	Earthworks	Utility works	Civil works	Instream structures Creek crossings	Chemical storage and refuelling	Water treatment and discharge
Westmead Metro Station	●	●		●	●	●					●
Parramatta Metro Station	●				●	●					●
Clyde MSF	●	●	●		●	●	●	●	●	●	●
Sydney Olympic Park Station	●	●			●	●					

6.2 Impacts

The potential for impacts on soil and water will depend on several factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Construction-related risks associated with climate change such as more frequent extreme rainfall events, extreme heat and wind conditions and increased bushfire risks may also exacerbate the below impacts.

Potential impacts to soil and water quality from construction are summarised in Table 6.2.

Table 6.2: Summary of potential construction soil and surface water quality impacts

Aspect	Potential Impacts
Demolition of infrastructure	• Requirement to manage potential hazardous building materials during any demolition works – noting there will be significant demolition works at the Clyde MSF
Continuing site establishment including setting up long term facilities, and trenching to facilitate utility adjustments	• Potential for dust or sediment from construction materials to be blown offsite, impacting neighbours • Erosion of the natural ground surface and subsurface through vegetation removal and structures requiring demolition • Transportation of soils, spoil, construction products (such as sand and aggregates) into surface water runoff and surrounding watercourses
Material storage including chemicals storage	• Potential leak or spill of petroleum hydrocarbons from refuelling and hydraulic hose bursts causing land and water contamination • Potential leaks and spills from water treatment chemicals used in the construction water treatment plants (the design for these plants is ongoing, hence the list of chemicals is not finalised yet)
Operation and management of site and heavy vehicles	• Potential leak or spill causing land and water contamination caused by the release of hydrocarbons • Potential for tracking of sediment onto public roads, leading to traffic safety issues and pollution of stormwater systems and receiving waters
Tunnelling	• Potential for flooding into tunnel portals • Potential for the quality of groundwater flowing into tunnels to be impacted
Drilling works	• Potential for soil and sediment transport from cuttings and dust • Erosion due to temporary exposure around drilling locations from environmental conditions (wind/rain)
Concreting and grouting	• Potential for water quality impacts on surface and groundwater from concreting and grouting • Potential for spills of excess or waste concrete • Potential for waste concrete to be discharged into stormwater systems • Concrete spillage and runoff from washout areas
Material/spoil stockpiling, loading and haulage (Including between sites)	• Mud tracking from site onto shared public roads • Sediment tracking onto roads • Stockpiled soils migrating offsite • Migration of sediment into nearby stormwater system and/or waterways
Handling of contaminated soil, surface water and/or groundwater	• Potential for cross contamination during excavation, stockpiling, or during the mobilisation of contaminant laden sediment • Potential for mixing of stormwater and groundwater (possibly contaminated)

Aspect	Potential Impacts
Operation of water treatment plants	• Water treatment plant failure leading to uncontrolled discharge or discharge into nearby stormwater system and/or waterways
Discharge of water detained onsite following heavy rainfall / localised flooding	• Potential for polluted water to be discharged offsite
Exposure of potential acid sulfate soils (ASS)	• Potential exposure of acid sulfate soils could release acid sulfates into the local environment or cause acidic runoff that would damage aquatic environments • ASS may cause damage to structures
In stream works including structures, crossing and diversion works	• Potential to introduce additional sediment load to streams during works within and adjacent to A'Becketts and Duck Creek • Potential for works adjacent to and within streams to introduce further erosion and sediment risks

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT MEASURES

Measures to manage soil and surface water quality impacts and reduce the risk of impact to sensitive receivers will be implemented throughout construction of the Project.

7.1 Standard Mitigation and Management Measures

The following sub-sections in Section 7 outline the management measures that will be implemented to address soil and surface water quality risks. As a minimum, the following will be incorporated at each construction site and documented in the Environmental Control Maps (ECMs) in Attachment 8 of the CEMP.

Specific measures and requirements to meet the objectives of this SWMP and to address impacts on soil and water are outlined in Table 7.1. These measures have been developed in line with the requirements in the EIS and those listed in Section 8 of the CEMP. As a minimum the following will be incorporated at each construction site and documented on the environmental control map, as applicable:

- Clean water diversions around disturbed site areas, stockpiles, and contaminated areas.
- Erosion and sediment control measures will be installed downstream of works, stockpiles, and other disturbed areas.
- Exposed surfaces will be minimised, and stabilised / revegetated as soon as feasible and reasonable upon completion of construction.
- Dangerous goods and hazardous materials will be stored within bunded areas with a capacity of 110 per cent of the maximum single stored volume.
- Chemicals will be stored and handled in accordance with relevant Australian standards.
- Known or potential areas of contamination
- Spill kits will be provided at the pre-cast yard, storage areas and main work sites in locations associated with chemical use

Table 7.1: Environmental Control Measures

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
1.	Environmental incidents where material harm to the environment is caused or threatened will be managed in accordance with Section 12 of the CEMP. These procedures include the initial actions required to be undertaken to avoid or minimise environmental harm and notify relevant Project personnel.	Construction	SEA/EA	• CEMF • CEMP Section 12
2.	Except as may be provided by an EPL, the Project shall be constructed and operated to comply with Section 120 of the POEO Act, which prohibits the pollution of waters.	Construction	SEA/EA	• POEO Act
3.	Training will be provided to relevant staff and subcontractors on sound erosion and sediment control practices and the requirements from this Plan through inductions, toolboxes, or general training. Specific targeted training for constructions teams involved in the management of soil and water will be provided before the commencement of construction. If key documentation is updated during the project, the training materials will be updated, and refresher sessions provided. Further details on training are provided in Section 8.2.	Prior to and during construction	SEA/EA	• CEMP • CEMF
4.	Preparation of ESCP's for each site in accordance with Volume 2D of Managing Urban Stormwater: Soils and Construction (Landcom, 2004). These plans will be updated as required as the work progresses, and the sites change.	Prior to and during Construction	SEA/EA	• Landcom 2004 • CEMF • MCoA D116 • REMM SSWQ3
5.	The Water Treatment Plant for tunnel water discharge will be designed so that the water will be of suitable quality for discharge to the receiving environment in compliance with the discharge criteria, the Project EPL, and the POEO Act.	Design	Project Engineers	• MCoA D118 • REMM SSWQ5

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
6.	All erosion and sediment controls will be installed in accordance with the ECM and the Blue Book. This may include (but not limited to): • Geotextile linings, soil binders, tarps or similar will be used to provide temporary surface protection were appropriate • Designing and constructing diversion banks upslope of areas to be disturbed, where practical, to direct clean water runoff away from disturbed areas and allow clean surface water to return to natural watercourses • Locating stockpiles away from traffic areas and watercourses • Disturbed ground and exposed soils will be temporarily stabilised during periods of site inactivity, for more than ten days, to minimise the potential for erosion • Key management structures such as sediment traps and clean water diversions will be installed as interim measures to assist in effective site management before more permanent controls are installed • Level or gently sloping areas will be selected as stockpile sites to minimise erosion and potential soil loss where possible • Staging of works where possible, when working adjacent to and within particularly sensitive areas (i.e A'Becketts and Duck creek) The specific management and mitigation measures will be defined as the construction layouts are completed and the ECMs are developed. This will also be done in accordance with	Prior to and during Construction	SEA/EA	• REMM SSWQ3 • Landcom 2004 • CEMF • MCoA D116

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
	the management and mitigation measures provided in the Spoil Management Plan.			
7.	Works will be designed and programmed to minimise the extent and duration of disturbance to vegetation	Prior to and during construction	Project Engineers	• MCoA D2
8.	Minimise the extent of ground disturbance and exposed soil where practical to minimise the potential for erosion	Construction	SS	• Best practice
9.	Measures will be implemented to minimise dust, soil or mud from being deposited by vehicles on public roads. This includes: • Site access and egress points to be fitted with wheel wash facilities and rumble grids to prevent tracking of sediment off site • Streetsweepers to be used to manage residual sediment tracking • Cleaning of hardstand areas as soon as practically possible • Washing/sweeping/cleaning of tyres by any other means necessary as required • Maintaining cleanliness of internal haul routes, particularly access/egress points to mitigate mud tracking The same mitigation measures apply in full for trucks transporting material between the different sites of the WTP Project.	Construction	SS	• CEMF • MCoA D1
10.	Before commencement of any construction that would result in the disturbance of moderate to high-risk contaminated sites, investigation and management in accordance with the requirements of guidance endorsed under section 105 of the	Construction	SEA/EA	• MCoA D71 • MCoA D72

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
	CLM Act will be completed. This may require further investigations in areas of potential contamination identified in the Project footprint. If contamination posing a risk to human or ecological receptors is identified, a Remediation Action Plan (RAP) will be prepared. The location of contaminated areas will be documented in the contaminated land register and conveyed to workers prior to working in these areas. If there are specific HSE risks these will be managed by the Health and Safety, and or Environment Manager and appropriate controls put in place. The contaminated land management process is detailed in Section 7.3.			
11.	An Unexpected Contaminated Land and Asbestos Finds procedure has been developed and is to be implemented throughout construction. This is included in Attachment 4.	Prior to and during construction	SEA/EA	• MCoA D77 • MCoA D78
12.	Spoil stockpiles will be managed to reduce potential impacts associated with dust generation, erosion and sedimentation including by battering slopes or wetting to keep moist. Stockpiles will also be managed to separate clean and contaminated spoil. Stockpile management will include identification measures such as signage detailing information such as source and classification. Further detail concerning contaminated stockpile management are detailed within the Spoil Management Plan.	Construction	SS/SEA/EA	• REMM AQ1
13.	Hydrocarbon spill kits must be kept onsite, and all staff inducted in their use. Used spill kits will be replaced as soon as practical.	Construction	SS	• CEMF
14.	Storage of chemicals on site will occur in accordance with suppliers' instructions and relevant Australian Standards and legislation including the:	Construction	SS	• Best Practice

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
	• *Work Health and Safety Act 2011* (NSW) • Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005) • Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, 2011) • AS 1940-2004 The storage and handling of flammable and combustible liquids • AS/NZS 4452:1997 The storage and handling of toxic substances • AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods • AS/NZS 1547:2012 On-site domestic wastewater management • Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (EPA 1997).			
15.	All chemicals stored on site must be securely sealed and bunded to 110% of their capacity. Incompatible chemicals will be stored separately in accordance with manufactures specifications and compatibility chart.	Construction	SS	• Best Practice
16.	Ensure all chemicals are clearly labelled. Clean and reattach labels as necessary and ensure any pipe work or plant that contains hazardous chemicals is identified through a label, sign or other measure.	Construction	SS	• Best Practice
17.	An up-to-date register of hazardous chemicals and dangerous goods will be kept onsite at all times	Construction	SEA/EA	• Best Practice

ID	Mitigation and Management Measure and Project site requirements	Timing	Responsibility	Reference
SEA – Senior Environmental Advisor, EA – Environmental Advisor, CM – Construction Manager, SS – Site Supervisor				
18.	The refuelling of plant and maintenance of machinery will be undertaken in designated bunded areas where possible, and generally away from sensitive receiving environments (i.e streams). Refuelling will be attended at all times.	Construction	SS	• Best Practice
19.	A Water Reuse Strategy will be prepared prior to the commencement of construction.	Prior to Construction	SEA/EA	• MCoA D79
20.	Suitable areas will be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Suitable areas will be hardstand or lined areas that are appropriately stabilised and bunded, with sufficient area for stockpile storage.	Prior to and during construction	SS	• Best practice
21.	Vehicles will be properly maintained to minimise the risk of fuel/oil leaks and routine inspections of construction equipment will be undertaken to identify any fuel/oil leaks and repairs made as required. Plant will be inspected prior to arriving on site to ensure it is fit for operation. Daily pre-start plant checks will be undertaken to check for oil, fuel or other liquids leaks.	Construction	SS	• Best Practice
22.	All spills or leakages will be immediately contained and absorbed.	Construction	SS	• Best Practice
23.	Identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks	Design	Project Engineers	• REMM HF1 • REMM HF3 • REMM HF6 • MCoA D10
24.	The rainfall forecast will be monitored to identify and communicate the risk of potentially flooding rains	Construction	SEA/EA	• Best Practice

7.2 Erosion and Sediment Control Plans

Erosion and sediment control measures will be guided by the Erosion and Sediment Control Plan (ESCP) procedure in Attachment 3, which has been developed in accordance with the requirements of Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) and Managing Urban Stormwater: Soils and Construction Volume 2A and 2D (DECC 2008) (the "Blue Book').

In accordance with the ESCP procedure (Attachment 3), an ESCP will be developed and implemented prior to the commencement of construction at each construction site. Depending on the size and complexity of each construction site, it may be necessary to develop ESCPs for sub-areas. These will be developed as a Hold Point prior to the commencement of intrusive activities/ground disturbance.

Progressive Erosion and Sediment Control Plans would be developed, whereby they are gradually updated to reflect the changing construction progress and site conditions. The application of best practice erosion and sediment control will be based upon the appropriate integration of three groups of control measures:

- Drainage control measures
- Erosion control measures
- Sediment control measures.

A typical ESCP will be drafted in reference to the Erosion and Sediment Control Procedure provided in Attachment 3.

7.2.1 Environmental Control Maps (ECMs)

To assist with design and construction planning and management, identified site constraints are consolidated on a series of map-based sheets for each Project construction site/work site called Environmental Control Maps (ECMs), as described in Section 8.4 of the CEMP. Each ECM will provide details specific to the site that they present, including but not limited to:

- site boundaries
- discharge points
- environmental controls, procedures and relevant environmental requirements

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

7.3 Contamination Management

7.3.1 Areas of Known Contamination

Per the information summarised in the EIS there are numerous AEIs across the three station construction sites and the Clyde MSF where a moderate to high risk of contamination has been identified.

Any contamination identified will require management in accordance with the MCoAs and also relevant guidance made or approved by the EPA under Section 105 of the CLM Act.

Per the requirements of the MCoAs and REMM's, GLC conducted detailed site investigations (DSI) at each of the sites, inclusive of an assessment of materials for waste classification purposes.

These works were completed prior to construction that would result in disturbance at a moderate to high-risk construction site, and the works will be documented in a SAQP. DSIs have occurred at the following construction sites:

- Westmead metro station construction site (1 DSI)
- Parramatta metro station construction (1 DSI)
- Clyde MSF construction site (8 DSI's).

It is noted that the Clyde MSF has been broken into a number of zones to allow assessment and sign off of different areas at different times. Each of these zones will be subject to the process defined below and assessed as individual sites. These zones have been approved between Sydney Metro and GLC and are generally based on site access dates, which differ across the Clyde MSF.

The Sydney Olympic Park site is currently being managed by the Central Tunnelling Package contractor, Acciona Ferrovial Joint Venture (AFJV). However, handover to GLC for the TBM retrieval and re-launching is proposed in late 2023, during which GLC will occupy part of the site. DSI's were conducted by AFJV given their extensive excavation scope and these results were issued to GLC for information. Given GLC's scope at SOP, namely the minimal excavation proposed within the tunnel portals which reside within VENM, WTP will not be undertaking further DSI's for the SOP construction site. But instead, will rely on the pre-existing DSI's conducted by AFJV to determine any imminent risk and actions concerning site contamination.

As well as the MCoAs, there are also specific SM requirements within the Project Deed. These are generally consistent with the MCoAs and do not change the intent or the process of contaminated land management described herein.

Following the completion of the DSIs, ECMs may be updated to outline the areas where contamination specific management would need to be implemented. These ECMs will be updated as the Project progresses, and based on the current risks.

In-situ waste classification will occur where practical and be completed to provide data, which will allow material to be excavated and transported offsite to an appropriate facility. However, some stockpiling of material will be required. Where possible GLC will minimise the opportunity for the mobilisation of soil through erosion or as airborne dust. The in-situ classification will also allow for strategic planning of excavation, storage, and transport minimising the risk of occupational health exposure, environmental harm and cross-contamination.

Any contaminated material that requires stockpiling will be managed in accordance with section 7.3.2 of the Spoil Management Plan

7.3.2 Contamination Management Process

MCoAs D71 through D75 clearly define a process for the management of areas of contamination. The process is consistent with the guidelines for the management of contaminated land in NSW. For all sites with potential or known contamination a DSI will be completed prior to site establishment. If the DSI assesses that the site poses an unacceptable risk to human health or the environment with regards to the intended land use, remediation may be required. It this is recommended, a Remediation Action Plan (RAP) will be developed to guide remedial activities and then reported in a validation report. The process is shown in Figure 6 and further discussed below.

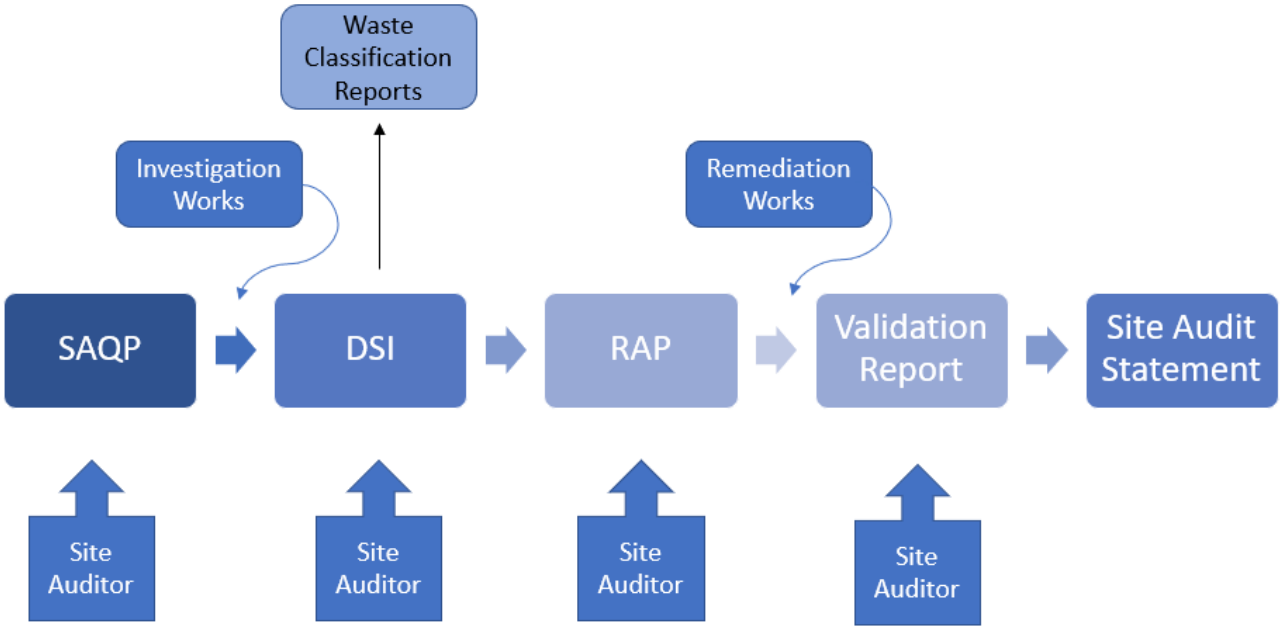

Figure 6: Contamination Management Process

The development of the SAQP will include a review of existing data. Where it is concluded that there is insufficient data or the data indicates a moderate, high or very high risk, a DSI will be required and the SAQP will inform this investigation.

Each RAP will include measures to remediate contamination at the site to ensure the site will be suitable for the proposed use once the RAP has been implemented. Remediation options in the RAP will consider effectiveness, durability, and maintenance and monitoring as well as value for money and program. The options will also consider the hierarchy for reuse noting the requirement to reuse all suitable material. The RAP will include at least one indicator from each of the sustainability dimensions – environmental, social and economic from the 'Framework for Assessing the Sustainability of Soil and Groundwater Remediation' (SuRF 2009), as described in Table 7.2.

Table 7.2: Sustainability indicators from the 'Framework for Assessing the Sustainability of Soil and Groundwater Remediation' (SuRF 2009)

Environmental	Social	Economic
1. Impacts on air (including climate change); 2. Impacts on soil; 3. Impacts on water; 4. Impacts on ecology; 5. Use of natural resources and generation of wastes; 6. Intrusiveness	1. Impacts on human health and safety; 2. Ethical and equity considerations; 3. Impacts on neighbourhoods or regions; 4. Community involvement and satisfaction; 5. Compliance with policy objectives and strategies; 6. Uncertainty and evidence.	7. Direct economic costs and benefits; 8. Indirect economic costs and benefits; 9. Employment and capital gain; 10. Gearing; 11. Life-span and 'project risks'; 12. Project flexibility

Contamination reports including the DSIs, RAPs and validation reports will be prepared, or reviewed and approved by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme.

To ensure contamination management activities, including fieldwork and reporting, are completed in accordance with relevant guidelines and legislation, a NSW accredited Site Auditor (Site Auditor) will be engaged to provide reviews of key documents. These include the following:

- Review of SAQP
- Review of DSI
- Review of the RAP and provision of a Section B Site Audit Statement
- Review of the validation report and provision of a Section A1 or Section A2 Site Audit Statement and accompanying Site Audit Report.

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

For locations outside the areas of concern such as at Sydney Olympic Park, the Unexpected Contaminated Land and Asbestos Finds Procedure will be implemented to manage the discovery of unanticipated contaminated materials, including asbestos. The Unexpected Finds Procedure is included in Attachment 4. This process will be implemented throughout construction.

7.3.3 Contamination Management Actions

Where contamination is known or expected, mitigation and management measures will be implemented to manage and prevent the spread of contamination within the construction sites. These measures will be site specific and where appropriate will be documented in ECMs for the individual sites. Mitigation and management measures will include the following:

- Establishment and maintenance of a Contamination Register and plans to list and identify contamination locations, proposed future land use, and track investigations and their findings
- Tracking of spoil both within and off site as detailed in the Spoil Management Plan
- Managing onsite stormwater runoff in accordance with TfNSW Technical Guideline EMS-TG-010: Stockpile Site Management and the Blue Book
- Stockpile management (e.g. siting/location, stockpile height, etc) as detailed in the Spoil Management Plan
- Establishing and maintaining erosion control and sediment capture measures
- Diversion of offsite stormwater
- Signage and exclusion zones
- Odour controls (if required).

The management of surface water is discussed in detail in sections below. However, the intent is to manage clean surface water (from rainfall events) separately from groundwater, whether contaminated or not. Surface water that falls directly into excavations and that may come into contact with contaminants of concern will be treated within the associated water treatment plant (depending on the construction site).

Where contamination is likely to be encountered, workers will wear appropriate Personal Protective Equipment (PPE). The PPE will depend on the contaminant type and the works to be undertaken. Appropriate PPE will be decided upon in consultation with an Occupational Hygienist. Workers will also participate in appropriate inductions and toolbox meetings prior to working in contaminated areas.

In accordance with MCoA D77, an Unexpected Contaminated Land and Asbestos Finds Procedure has been prepared for the commencement of construction and will be followed should unexpected, contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction. This is included as Attachment 4. The procedure will apply to unexpected finds or contamination identified outside the areas that are subject to the DSIs. Unexpected finds will be documented in a contaminated land register for the Project.

7.3.4 Waste Classification and Offsite Disposal

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

Section 3.1 of the Spoil Management Plan defines targets for reuse and recycling including specific targets for the following material classifications:

- Virgin excavated natural material (VENM) – targeting 100% reuse
- Soils without a resource recovery exemption and order - 100% that is permitted to be beneficially reused in accordance with Project Specifications, RAP, Legislation, and relevant Guidelines
- Potential or Actual Acid Sulphate Soils (PASS/ASS) - 100% that is permitted to be beneficially reused in accordance with Project Specifications, RAP, Legislation and relevant Guidelines.

Please refer to the Spoil Management Plan for details on soil reuse.

7.3.5 Acid Sulfate Soils

If acid sulfate soils (ASS) are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSM) (Acid Sulfate Soil Management Advisory Committee, 1998). The manual includes procedures for the investigation, handling, treatment and management of such soils. Prior to disturbance of areas with known potential for encountering ASS, testing of the soils is required and management in accordance with Section 7.3.1.

Excavation plans and the ASS mapping completed to date it have indicated that it is not likely that significant volumes of ASS will require management on the Project. In areas where a risk has been identified treatment will be applied before the material is managed in accordance with the Spoil Management Plan and Acid Sulfate Soil Work Method Statement (ASSWMS).

Potential ASS material will be assessed using the ASSWMS and ASSM (1998). This approach would be applied to any areas that have been identified as high or very high risk for PASS, or in the event of an unexpected encounter with ASS. Similarly, treatment of any uncovered ASS will be occur in accordance with the ASSM (1998) as well as the ASSWMS. It is noted the reuse of ASS material is detailed in the Spoil Management Plan and ASSWMS. Generally, ASS material (solids and potential leachate) will be treated using a neutralisation process.

There is a risk of odour emissions during excavation of ASS materials. The following measures may be implemented to manage this risk. It is noted these should be read in conjunction with the requirements of the Spoil Management Plan and ASSWMS.

- Administrative controls
  - Notification to community if the location of the ASS material is likely to affect sensitive receptors
  - Where ASS material is encountered, the Unexpected Contaminated Land and Asbestos Finds Procedure to be implemented
- Engineering controls
  - If disposal of untreated ASS material is taking place, work to be programmed to ensure ASS material is removed promptly
  - If treatment to occur, it is to be completed promptly
  - ASS material to be covered where practicable
- Elimination controls
  - Avoid excavating ASS material where possible
  - Consider location of stockpile treatment area and where practicable relocate stockpile area to an area away from sensitive receivers.

Where odour is detected at the site boundary either through an inspection and/or complaint, the following actions will be undertaken:

- Implementation of management measures are to be reviewed to determine if the measure have been implemented correctly
- Where all management measures have been correctly implemented, harder engineering and elimination controls to be investigated. For example, avoiding excavation of ASS material, relocation of stockpile area, removal of ASS material from site, deodorisers etc.

For further information, refer to the ASSWMS.

7.3.6 Salinity

As detailed within EIS Chapter 19, Soil salinity refers to the movement and concentration of salt in soils because of weathering rock materials, historic inland seas and deposition of salt from the ocean onto land by wind or rain. Saline soils can degrade ecosystems and habitats and reduce the productive agricultural capacity of land. The probability of encountering saline soils within the project footprint are detailed within Section 5.3 of this SWMP.

Saline soils are assumed to be present throughout the Project, from Westmead through to Clyde. Saline intrusion monitoring will be undertaken across the Project in line with the Groundwater Monitoring Program (GWP). Saline intrusion in groundwater is being monitored through salinity loggers which have been installed since January 2023. These monitors allow for the continuous monitoring of conductivity, temperature, and depth (CTD loggers). GLC will continue to monitor saline intrusion over the course of its works in accordance with its GWP.

Soil salinity testing within Clyde MSF was undertaken across five distinct zones on the site between June 2022 and September 2022, confirming the presence of saline. Monitoring proposed in the GWP will allow GLC to identify any risks or impacts associated with changes to soil salinity, with Mitigation Measures as detailed in Table 7.1 of this plan being utilised as required, in accordance with Book 4: Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008).

7.3.7 Water Storage and Reuse

Water management addressed within this SWMP will focus on surface water collected within the construction site footprint (with the exception of the station boxes). Water generated from construction activities including the operation of the TBMs and road headers, stormwater collected within the station boxes, and other process water are assessed separately within the Groundwater Management Plan. This is due to the majority of these flows coming from groundwater sources/underground processes.

Where practicable, any water collected in excavations / work sites will be reused within the construction site (e.g., dust suppression, watering retained vegetation, re-use in wheel washes and/or wheel baths). In-line with the CEMF, reuse onsite will further support the following water resource management objectives:

- Minimise demand for, and use of potable water
- Maximise opportunities for water re-use of rainwater, captured stormwater, wastewater and groundwater.

Attachment 5 contains the Project Construction Site Water Reuse and Dewatering Procedure to be implemented.

Where water is collected in detentions basins, holding tanks and/ or excavations, this will be tested and treated in accordance with the EPL and Project Discharge process, as detailed in Section 7.5 and Attachment 5. Sediment basins proposed for the Project, however their design and associated controls should would be confirmed during detailed design and would generally be in compliance with the requirements detailed in Attachment 3. In the context of SOP, surface water collected within the station box would initially be collected in storage tanks for treatment by Acciona Ferrovial Joint Venture's (AF JV) Water Treatment Plant (W.T.P), however this water would be diverted to Rosehill's W.T.P following GLC's TBM breakthrough in the first half of 2024.

It is not anticipated that odour will be an issue for stormwater that is collected from the surface of the sites. Generally, stormwater falling on hardstand will be diverted through the ERSED controls. ERSED plans will be developed by the Sites Environmental Representative and signed off by the Site Supervisor and Project Engineer. There will be limited opportunity for contact with materials that may result in odour. As detailed above, stormwater falling in excavations will be treated within one of the construction water treatment plants.

7.3.8 Concrete equipment will be washed down in designated lined or bunded areas. Waste products will be left to harden and then the solid material beneficially reused. Concrete washout water would be contained within the washout area and allowed to either evaporate or harden. In the event that capacity is reached, it would be removed by vacuum truck or pumped to an appropriately bunded container. This is in accordance with the Waste Management Plan.Water Reuse Strategy

Per the requirements of MCoA D79, Rev B of the Water Reuse Strategy (WRS) was finalised on 6 July 2022, prior to the start of construction which began on 19 July 2022. Rev C of the WRS was finalised on 13 December 2022 and has since been uploaded to the project website in accordance with MCoA D79. The study identified opportunities for the reuse of non-potable water and details the various quantities, types and sources of water generated during construction of the Project. The strategy aims to minimise the use of both potable and non-potable water.

The water reuse strategy considers the following activities:

- Operation of site facilities
- Dust control across each construction site
- Trenching and piling activities
- Subgrade treatments
- Establishment of landscaping
- Ongoing water demand for operation and maintenance

Examples of potential initiatives include the following:

- Smart metering – to track water discharge and reuse
- Water efficient controls, fixtures, and fittings (e.g., push button taps)
- Rainwater harvesting
- Reuse of non-potable water (e.g., treated groundwater and harvested rainwater) for activities such as dust suppression, landscaping, wheel washes, wheel baths, cleaning, laundering
- Water efficient construction methods and equipment
- Specifying recycled water be used within offsite concrete batching

The Water Reuse Strategy includes, but is not limited to:

a) evaluation of reuse options
b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required
c) measures to avoid misuse of recycled water as potable water
d) consideration of the public health risks from water recycling
e) time frame for the implementation of the preferred reuse option(s).

7.4 Water Quality and Discharge

In accordance with SSWQ3, water collected in detentions basins, holding tanks and/ or excavations will be appropriately treated prior to discharge to avoid potential contamination or local stormwater impacts. Primarily this will be treated through the water treatment plants prior to discharge. If the water is to be reused onsite for dust suppression or similar, the Permit to Discharge (GA-WTP-FRM-ENV) will also be utilised.

A permit will be raised for every discharge event and will monitor compliance with the criteria provided in the WTP EPL (21676). Water discharges to stormwater or waterways will comply with the requirements of the EPL and the POEO Act and requires written approval of the GLC Environmental Manager (or delegate) as part of the Discharge Permit process. Water will only be discharged to licensed discharge points defined in the EPL, and the volumes of water discharged (to stormwater, waterways, or reused) monitored via meters on Water Treatment Plants.

Discharge criteria are detailed in Table 7.3 as extracted from the Projects EPL (No. 21676). Several discharge locations (referred to as Points in the EPL) are specified in the license, of which have specific discharge criteria. The Points as well as the discharge criteria are subject to change based on consultation with the EPA and amendments made to the Projects EPL. However, as of October 2023, these ‘Points’ are as follows:

- Point 1: Eastern Creek Pre-Cast Yard stormwater discharge point.
- Point 3: Discharge from the Westmead permanent Water Treatment Plant to Domain Creek

- Point 4: Discharge from the Rosehill permanent Water Treatment Plant to Duck River
- Point 5: Discharge from the Parramatta construction Water Treatment Plant to Parramatta River

Please refer to the EPA EPL Register for the most recent version of GLC's EPL (No. 21676).

Table 7.3: Criteria for Offsite Discharge of surface and ground Water

		Discharge/Monitoring point			
Parameter	Unit	Point 1	Point 3	Point 4	Point 5
Oil and grease	Visible?	No	No	No	No
pH	pH	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5
Total suspended solids	mg/L	<50 mg/L			
Turbidity	NTU		20		10
Ammonia	µg/L		200	910	15
Arsenic	µg/L		13		13
Cadmium	µg/L		0.2		0.7
Chromium (hexavalent)	µg/L		1.0	15	4.4
Chromium (trivalent)	µg/L		27		4.4
Cobalt	µg/L		1.4	5	1
Copper	µg/L		1.4	1.3	1.3
Electrical Conductivity	µS/cm		2200		
Iron	µg/L		300		300
Lead	µg/L		3.4		1
Manganese	µg/L		1900		1900
Mercury	µg/L		0.06		0.4
Nickel	µg/L		11		35
Nitrate + nitrite (oxidised nitrogen)	µg/L		200	1200	300
Nitrogen (total)	µg/L		350	1200	1200
Perfluoro octane sulphonate (PFOS)	µg/L		0.13	0.13	0.0001
Phosphorus (total)	µg/L		25	90	30
TPH C10-C36 Fraction	µg/L		100		100
TPH C6-C9	µg/L		100		100

		Discharge/Monitoring point			
Parameter	Unit	Point 1	Point 3	Point 4	Point 5
Fraction					
Zinc	µg/L		8	12	8

Discharge from the construction water treatment plants is managed in accordance with the Groundwater Monitoring Program. Similarly, groundwater intercepted during construction will be treated in the construction water treatment plants and is detailed within the Groundwater Management Plan. Specific requirements for treatment will be informed by groundwater data collected during the DSI program.

If surface water is captured that has been assessed as having a risk of being contaminated, the water will be captured and then diverted to the construction water treatment plants for treatment. It will then be treated and discharged in accordance with the Groundwater Management Plan and the Project EPL discharge criteria as detailed above.

The Surface Water Quality Monitoring Program was approved on 11 July 2022 by the Secretary and will monitor potential impacts on the receiving environment for the duration of construction. The results of the Surface Water Quality Monitoring Report will be submitted to the Planning Secretary, ER and relevant government agencies for information at a frequency described in the Surface Water Quality Monitoring Program.

The reuse of captured stormwater onsite will be undertaken in accordance with Attachment 5.

7.4.1 Water Pollution Impact Assessment

In accordance with MCoA D119 Water Pollution Impact Assessments were developed to inform licensing consistent with section 45 of the POEO Act. The assessments take into consideration the environmental values of the receiving waterway(s) to establish suitable discharge criteria to maintain the identified NSW Water Quality Objectives.

The Water Pollution Impact Assessment for each discharge point was prepared in consultation with the EPA and are consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk. Where new discharge Points are required, further Water Pollution Impact Assessment's may be prepared dependent on risk and location of the discharge point.

The Water Pollution Impact Assessments to date, have since been used to inform the Project EPL's (21676) specific discharge points and criteria, of which are presented in Section 7.4.

7.5 Instream structures

7.5.1 Work in Waterways

All work occurring in A 'Becketts Creek and Duck Creek at Clyde MSF will be in accordance with:

- 'Guide 10: Aquatic Habitats and Riparian Zones' presented in the "*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*" (NSW Transport, Roads & Traffic Authority (RTA), 2011)
- "*Technical Guideline: Temporary stormwater drainage for road construction*" (NSW Transport, Roads and Maritime, 2011)"

- "*Controlled Activities on Waterfront Land - Guidelines for riparian corridors on waterfront land*" (Department of Primary Industries Office of Water, 2012)

Where reasonably practical, GLC will:

- Undertake work in periods of predicted low flow to minimise impacts
- Reclaim existing creek bed material and reuse in the reconstruction or stabilisation of the creeks
- Progressively stabilise the disturbed creeks to avoid potential scouring and sedimentation
- Implement, as soon as practical, permanent stabilisation measures
- Where practical, plan work to avoid activities in aquatic habitats and riparian zones
- Identify and protect environmentally sensitive areas within or adjacent to the project site and exclude these from the work area. Guidance is available in "*Specification Guide NG36, Guide to QA Specification G36 Environmental Protection*" (NSW Transport for NSW, Ed 4, Rev 6)
- Where practical, minimise riparian vegetation removal, and limit works and access to the minimum amount of waterway bank length
- For as long as feasibly possible, retain stumps in riparian zones and aquatic habitats to minimise potential erosion of the creek bank. Removal of stumps will occur immediately prior to the commencement of earthworks in the riparian zone
- Activities such as decanting or refuelling of plant and equipment and chemical storage occur at least 50 m away from aquatic habitats, and or within designated re-fuelling zones.

7.5.2 Construction of Instream Structures

Construction of instream structures will occur at A'Becketts and Duck Creeks at Clyde MSF. These works are considered sensitive as work will occur in live flow lines and there is a high potential for sediment impacts. The design of these structures will be completed by a competent engineer from the design team and in accordance with relevant guidance documents listed in Section 7.5.1.

Progressive Erosion and Sediment Control Plans (PESCP) will be developed to detail the specific controls and methodologies that will be implemented to minimise the potential impacts to the flow line and water quality. The following example elements will be included in the PESCPs:

- Diversion of site runoff away from work areas
- Staging of proposed works to minimise disturbance
- Isolation of the work area from active flow lines
- Diversion of clean water around the site
- Extensive use of erosion and sediment controls
- Stabilisation and scour protection works to be completed as soon as practical.

7.6 Groundwater Management

Some groundwater seepage into excavations may occur and will be managed as detailed in the Groundwater Management Plan. Contaminated groundwater will be managed in accordance with the RAPs (where relevant), the Groundwater Management Plan and Groundwater Monitoring Program.

7.7 Flooding

7.7.1 Construction

Potential flooding during the construction phase will be considered by the design team in the temporary works design, with appropriate safeguards implemented during construction.

Of the four construction sites, Parramatta metro station and the Clyde MSF are at risk of flooding during the 1% AEP and possible significant flooding during the PMF. During the detailed design process, both Parramatta and Clyde construction sites were assessed for the residual risk of flooding following mitigation, and were later incorporated into the GLC Stormwater and Flooding Management Plan. The SFMP outlines the flood mitigation and management measures based on construction activities and flood risk that GLC will use to address potential stormwater and flooding impacts during the construction of the Project, while complying with relevant approvals, statutory and contract requirements. The SFMP also includes procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during construction.

7.7.2 Detailed design

Detailed design will be developed to meet the MCoA requirements of D10 and D11, in accordance with MCoA conditions:

- MCoA D10: All proposed mitigation measures must be reviewed and endorsed by a suitably qualified and experienced person in consultation with directly affected landowners, DPE Water, DPI Fisheries, DPE BCD, NSW State Emergency Service (SES), SOPA (in respect of Sydney Olympic Park), and Relevant Council(s). GLC will when consult with these stakeholders where flooding characteristics exceed levels specified in MCoA D11 (a-d) regarding the management of any residual flood risk beyond the 1 per cent AEP flood event and up to the probable maximum flood.

The Sydney Metro West Interface Manager will lead consultation with Councils and the NSW SES. Furthermore, interactions with State Departments will also involve the relevant Sydney Metro Lead.

8 COMPLIANCE MANAGEMENT

8.1 Roles and Responsibilities

The GLC Project Team's organisational structure and overall roles and responsibilities are outlined in the CEMP. Key roles with regard to the management of soil and water are identified in Table 8.1.

Table 8.1: Roles and Responsibilities

Roles	Authority and Responsibilities
Environment and Sustainability Lead (Or Manager)	• Develop and implement the SWMP • Oversee all required activities outlined in Section 7 and in accordance with this sub-plan • Oversee compliance tracking and reporting • Oversee the keeping of all environmental records • Engage suitably qualified consultants to support implementation • of this sub-plan • In consultation with the Project Director and Site Supervisor, • oversee the investigation and reporting of environmental • incidents • Regularly engage with the key stakeholders and other interface • contractors to achieve environmental alignment. • Responsible for management of system documents and for auditing site activities against this procedure
Senior Environmental Advisor	• Have a responsibility to comply with the requirements of this SWMP and to manage their works accordingly. • Personnel responsible for undertaking specific management actions as specified in Section 7.1. • Complete inspections and monitoring. • Complete reporting (refer to Section 8.3) • Prepare ECMs to outline the controls in this sub-plan relevant to each work activity • Respond to inquiries raised by the ER or Sydney Metro representatives • Attend inspections with the ER, Sydney Metro, or other stakeholders • Respond to environmental incidents and non-conformances
Environmental Advisor	• Delivery of toolbox / prestart presentation (or other specific training) to inform work crews of the controls documented in the ECMs • Perform regular on-site liaison and inspections • Provide environmental advice and assistance to construction personnel • Manage implementation of SWMP • Respond to environmental incidents and non-conformances

Roles	Authority and Responsibilities
	• Plan, manage and execute contaminated land strategy • Investigate the extent (horizontal and vertical) of soil salinity and ASS • Prepare site-specific action management plans for soil salinity or ASS that will be disturbed by the works
Soil Conservationist (Certified Professional in Erosion and Sediment Control)	• Provide specialist advice and input on an ad-hoc basis as instructed by GLC. • Specialists may include external consultants, or specialists within Gamuda. • Duties would typically include the review of Erosion and Sediment Control Plans in accordance with the Blue Book including calculations of soil loss from site and basin sizing
Environmental Representative (ER)	• Endorse this SWMP(CoA C8) • Endorse the Construction Monitoring Programs (CoA C18-C21)
Site Auditor	• Review key documents to ensure contamination management activities, including fieldwork and reporting, are completed in accordance with relevant guidance • Review SAQP and DSI reports • Review and approve the RAP and any revisions to the RAP (CoA D73 and REMM C4) • Review and approve the Validation Report • Prepare and issue Site Audit Statements and Site Audit Reports
Construction Manager	• Ensures compliance with this SWMP, procedures and ECMs • Work collaboratively with environment teams to ensure the mitigation and management measures in this SWMP are integrated into construction works • Ensure that soil and water management impacts are always considered in forward planning and scheduling
Site Supervisor	• Install and maintain environmental control in accordance with ESCPs and ECMs • Attend inspections with the Environmental Coordinator, Sydney Metro / ER, Soil Conservationist or other stakeholders • Implement corrective actions raised during environmental inspections in agreed timeframes • Obtain and comply with Water Discharge Permits prior to any discharge of water from site • Notify the Environmental Coordinator of any observations of Visual difference in water quality (turbidity) from upstream to down of works or site discharge or other pollution event evident in waterway including discolouration, fish kill or strong odour
All personnel	• Notify Site Supervisor of any observations of visual difference in water quality (turbidity) from upstream to down of works or site discharge or other pollution event evident in waterway including discolouration, fish kill or strong odour

8.2 Training

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

- Relevant details of the CEMP
- Existence and requirements of this SWMP, including appendices
- Relevant legislation and guidance
- Roles and responsibilities for soil and water management
- Procedures to be implemented in the event of an unexpected discovery of contaminated land
- Water quality management and protection measures
- Flood mitigation measures
- Conditions of environmental licences, permits and approvals
- Incidence response and reporting procedures
- Maintenance of environmental controls
- Water discharge requirements
- Management of contamination/exclusion zones
- Details of ECMs.

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

- Spill response training for all operational personnel to ensure all emergency response requirements are clearly communicated and understood.
- PIRMP requirements for construction management, including EPL reporting requirements.
- Blue book (ERSED) requirements and discharge procedures for all surface and civil workforce (including water testing and treatment).
- Water treatment plant management (which may include a verification of competency (VOC) or similar process for water treatment plant operators to maintain compliant operations across all shifts.
- Further details regarding staff induction and training are outlined in Section 3.5 of the CEMP.

8.3 Monitoring, Reporting and Inspections

General monitoring, inspection, and reporting requirements are outlined in Table 8.2.

Additional requirements and responsibilities in relation to monitoring and inspections are documented in the CEMP. Inspections related to contaminated material stockpiles can be found in the Spoil Management Plan.

Table 8.2: Inspection and monitoring requirements

Title	Scope	Frequency	GLC responsibility and other attendees	Records / reporting
Monitoring				
Surface Water Quality Monitoring	Surface Water Quality Monitoring Program in accordance with MCoA C14 and REMM SSWQ6	In accordance with the Surface Water Quality Monitoring Program	Senior Environmental Advisor	Surface Water Monitoring Report
Weather forecasts	Monitoring of weather observations from the BoM Parramatta North (Masons Drive) weather station (site number 066124) and Sydney Olympic Park Aws (Archery Centre) weather station (site number 066212) to determine when adverse weather conditions are predicted. Specific notifications to the construction teams will be made if rainfall exceeding the 5-day 85th %tile (36.6 mm) rainfall depths are forecast. Monitoring weather using the real-time on-site weather stations installed at Clyde MSF and Westmead Construction sites.	• Weekly forecast • Daily updates when adverse weather is predicted	Environmental Advisor	Project alerts (e.g. email distribution)
Weather observations	Monitoring of weather observations from the BoM Parramatta North (Masons Drive) weather station (site number 066124) and Sydney Olympic Park Aws (Archery Centre) weather station (site number 066212) Monitoring weather using the real-time on-site weather stations installed at Clyde MSF and Westmead Construction sites.	Monthly summary placed into Annual Report	Environmental Advisor	Construction Monitoring Report (as deemed necessary)
Inspections				
Weekly Inspections including	Inspection of the environmental controls and implementation of the soil and water quality mitigation measures outlined in Attachment 3 including:	Weekly Ad hoc following significant rainfall events	Senior Environmental Advisor	Weekly Environmental

Title	Scope	Frequency	GLC responsibility and other attendees	Records / reporting
erosion and sediment control measures	• Erosion and sediment controls • Measures to prevent tracking of material onto the surrounding road network • Construction water reuse and discharge inspection practices • Chemical and fuel storage and spill response readiness • Refuelling areas • Contaminated land management activities • Concrete disposal and washout facilities • Management of potential and/or actual acid sulfate soils (if present)	(greater than 20 mm in 24 hours)	Other attendees: Environmental Representative (ER), Sydney Metro	Inspection Report
Erosion and sediment control measures	Ensure that all erosion and sediment control measures installed on the premises are inspected and works undertaken to repair and/or maintain these controls if practicable and safe to do so.	• Weekly (even if work is not occurring on-site) • Daily during periods of rainfall • Immediately before site closure greater than 48 hours • 24 hours prior to a rainfall event. • Within 24 hours of the cessation of a rainfall event causing: – runoff to occur on or from the	Environmental Advisor	Environmental Inspection Checklist

Title	Scope	Frequency	GLC responsibility and other attendees	Records / reporting
		premises (≥20mm in 24hrs)		
Site Auditor Inspections	As required to review and approve documentation associated with contamination investigations and remediation	As required	Site Auditor	Details recorded within Site Audit Memos or within Site Audit Reports
ER Inspections	Monitor the implementation of the SWMP in accordance with MCoA A30	Regularly (TBD by the Environmental Representative)	Environmental Representative	Incorporated within the ER Monthly Report

Specific reports prepared in response to soil and surface water quality monitoring will capture detail including, but not limited, to:

- In accordance with MCoA C23, the results of the Construction Monitoring Programs, in the form of a Construction Monitoring Report, will be prepared and submitted to the Planning Secretary, ER and relevant regulatory agencies
- Register of all ESCP and copies of ESCPs for each construction site
- Records of water discharge permits
- Records of water quality monitoring and testing results including:
  - Records of testing of water prior to discharge
  - Records of Hold Point(s), where discharge of construction water is waiting written approval from GLC's Environmental Manager (or delegate)
- Records of any finds from the unexpected finds protocol
- Records of acid sulfate soil testing and management in accordance with the ASSWMS
- Any records associated with contaminated land management.

8.4 Obtaining and managing compliance with the Environmental Protection Licence (EPL)

The following section outlines how GLC will obtain and manage compliance with the EPL required for the Project.

8.4.1 Obtaining the EPL

GLC currently holds an EPL (No. 21676), which was developed in consultation with the EPA. This involved the following:

- Discussions with the EPA regarding the scope of the project, program and water discharge requirements and receiving waters
- Submission of the EPL application and supporting documentation at least 60 days prior to commencement of Construction
- Review and respond to draft conditions.

In accordance with MCoA D119, a Water Pollution Impact Assessment was prepared in consultation with EPA, for the discharge of construction stage stormwater to ensure consistency with licensing requirements of section 45 of the POEO Act and the ANZECC ARMCANZ (2000) Water Quality Guidelines. This assessment utilised the results of the EIS studies and the baseline surface water and groundwater monitoring programs to inform the current water quality objectives and site-specific discharge criteria as detailed in Table 7.3.

8.4.2 Managing compliance with the EPL

The EPL will apply to all Project Works. To ensure compliance with the conditions of the EPL the Environment and Sustainability Lead (or delegate) will undertake the following activities:

- Develop procedures and monitoring programs for implementation during project delivery, refer to the appendices for an indicative list.
- Train senior leaders on the conditions of the EPL, including incident notification requirements

- Engage with the construction team to ensure the EPL requirements are understood
- Report on performance of the monitoring program to the EPA as required by the EPL
- Update sub-contractor documentation to include all the applicable obligations of the EPL, including discharge criteria and incident response and reporting requirements.

Throughout construction, compliance with the EPL will be managed through integration of the EPL conditions into the environmental management documents including this SWMP.

As an EPL holder, GLC will:

- Comply with the conditions of the licence
- Prepare a pollution incident response management plans (PIRMP)
- Publish pollution monitoring data on the GLC website including all discharge records
- Pay the annual administrative fees
- Submit annual return/s.

8.5 Auditing

Audits (both internal and independent) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub-plan, MCoA and other relevant approvals, licenses, and guidelines. These audits will be undertaken at planned intervals to provide information on whether the Project:

- Is meeting its compliance obligations
- Conforms to this sub-plan
- Determines if this sub-plan is effectively implemented and maintained.

The approach to internal and independent audits, including auditing schedule, is outlined further in Section 11.3 of the CEMP.

8.6 Environmental Incidents

All Incidents will be classified by the Environment and Sustainability Lead and Environment Manager in consultation with the Deputy Project Director in accordance **GA-MSP-HSEQ-006 Incident Management and Reporting** and the classifications outlined in Section 12.2 of the CEMP.

All incidents will be reported in accordance with the Sydney Metro Environmental Incident and Non-compliance Reporting Procedure Version 5.1 (SM-17-00000096), relevant licenses and legislation.

The report (GA-WTP-FRM-ENV-002 Environmental Incident And Non-Compliance Notification Report) will be completed, and details of the incident will be entered into an electronic incident register, which is to be always accessible from site. This will be done through GLC's Project Safety and Environmental Manager Software. The Incident Register will include:

- Details of any incidents where impacts to soil and surface water quality causes public nuisance
- Details of any accidental impacts to soil and surface water quality, including accidental spills, unexpected contaminated land and unapproved ground disturbance
- Details of any other soil and surface water quality related incidents.

Further details about incident classification and notification are detailed in Section 12.2 of the CEMP.

Examples of incidents as they relate to soil and surface water quality may typically include:

- Dispersion of contaminated material into nearby waterways
- Generation and dispersion of sediments during uncontrolled construction activities
- Flood events.

The Project Director, Deputy Project Director, Construction Manager and relevant Project Manager will be made aware of the incident as soon as possible.

In the event an actual or potential incident is reported through the Community Complaints line, the Environment Manager (or delegate) will be contacted immediately to respond and investigate.

The approved ER will review all relevant notifications of incidents, in accordance with MCoA A43.

Where relevant, incidents will also be notified to the environmental consultant and Site Auditor for advice, assessment (if required) and to ensure appropriate inclusion in the Contaminated Site Audit.

8.6.1 Sydney Metro

The Environment Manager (or delegate) will notify Sydney Metro of any incidents. In accordance with MCoA A43, and in order for Sydney Metro to comply with its incident notification requirements under the Planning Approval, the incident notification will include the location and general nature of the incident, any non-conformance with the CSSI Approval and any corrective actions in relation to that non-conformance where relevant.

The Environmental Incident and Non-compliance Notification Report (GA-WTP-FRM-ENV-002)) or a similar and consistent form approved by Sydney Metro will be completed for all actual and potential Class 1 and 2 environmental incidents within 48 hours and forwarded to the Project Director (refer to Section 12.2 of the CEMP for environmental incident classifications).

GLC will provide notification of the incident to Sydney Metro's Representative in accordance with Table 8.3.

Table 8.3: Incident Reporting Requirements

Notification Type	Contract Requirement
Initial verbal notification	• Notify Sydney Metro and ER of incidents as soon as possible. • If the incident is a notifiable event, GLC will notify the EPA, Sydney Metro and relevant authorities immediately.
Environmental Incident Report requirements	• Prepare an incident / non-conformance report and submit to Sydney Metro and the ER within 48 hours.

8.6.2 Planning Secretary

The Planning Secretary will be notified via phone or in writing by Sydney Metro via the Major Projects website immediately after GLC and Sydney Metro become aware of a reportable incident, in accordance with MCoA A43. Any notification via phone will be followed up by a notification in writing via the Major Projects website within 24 hours of the initial phone call, which will include the CSSI application number and name, as well as location and general nature of the incident.

Subsequent notification will be given and reports submitted in accordance with the requirements set out in MCoA A44.

8.6.3 EPA and Other Agencies

If a potential environmental pollution event occurs (as specified by the POEO Act), the Environment and Sustainability Lead (or delegate) will immediately notify the EPA and other agencies as nominated by the PIRMP. Information to be provided to the EPA will be in accordance with Section 150 of the POEO Act.

For notifiable events as detailed in the PIRMP, authorities other than the EPA that will also be notified immediately include:

- The Ministry of Health (via the local Public Health Unit – 02 9391 9000)
- SafeWork NSW (13 10 50)
- Depending on the LGA where the incident occurred: Cumberland City Council (02) 8757 9000, (Westmead) City of Parramatta (02) 9806 5000 (Parramatta, Clyde and Sydney Olympic Park sites)
- Fire and Rescue NSW on 000.

Regardless of the actual or potential impact, these authorities will be notified for all notifiable pollution incidents. Further information in relation to the incident will be provided immediately as it becomes available after the initial notification. Records of contact with and details of the information provided to external authorities will be maintained in the project records.

Incidents requiring notification to the EPA will also be immediately notified to the Gamuda Engineering (Australia) Head of Health, Safety, Environment and Quality, LOR Environmental Leader, LOR HSE General Manager and the Head of Legal for both Gamuda Engineering (Australia) and Laing O'Rourke.

8.7 Complaints Register

All complaints made by the community and stakeholders will be managed in accordance with the Sydney Metro's requirements, the Overarching Community Communication Strategy[1] (OCCS), including the Sydney Metro Construction Complaints Management System[2] (CCMS) (2021), as well as relevant MCoAs (B1 – B6). Further details on the complaints register can be found in the Project CEMP (SMWSTWTP-GLO-1NL-EV-PLN-000001), Section 10.

[1] *Sydney Metro Overarching Community Communications Strategy (OCCS)* developed for the Sydney Metro City & Southwest project. Rev 7.0 dated 22 October 2020. Document no. SM-20-00118106.
[2] *Sydney Metro Construction Complaints Management System (CCMS)* developed for the Sydney Metro City & Southwest project, Rev 7.0 dated 30 June 2020

9 REVIEW AND IMPROVEMENT

9.1 Continuous Improvement

The Project Management Team will review the status and adequacy of the EMS including the CEMP and CEMP Sub-plans. The objective of the review will be to ensure that it meets current Sydney Metro and GLC requirements as well as relevant environmental standards.

Continuous improvement of this SWMP 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 nonconformances 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.

In order to ensure continual improvement and prevent recurring issues, this sub-plan will be reviewed in response to:

- Corrective actions arising from non-conformance, incidents, or audits.
- Opportunity for improvement in environmental management performance which may be identified by the project team, ER or Sydney Metro
- Changes to the Gamuda Australia EMS.

Review of this sub-plan will occur annually as a minimum, or as needed in consultation with Sydney Metro and the ER. A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the document control procedure outlined in the CEMP.

9.2 Document Updates

The processes described above may result in the need to update or revise this sub-plan. This will occur annually as a minimum, or as required, and may only be approved by the Environmental Manager, or delegate.

Where minor amendments are required to this SWMP, the revised SWMP will be issued to the ER for review and endorsement in accordance with MCoA A30(j).

9.3 Distribution

All GLC personnel and contractors will have access to this SWMP via the project document control management system.

The approved SWMP will be made publicly available on the GLC website soon after its approval or before the commencement of any work to which it relates, in accordance with MCoA B11.

The document is uncontrolled when printed.

ATTACHMENTS

Attachment 1 – Compliance Matrix

The MCoA, REMMs, CEMF requirements and EPL requirements that relate to this SWMP are detailed in the following tables.

Conditions of Approval

ID	Conditions of Approval	Document Reference
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF) included in the documents listed in Condition A1 of this schedule to detail how the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1 of this schedule will be implemented and achieved during construction.	CEMP
C5(c)	Of the CEMP Sub-plans required under Condition C1 of this schedule, the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of issues raised by a government agency during consultation must be included in the relevant CEMP Sub-plan, including copies of all correspondence from those government agencies as required by Condition A6 of this schedule. Where a government agency (ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why: (c) Soil and Water CEMP Sub-plan: DPE BCD, Relevant Council(s), SOPA (in respect of Sydney Olympic Park) and Sydney Water (if Sydney Water's assets are affected)	Section 1.4
C6	The CEMP sub-plans must state how: a) the environmental performance outcomes identified in the documents listed in Condition A1 of this schedule will be achieved	Section 3
	b) the mitigation measures identified in the documents listed in Condition A1 of this schedule will be implemented;	Section 7

ID	Conditions of Approval	Document Reference
	c) the relevant conditions of this approval will be complied with;	Attachment 1
	d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	CEMP Section 7.1
C7	With the exception of any CEMP Sub-plans expressly nominated by the Planning Secretary to be endorsed by the ER, all CEMP Sub-plans must be submitted to the Planning Secretary for approval	Section 1.5
C8	The CEMP Sub-plans not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all relevant undertakings made in the documents listed in Condition A1 of this schedule. Any of these CEMP Sub-plans must be submitted to the ER with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is phased no later than one (1) month before the commencement of that phase.	Section 1.5
C9	Any of the CEMP Sub-plans to be approved by the Planning Secretary must be submitted to the Planning Secretary with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is phased no later than one (1) month before the commencement of that phase	Section 1.5
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary or endorsed by the ER (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction. Where construction of Stage 1 of the CSSI is phased, construction of a phase must not commence until the CEMP and CEMP Sub-plans for that phase have been approved by the Planning Secretary or certified by the ER upon nomination by the Planning Secretary (whichever is applicable).	Section 1.5
C12	In addition to the relevant requirements of the CEMF, the Soil and Water CEMP Sub-plan must include, but not be limited to:	
	(a) details of construction activities and their locations which have the potential to expose areas known to contain, or potentially contain, contaminated soils and / or materials;	Section 6.1

ID	Conditions of Approval	Document Reference
	(b) measures for the handling, treatment and management of hazardous and contaminated soils and materials including measures to manage and / or minimise worker and public health and safety with regards to exposure to contamination; and	Section 7.3 Spoil Management Sub-plan
	(c) a description of how the effectiveness of the actions and measures for managing contamination impacts would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, and how the results of the monitoring would be recorded and reported.	Section 7.3.2 and 7.3.3 Section 8.3 Spoil Management Sub-plan
C14(c)	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of Stage 1 of the CSSI against the performance predicted in the documents listed in Condition A1 of this schedule or in the CEMP: (c) Surface water quality - DPE water, Relevant Council(s), and Sydney Water (if Sydney Water's assets are affected)	Surface Water Quality Monitoring Program
C15	Each Construction Monitoring Program must provide: (a) details of baseline data available including the period of baseline monitoring; (b) details of baseline data to be obtained and when; (c) details of all monitoring of the project to be undertaken; (d) the parameters of the project to be monitored; (e) the frequency of monitoring to be undertaken; (f) the location of monitoring; (g) the reporting of monitoring results and analysis results against relevant criteria; (h) details of the methods that will be used to analyse the monitoring data; (i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts; (j) a consideration of SMART principles; and (k) any consultation to be undertaken in relation to the monitoring programs; and	Surface Water Quality Monitoring Program sections: (a) Section 6.2 (b) Sections 7.2 and 7.4 (c) Table 9, Section 7.4.1 (d) Section 7.4 (e) Section 7.2 (f) Section 7.1 (g) Section 8.2 (h) Section 8.2 (i) Section 8.2

ID	Conditions of Approval	Document Reference
	(l) any specific requirements as required by Conditions C16 to C17 of this schedule.	(j) Section 5.0 (k) Section 3.0 and 3.1 (l) Refer to Noise and Vibration Construction Monitoring Program, Blasting Construction Monitoring Program, and Groundwater Construction Monitoring Program
C18	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval.	Section 1.5
C19	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1 of this schedule. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase.	Section 1.5
C20	Any of the Construction Monitoring Programs which require Planning Secretary approval must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction or where construction is phased no later than one (1) month before the commencement of that phase	Section 1.5
C21	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.	Section 1.5
C22	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), including any minor amendments approved by the ER, must be	Section 1.5

ID	Conditions of Approval	Document Reference
	implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the ER (whichever is applicable), whichever is the greater.	
C23	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 7.4 Section 8.3
D10	Unless otherwise agreed by the Planning Secretary, Stage 1 of the CSSI must be designed and constructed to not worsen flooding characteristics within and in the vicinity of the CSSI. Not worsen existing flooding characteristics means the following: (a) a maximum increase in inundation time of one hour in a one (1) per cent Annual Exceedance Probability (AEP) flood event; (b) a maximum increase of 10 mm in inundation at properties where floor levels are currently exceeded in a one (1) per cent AEP flood event; (c) a maximum increase of 50 mm in inundation of land at properties where floor levels would not be exceeded in a one (1) per cent AEP flood event; and (d) no inundation of floor levels which are currently not inundated in a one (1) per cent AEP flood event. Measures identified in the documents listed in Condition A1 of this schedule to not worsen flooding characteristics or measures that achieve the same outcome must be incorporated into the detailed design of Stage 1 of the CSSI. The incorporation of these measures must be reviewed and endorsed by a suitably qualified and experienced person in consultation with directly affected landowners, DPE Water, DPI Fisheries, DPE BCD, NSW State Emergency Service (SES), SOPA (in respect of Sydney Olympic Park) and Relevant Council(s). Where flooding characteristics exceed the levels identified in (a), (b), (c), (d) above, the Proponent must undertake the following: (a) consult with property owners for properties adversely flood affected as a result of Stage 1 of the CSSI and mitigate where necessary; and	Section 5.9 Section 7.7

ID	Conditions of Approval	Document Reference
	(b) consult with the NSW State Emergency Service (SES), SOPA (in respect of Sydney Olympic Park) and Relevant Council(s) regarding the management of any residual flood risk beyond the 1 per cent AEP flood event and up to the probable maximum flood.	
D12	Flood information including flood reports, models and geographic information system outputs must be provided to the Relevant Council(s), SOPA (in respect of Sydney Olympic Park), DPE BCD and the SES in order to assist in preparing relevant documents and to reflect changes in flood behaviour as a result of Stage 1 of the CSSI. The Relevant Council(s), SOPA (in respect of Sydney Olympic Park), DPE BCD and the SES must be notified in writing that the information is available no later than one (1) month following the completion of construction. Information requested by the Relevant Council(s), SOPA (in respect of Sydney Olympic Park), DPE BCD or the SES must be provided no later than six (6) months following the completion of construction or within another timeframe agreed with the Relevant Council(s), SOPA (in respect of Sydney Olympic Park), DPE BCD and the SES. The project flood models and data must be uploaded to the NSW Flood Data Portal and access must be provided to the Relevant Council(s), DPE BCD, SES and SOPA (in respect of Sydney Olympic Park) no later than one (1) month following the completion of construction.	To be addressed through detailed design. I.e., this does not apply to construction and therefore does not form part of this Plan.
D71	Before commencement of any construction that would result in the disturbance of moderate to high risk contaminated sites as identified in the documents identified in Condition A1 of this schedule, Detailed Site Investigations (for contamination) must be conducted to determine the full nature and extent of the contamination. The Detailed Site Investigation Report(s) and the subsequent report(s), must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The Detailed Site Investigations must be undertaken in accordance with guidelines made or approved under section 105 of Contaminated Land Management Act 1997 (NSW). The Detailed Site Investigation for Sydney Olympic Park metro construction site must be prepared in consultation with SOPA.	Section 7.3
D72	Should remediation be required to make land suitable for the final intended land use, a Remedial Action Plan must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site	Section 7.3

ID	Conditions of Approval	Document Reference
	Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The Remedial Action Plan must be prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997* (NSW) and must include measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use when the Remedial Action Plan is implemented. The Remedial Action Plan for Sydney Olympic Park metro construction site must be prepared in consultation with SOPA.	
D73	Before commencing remediation, a Section B Site Audit Statement(s) must be prepared by an NSW EPA-accredited Site Auditor that certifies that the Remedial Action Plan(s) is/are appropriate and that the site can be made suitable for the proposed use. The Remedial Action Plan(s) must be implemented and any changes to the Remedial Action Plan(s) must be approved in writing by the NSW EPA-accredited Site Auditor.	Section 7.3
D74	Validation Report(s) must be prepared in accordance with Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA, 2020) and relevant guidelines made or approved under section 105 of the *Contaminated Land Management Act 1997* (NSW).	Section 7.3
D75	A Section A1 or Section A2 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI.	Section 7.3
D76	A copy of Detailed Site Investigation Report(s), Remedial Action Plan(s), Validation Report(s), Site Audit Report(s) and Site Audit Statement(s) must be submitted to the Planning Secretary, SOPA (in respect of Sydney Olympic Park) and the Relevant Council(s) for information.	Section 7.3
D77	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared before the commencement of construction and must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction.	Attachment 4

ID	Conditions of Approval	Document Reference
D78	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.	Attachment 4
D79	A Water Reuse Strategy must be prepared, which sets out options for the reuse of collected stormwater and groundwater during Stage 1 of the CSSI. The Water Reuse Strategy must include, but not be limited to: (a) evaluation of reuse options; (b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required; (c) measures to avoid misuse of recycled water as potable water; (d) consideration of the public health risks from water recycling; and (e) time frame for the implementation of the preferred reuse option(s). The Water Reuse Strategy must be prepared based on best practice and advice sought from relevant agencies, as required. The Strategy must be applied during construction. Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be made publicly available. Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction phases of Stage 1 of the CSSI.	Section 7.3.8
D116	Before undertaking any works and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with LandComs Managing Urban Stormwater series (The Blue Book).	Section 7.2
D117	Stage 1 of the CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with.	Section 7.4
D118	Unless an EPL is in force in respect to Stage 1 of the CSSI and that licence specifies alternative criteria, discharges from wastewater treatment plants to surface waters must not exceed:	Section 7.4

ID	Conditions of Approval	Document Reference
	(a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC/ARMCANZ); and (c) for bioaccumulative and persistent toxicants, the ANZG (2018) guidelines values at a minimum of 99 per cent species protection level. Where the ANZG (2018) does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG (2018) for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.	
D119	If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required to inform licensing consistent with section 45 of the POEO Act. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk.	Section 8.3 Section 8.4.1
D120	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be carried out in accordance with relevant guidelines and designed by a suitably qualified and experienced person.	Section 7.5.2

Revised Environmental Management Measures (REMM)

Condition Classification	Condition Reference	Description	Reference
Soils and surface water quality	SSWQ1	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the presence of actual and/or potential acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998)	Section 7.3.5

Condition Classification	Condition Reference	Description	Reference
Soils and surface water quality	SSWQ2	Prior to ground disturbance in high probability salinity areas, testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or it would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008). Erosion controls would be implemented in accordance with Blue Book (Landcom, 2004).	Section 7.3.6.
Soils and surface water quality	SSWQ3	Erosion and sediment measures would be implemented at all construction sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water (DECCW) 2008), commonly referred to as the 'Blue Book'. Additionally, any water collected from construction sites would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts. Temporary sediment basins would be designed in accordance with Managing Urban Stormwater: Soils and Construction and Managing Urban Stormwater, Volume 2D: Main Road Construction (DECC, 2008).	Section 7.2 Section 7.3.7 Section 7.4
Soils and surface water quality	SSWQ4	Works in waterways and surrounding low lying areas would be carried out in accordance with progressive erosion and sediment control plans.	Section 7.2
Soils and surface water quality	SSWQ5	The water treatment plants would be designed so that wastewater is treated to a level that is compliant with the ANZECC/ARMCANZ (2000) and ANZG (2018) and draft ANZG (2020) default guidelines for 95 per cent species protection and 99 per cent species protection and 99 per cent species protection for toxicants that bioaccumulate unless other discharge criteria are agreed with relevant authorities.	Detailed within the Groundwater Management Plan Table 7.3
Soils and surface water quality	SSWQ6	A surface water monitoring program would be implemented to observe any changes in surface water quality that may be attributable to Stage 1 and inform appropriate management responses.	Surface Water Quality Monitoring Program

Condition Classification	Condition Reference	Description	Reference
		The program would be developed in consultation with the EPA and relevant Councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the WestConnex M4 East monitoring. Monitoring would occur during pre-construction and during construction at all waterways with the potential to be impacted. Monitoring sites could be located upstream and downstream of the potential discharges and would include sampling for key indicators of concern.	
Soils and surface water quality	SSWQ7	Further design development would confirm the local stormwater system capacity to receive construction water treatment plant inflows. In the event there is a stormwater infrastructure capacity issue with existing infrastructure, mitigation measures such as storage detention to control water outflow during wet weather events would be implemented.	Water Pollution Impact Assessment which will accompany the EPL application
Contamination	C1	For sites where potential contamination risk is moderate, high or very high, a further review of data would be performed. Where the additional data review provides sufficient information to confirm that contamination is likely to have a very low or low risk, the site would then be managed in accordance with the Soil and Water Management Plan. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal.	Section 7.3
Contamination	C2	Where data from the additional data review (mitigation measure C1) is insufficient to understand the risk of contamination, a Detailed Site Investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW EPA. The sites requiring a Detailed Site Investigation would be confirmed following the additional data review (mitigation measure C1), however on the basis of the Stage 1 assessment, it is anticipated that Detailed Site Investigations would be required at the specified application locations.	Section 7.3

Condition Classification	Condition Reference	Description	Reference
Contamination	C3	Where data from the additional data review (mitigation measure C1) or the Detailed Site Investigation (mitigation measure C2) confirms that contamination would have a moderate, high or very high risk, a Remediation Action Plan would be developed for the area of the construction footprint. Each Remediation Action Plan would detail the remediation works required to mitigate risks from contamination throughout and following completion of construction. The Remediation Action Plan would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice. Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land. The sites requiring Remediation Action Plans and remediation would be confirmed following the additional data review (mitigation measure C1) and Detailed Site Investigation (mitigation measure C2), however on the basis of the Stage 1 assessment, it is anticipated that Remediation Action Plans and remediation could be required at the specified application locations.	Section 7.3
Contamination	C4	Where contamination is highly complex, such as significant groundwater contamination; contamination associated with vapour; contamination that requires specialised remediation techniques; or contamination that requires ongoing active management during and beyond construction, an accredited Site Auditor would review and approve the Remediation Action Plan, and would develop a Site Audit Statement and Site Audit Report upon completion of remediation. The sites requiring Site Audit Statements would be confirmed following the preparation of Remediation Action Plans (mitigation measure C3), however on the basis of the Stage 1 assessment, it is anticipated that Site Audit Statements would be required at the specified application locations.	Section 7.3

Condition Classification	Condition Reference	Description	Reference
Contamination	C5	Ongoing management and monitoring measures would be documented in an appropriate form and implemented for any areas where minor, residual contamination remains following construction.	Section 7.3
Hydrology and flooding	HF1	Detailed construction planning would consider flood risk at construction sites. This would include: • Identification of measures to not worsen flood impacts on the community and on other property and infrastructure during construction up to and including the one per cent AEP flood event • Provide flood-proofing to excavations at risk of flooding or Coastal inundation during construction, where feasible and reasonable, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure • Review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required. This includes design of site hoardings to minimise disruption to flow paths (if possible). • Not worsen is defined as: – A maximum increase in flood levels of 50mm in a one per cent AEP flood event – A maximum increase in time of inundation on one hour in a one per cent AEP flood event – No increase in potential soil erosion and scouring from any increase in flow velocity in a one per cent AEP flood event.	Section 7.7 To be addressed in the Stormwater and Flooding Management Plan and therefore not part of this Plan.
Hydrology and flooding	HF2	Condition deleted	NA
Hydrology and flooding	HF3	Further design refinement at the Clyde SMF construction site would occur during detailed design to mitigate the identified potential impacts including:	To be addressed through detailed design. Ie this does

Condition Classification	Condition Reference	Description	Reference
		• The increases in flood levels of up to 0.03 metres in Duck Creek and adjacent properties in the one per cent AEP flood event • Increases in flow velocities and the potential increased risk of scour at the proposed creek crossings and in the downstream channels • The potential flooding impacts from filled features	not apply to construction and therefore does not form part of this Plan.
Hydrology and flooding	HF4	• The increases in flood levels of up to 0.03 metres in Duck Creek and adjacent properties in the one per cent AEP flood event	To be addressed through detailed design. Ie this does not apply to construction and therefore does not form part of this Plan.
Hydrology and flooding	HF5	• Increases in flow velocities and the potential increased risk of scour at the proposed creek crossings and in the downstream channels	To be addressed through detailed design. Ie this does not apply to construction and therefore does not form part of this Plan.
Hydrology and flooding	HF6	Consultation would occur with the proponent of the Camellia Town Centre redevelopment to understand potential flood impacts from the redevelopment on Stage 1 and to identify any additional flood protection (if required).	To be addressed through detailed design. Ie this does not apply to construction and therefore does not

Condition Classification	Condition Reference	Description	Reference
			form part of this Plan.
Hydrology and flooding	HF7	Construction planning regarding flooding matters would be carried out in consultation with the NSW State Emergency Service and the relevant local council.	Section 7.7

CEMF Requirements

CEMF Reference	Description	Reference
12.2a	Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:	This plan
	(i) The surface water and flooding mitigation measures as detailed in the environmental approval documentation;	Section 5.7 Section 5.9 Section 7.7
	(ii) Details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;	Section 6
	(iii) Surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines;	Section 7.4
	(iv) Management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the project will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;	Section 7 Groundwater Management Plan Spoil Management Plan Waste Management Plan

CEMF Reference	Description	Reference
	(v) A contingency plan, consistent with the NSW Acid Sulphate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	Section 7.3.5
	(vi) Management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;	Section 7.3.3 Attachment 1
	(vii) A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified;	Section 8.3 Surface Water Quality Monitoring Program
	(viii) The requirements of any applicable licence conditions;	Section 7.3.7
	(ix) The responsibilities of key project personnel with respect to the implementation of the plan	Section 8.1
	(x) Procedures for the development and implementation of Progressive Erosion and Sediment Control Plans	Section 7.2
	(xi) Identification of locations where site specific Stormwater and Flooding Management Plans are required	Section 7.7 Stormwater and Flooding Management Plans
	(xii) Compliance record generation and management.	Section 8
12.2b	Principal Contractors will develop and implement Progressive Erosion and Sediment Control Plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”). The ESCPs will be approved by the Contractor’s Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman.	Section 7.2

CEMF Reference	Description	Reference
12.2c	ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor's Environmental Manager (or delegate)	Section 7.2
12.2d	Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.	Section 7.7
12.2e	Principal Contractors will undertake the following soil and water monitoring as a minimum:	Section 8.4
	Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable	Attachment 3
	Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours)	Attachment 3
	All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with relevant approvals and licence requirements. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT	Section 7.4
12.2f	The following compliance records will be kept by the Principal Contractors	
	i) Copies of current ESCPs for all active construction sites	Section 7.2
	ii) Records of soil and water inspections undertaken	Section 8.3
	iii) Records of testing of any water prior to discharge	
	iv) Records of the release of the hold point to discharge water from the construction site to the receiving environment.	
12.2g	The following water resources management objectives will apply to the construction of the project:	This SWMP
	i) Minimise demand for, and use of potable water	Section 3
	ii) Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater	

Environment Protection Licence

The Project construction activities are designated as '***Railway activities—railway infrastructure construction'*** under Schedule 1 of the POEO Act. Scheduled activities under clause 48 of the POEO Act, require an Environmental Protection Licence (EPL) for the premise at which a scheduled activity is carried on.

The EPL typically regulates the emissions of potentially offensive odours, noise and dust.

The EPL typically prescribes water quality parameters to be measured and associated site-specific discharge criteria from licensed discharge points. The EPL also details the monitoring and analytical requirements by reference to authority publications (e.g., Methods for Sampling and Analysis of Water Pollutants in NSW (EPA 2004)).

The EPL for the project is EPL 21676. A copy can be found on the public register.

Attachment 2 – Stakeholder Consultation

Engagement Log

Stakeholder	Date of Engagement/ Attempted Engagement
DPE EES (now BCD)	• Sydney Metro sent DPE EES an invitation to review and comment on the SWMP on 27/04/2022, which included a cover letter and the SWMP as a PDF document • DPE EES provided comments on 16/05/2022
SOPA	• Sydney Metro sent SOPA an invitation to review and comment on the SWMP on 26/04/2022, which included a cover letter and the SWMP as a PDF document • SOPA provided comments on 10/05/2022
City of Parramatta Council	• Sydney Metro sent the City of Parramatta an invitation to review and comment on the SWMP on 27/04/2022, which included a cover letter and the SWMP as a PDF document • The City of Parramatta Council did not provide comments within the 21-day consultation period
Cumberland City Council	• Sydney Metro sent the Cumberland City Council an invitation to review and comment on the SWMP on 27/04/2022, which included a cover letter and the SWMP as a PDF document • The Cumberland City Council provided comments on 16/05/2022
Sydney Water	• Sydney Metro sent Sydney Water an invitation to review and comment on the SWMP on 05/05/2022, which included a cover letter and the SWMP as a PDF document • Sydney Water did not provide comments within the 21-day consultation period

Comments Register

Stakeholder	Comment Raised	GLC Response	Where Addressed
DPE EES	The Environment and Heritage Group (EHG) of the Department of Planning and Environment has reviewed the Soil and Water Management Plan	Agreed	No action required

Stakeholder	Comment Raised	GLC Response	Where Addressed
	(Sydney Metro West – Western Tunnelling Package) in relation to the flooding content. EHG has no comments on the Soil and Water Management Plan other than to note it only addresses construction phase flooding and that the 'hydrology and flooding' revised environmental management measures detailed in the compliance matrix will be considered 'through detailed design' and/or the Stormwater and Flooding Management Plan (SFMP). EHG understands the SFMP, as well as flood mitigation measures proposed through detailed design, will be referred to EHG for review.		
Cumberland City Council	***(Section 3 Table 3.1: Soil and water targets and performance criteria)*** if incident such as a discharge occurs, Council would like to be able to review a copy of the reports and permits, on request in case community complains are received. (Section 3 context) Table 3.2 EIS Construction performance outcomes.	GLC will make reports and permits available to Cumberland City Council in the event of a complaint from the community.	Section 3.1
	(Section 7.2: Erosion and Sediment Control Plans) The final paragraph in this section references a Environmental Mitigation and Management measures in a table and no table number is provided.	Section 7.2 has been updated to reference Attachment 1.	Section 7.2
	Overall The plan covers relevant requirements for soil and water management. In combination of the implementation of further subplans, such as	Section 7.2 states that site-specific ESCPs will be prepared for each individual construction site.	Section 7.2

Stakeholder	Comment Raised	GLC Response	Where Addressed
	contamination & remediation, the risk of environmental harm should be minimised. Contaminated spoil designated for remediation, off site reuse or disposal is to be managed in accordance with the relevant Remedial Action Plan and is also to be managed in accordance with any Waste Management Plan. While the proposed will be managed with the implementation of standard erosion and sediment controls, it is recommended that site- specific sediment and erosion control plans are developed, implemented and followed for the duration of any demolition, excavation and construction works where there is to be major soil disturbances expected.		
SOPA	Update figures 2,3,4,5 to remove Silverwater site. Alternatively include note that Silverwater site has been removed.	Comment has been added to the listed figures.	Section 5
	Section 7.3 - Contamination Management - Does not include any Detailed Site Investigation for contamination at the Sydney Olympic Park site. The rationale for this should be provided given the site is known as an area of uncontrolled landfilling and activities of tunneling and excavation may impact waste containment systems with potential for leachate and gas ingress into the tunneling and box excavation works. The unexpected finds protocol is referenced however, will is unlikely to deal with landfill gas.	The SOPA site is being managed by the CTP contractor, Acciona Ferrovial. Impacts of tunnelling are being considered within the Groundwater Monitoring Program.	Section 7.3.1
	Table 7.1 - item 13 - stockpiles should also be managed to separate clean and contaminated	Additional detail provided within Table 7.1	Table 7.1

Stakeholder	Comment Raised	GLC Response	Where Addressed
	spoil - with cross reference to the Spoil management plan for details		
	Section 7.1 - standard mitigation measures - Should include diversion and management of groundwater ingress away from surface / clean waters to prevent contamination with leachate where tunneling and excavation is within potentially or known areas of contamination - unless otherwise permitted by the NSWEPA under the license	Groundwater will be captured and treated in the construction water treatment plants. No change required.	NA
	Does include the Sydney Olympic Park station box but this is not considered in any sections above? The document should be clear on whether the SOP station box is included in the works	Sydney Olympic Park Station box is not part of this scope of work. It is being addressed within the CTP by Acciona Ferrovial. The scope of this document has been updated.	Section 2.2
	Again, Sydney Olympic Park's creeks and wetlands are not discussed	See comment above.	
	Does not include any reference to the Sydney Olympic Park water courses including Haslams Creek and boundary creek, lake belvedere?	See comment above.	
	Section 5.6 Groundwater - The description should recognised that any groundwater that comes into contact with waste is, in accordance with the NSW EPA regulations, leachate. And must be ,managed as such. The derails to be provided in the groundwater Management Plan	Section 5.6 has been updated.	Section 5.6
	(during or post-construction) or stormwater generated during construction, is not to be drained to the Northern Water Feature (because it is freshwater breeding habitat for endangered Green	There are no major construction sites that will be completing excavation or stockpiling activity on SOPA land that will require stormwater	NA

Stakeholder	Comment Raised	GLC Response	Where Addressed
	and Golden Bell Frogs) – they will need to discharge into a catchment that drains to an estuarine system instead.	management by GLC. These will be managed by CTP as part of their Station Box excavation works.	
	Key Sites with potential for contamination do not include Sydney Olympic park - given its history of uncontrolled landfilling and the alignment which runs underneath waste containment cells this appears to be a significant omission. The clean-up of this site was based on consolidation of waste and it is recognised that residual waste and unexpected finds are likely to be found on site.	There are no major construction sites that will be completing excavation or stockpiling activity on SOPA land that will require contamination management by GLC. These will be managed by CTP as part of their Station Box excavation works.	NA
	Section 8.4 - SOPA's infrastructure and construction manual has reporting requirements for the sediment and erosion measures that needs to be considered by the relevant contractors.	Sediment and erosion control measures will not be required by GLC on the SOPA site as there will be no excavation or stockpiling activities.	NA
	Section 7.3 - The erosion control plans and analysis does not address the reduction in surface run-off intake capacity. Given the site at Herb Elliot Ave is subject to installation of sediment control measures, the pit intake capacities will be significantly reduced. This will result in re-direction of surface flows to Show Ground Road where there is high risk of flash flooding. This increases the risk of flash flooding and needs to be addresses as part of the construction management plan.	The WTP scope does not include construction sites on SOPA land. The referenced site at Herb Ellliot Ave is part of the CTP scope of work.	NA

Meeting Minutes

Document Transmittal

Transmittal No:	SMWSTWTP-GLO-TX-000090
Contract No:	WTP - 00013/13065 - Western Tunnelling Works Design and Construction Deed
Sub Contract:	WTP
Date:	14 April 2022, 07:58 AM

Issued	Name
By	Liem Ngo (Gamuda Laing O'Rourke Consortium)

Issued	Name
To	Andrew Hendy (Sydney Metro) ; Alicia Hatton (Sydney Metro) ; Kate Brooks (Sydney Metro)
Cc	Hayley Young (Gamuda Laing O'Rourke Consortium) ; Steph Mifsud (Gamuda Laing O'Rourke Consortium) ; Andy Thompson (Gamuda Laing O'Rourke Consortium) ; Huw Griffiths (Gamuda Laing O'Rourke Consortium) ; Tom Olorenshaw (Gamuda Laing O'Rourke Consortium)

Reason for Issue	Issued for Information
Subject	**Cumberland Council Meeting Minutes - 7 April 2022**

Dear all

Please find attached for your information, minutes for the meeting with Cumberland City Council on 7 April 2022.

Regards

Liem Ngo

Stakeholder and Community Engagement Manager
Sydney Metro West – Western Tunnelling Package
Gamuda Australia Laing O'Rourke Consortium

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Item	Document No	Title	Rev	Sts	Type	Design Lots	Alt Doc No
1	SMWSTWTP-GLO-WMD-CY-MIN-000001	Meeting Minutes - Cumberland City Council - 7 April 2022 - Project introduction and environmental management plans	A.01	S2	MIN		

Attachment(s):

MEETING MINUTES

Meeting details		
Meeting title	Briefing for Cumberland City Council - Sydney Metro West Western Tunnelling Package Project and Environmental Management Plan consultation introduction	
Date | Time	7 April 2022, 15:30-16:15	
Location	MS Teams (online)	
Attendees	Gamuda Australia Laing O'Rourke (GLC):	Simon Hussey, Andy Thompson, Hayley Young, Huw Griffiths, Tom Olorenshaw, Liem Ngo, Stephanie Mifsud
	Sydney Metro (SM)	Andrew Hendy, Kate Brooks, Nikita Cullum
	Cumberland City Council (CCC)	Daniel Cavallo, Shona Porter, Daniel Anderson

Item	Information
1	Introductions and welcome
	Introductions of meeting participants were conducted
2	**Western Tunnelling Package & CEMP Consultation**
2.1	**Andy Thompson delivered a presentation to provide an overview of the Sydney Metro West Western Tunnelling Package (WTP) including:** • Introduction about Gamuda Australia and Laing O'Rourke • Introducing the project team and key providers • A construction overview, including project staging
2.2	**Tom Olorenshaw provided an overview of key construction, which will include:** • HV trenching to bring in power supply for plant equipment will commence mid-2022 and will last 3-5 months • Local area works to facilitate deliveries. Changes to kerbs, traffic lights and installation of pedestrian fencing to improve road safety are currently still in design. CCC will be consulted on proposed designs. • Excavation works will start in 2023 and continue into 2024. This includes for the excavation of the station box, stub tunnels and cross over cavern. An acoustic shed will be built to mitigate noise from excavation. • Tunnel Boring Machine (TBM) removal will from Westmead site will take approximately 6-8 weeks. **Andy Thompson noted that Sydney Metro by changing the TBM launch site from Westmead to Rosehill, has substantially reduced the impact on Westmead due to the tunnel segments no longer needing to be delivered regularly to the Westmead site.**
2.3	**Liem Ngo provided an overview of potential stakeholder impacts, mitigation and engagement**
2.4	**Stephanie Mifsud presented the WTP Project's environmental approvals framework, including:** • The environmental approvals process, including the Construction Environmental Management Plans. • WTP Environmental Management plans framework and their interconnectedness with a range of WTP

Item	Information
	procedures and strategies • CEMP relationship with the WTP project's environmental management systems • Inviting feedback on the various tranches of the CEMP, with the first tranches to submitted shortly to SOPA and other key stakeholders for consultation, with a 4-week consultation process proposed, involving: • Step 1. 2-weeks for written feedback, Step 2 - in week 3, a comment review workshop for subject matter experts to address CCC feedback, Step 3 - in week 4, CEMPS to be amended to address comments discussed in the workshop
3	**Questions and Answers (CCC questions, GLC or SM answers)**
	Q. What is the depth of the tunnels? A. Station box is between 30 and 37m from surface, stub tunnels are 25 metres from surface and the crown of the cross cavern tunnel is 15m from the surface. **Q. Does tunnel depth limit basement depth for future developments?** A. (GLC) Potentially. There will be restrictions on depth from operating rail lines which may impact future developments. Action: GLC, via Sydney Metro/TfNSW will provide CCC with depth restrictions for future development. **Q. With respect to the environmental management plans, is GLC seeking technical advice or fact-checking?** A. Both. If the Council has feedback on technical issues GLC welcomes those issues being raised at this early stage so it can be discussed. GLC suggests that any feedback clearly identify the particular sections of a plan and clearly states the outcome CCC wants. Action: Sydney Metro, when sending plans to CCC for review and feedback should address to Daniel Cavallo and copied to his EA, Sarah Hussein, to coordinate input from CCC.
	Meeting finish
4	**Next meeting**
	Date: Consultation workshop date to be determined Time: TBD Location: TBD

Document Transmittal

Transmittal No:	SMWSTWTP-GLO-TX-000072
Contract No:	WTP - Western Tunnelling Package
Sub Contract:	WTP
Date:	07 April 2022, 09:47 AM

Issued	Name
By	Liem Ngo (Gamuda Laing O'Rourke JV)

Issued	Name
To	Alicia Hatton (Sydney Metro) ; Andrew Hendy (Sydney Metro) ; Nick Nathans (Sydney Metro) ; Kate Brooks (Sydney Metro)
Cc	Hayley Young (Gamuda Laing O'Rourke JV) ; Steph Mifsud (Gamuda Laing O'Rourke JV)

Reason for Issue	Issued for Information
Subject	**SOPA Project & CEMP briefing - Meeting Minutes - 1 April 2022**

Dear all

Please find attached for your information, meeting minutes for the 1 April 2022 meeting with SOPA.

Regards
Liem Ngo

Click here to download all Transmittal files.

Item	Document No	Title	Rev	Sts	Type	Design Lots	Alt Doc No
1	SMWSTWTP-GLO-OLP-SK-MIN-000001	SOPA Project & CEMP briefing - Meeting Minutes - 1 April 2022	-.01	S2	MIN		

Attachment(s):

MEETING MINUTES

Meeting details		
Meeting title	Briefing for SOPA - Sydney Metro West Western Tunnelling Package Project and Environmental Management Plan consultation introduction	
Date | Time	1 April 2022	
Location	MS Teams (online)	
Attendees	Gamuda Australia Laing O'Rourke (GLC):	Simon Hussey, Andy Thompson, Hayley Young, Huw Griffiths, Liem Ngo, Stephanie Mifsud
	Sydney Metro (SM)	Nick Nathan (Faciltator/Chair), Andrew Hendy, Alicia Hatton, Sarah Lepre, Nikkita Cullum, Ian Subramanian
	Sydney Olympic Park Authority (SOPA)	Sally Hamilton, John Ferguson, Vivienne Albin, Julie Currey

Item	Information
1	Introductions and welcome
	Introductions of meeting participants were conducted Nick Nathan (SM) provided an overview of the Sydney Metro West Project, including the three tunnelling packages and of the Stage 3 EIS currently open for public consultation. Alicia Hutton (SM) introduced the GLC team, including Andy Thompson (GLC) to provide details about the Western Tunnelling Package (WTP)
2	**Western Tunnelling Package & CEMP Consultation**
2.1	**Andy Thompson delivered a presentation to provide an overview of the Sydney Metro West Western Tunnelling Package (WTP) including:** • Introduction about Gamuda Australia and Laing O'Rourke • Introducing the project team and key providers • A construction overview, including project staging • Explanation of the combined Sydney Metro West construction site, including the WTP and the Central Tunnelling Package (CTP) sections • The stages for the TBM retrieval and nozzle construction, site demobilisation and handover to CTP contractor
2.2	**Liem Ngo provided an overview of potential stakeholder impacts, mitigation and engagement**
2.3	**Stephanie Mifsud presented the WTP Project's environmental approvals framework, including:** • The environmental approvals process, including the Construction Environmental Management Plans. • WTP Environmental Management plans framework and their interconnectedness with a range of WTP procedures and strategies • CEMP relationship with the WTP project's environmental management systems • Inviting feedback on the various tranches of the CEMP, with the first tranches to submitted shortly to

Item	Information
	SOPA and other key stakeholders for consultation, with a 4-week consultation process proposed, involving: • Step 1. 2-weeks for written feedback, Step 2 - in week 3, a comment review workshop for subject matter experts to address SOPA feedback, Step 3 - in week 4, CEMPS to be amended to address comments discussed in the workshop
3	**Questions and Answers (SOPA questions, GLC or SM answers)**
	Q. Will the WTP project tunnel under Haslams Creek? A. Yes **Q. Is a site auditor involved and will a meeting be setup with SOPA?** A. (GLC) Yes, Kylie Lloyd has been appointed the WTP site auditor and a meeting can be set up. It was noted that CTP will have a separate site auditor. Action: GLC to set up meeting between the site auditor and SOPA. **Q. Will the issues raised by SOPA during the CEMP consultation be addressed and closed out?** A. (GLC) Yes. The workshop is designed to have the subject matter experts present to address SOPA's feedback and ensure any necessary changes to the CEMPs to reflect the discussions. **Q. When will more detailed stakeholder engagement occur?** A. (GLC) Since GLC is not planning to take possession of the site until December 2023 or early 2024. More detailed stakeholder engagement is likely to commence in first half of 2023. Although it was noted that both parties welcome dialogue on any issues that may emerge in the meantime. **Q. How will the CEMPs be transmitted for consultation** A. (GLC) GLC will submit to Andrew Hendy at Sydney Metro who will then distribute to respective stakeholder and interface managers to send to SOPA and other key stakeholders for consultation. **Q. Is there an unexpected finds protocol?** A. (GLC) Yes, there is. **Q. Can the feedback given to CTP be shared with the WTP team?** A. (SM) Feedback from consultation on CTP plans should be included within the respective plans which are now publicly available. Andrew Hendy will provide links to the GLC Environment and Planning team. **Q. How with Sydney Metro coordinate WTP and CTP activities?** A. (SM) Nick Nathan will coordinate CTP and WTP teams for SOP interface, via joint SOPA meetings or meet separately with each contract teams, as required.
	Meeting finish
10	**Next meeting**
	Date: Consultation workshop date to be determined (late April/early May) Time: TBD Location: TBD

Meeting Summary

Total Number of Participants	20
Meeting Title	SMW Introduction and CEMP Sub-Plans Briefing
Meeting Start Time	3/24/2022, 3:59:12 PM
Meeting End Time	3/24/2022, 4:46:41 PM
Meeting Id	18d00fea-6311-4935-8a5d-d89b04fb3722

Full Name	Join Time	Leave Time	Duration
Tania Page	3/24/2022, 3:59:12 PM	3/24/2022, 4:46:41 PM	47m 29s
Andy Thompson (GAB)	3/24/2022, 3:59:20 PM	3/24/2022, 4:46:37 PM	47m 17s
Sarah Lepre	3/24/2022, 3:59:51 PM	3/24/2022, 4:46:35 PM	46m 44s
Andrea Giusa	3/24/2022, 3:59:55 PM	3/24/2022, 4:46:41 PM	46m 45s
Ngo, Liem	3/24/2022, 4:00:04 PM	3/24/2022, 4:46:37 PM	46m 33s
Steph Mifsud (GAB)	3/24/2022, 4:00:09 PM	3/24/2022, 4:46:37 PM	46m 28s
Griffiths, Huw	3/24/2022, 4:00:25 PM	3/24/2022, 4:46:38 PM	46m 13s
Andrew Hendy	3/24/2022, 4:00:26 PM	3/24/2022, 4:46:38 PM	46m 11s
Bishwanand Mishra	3/24/2022, 4:00:30 PM	3/24/2022, 4:46:36 PM	46m 6s
Nikkita Cullum	3/24/2022, 4:00:32 PM	3/24/2022, 4:46:36 PM	46m 4s
Jim Tsom	3/24/2022, 4:00:34 PM	3/24/2022, 4:46:39 PM	46m 4s
Hayley Young (GAB)	3/24/2022, 4:01:17 PM	3/24/2022, 4:46:36 PM	45m 19s
Pino Todarello	3/24/2022, 4:01:22 PM	3/24/2022, 4:46:35 PM	45m 12s
Phillip Kelly	3/24/2022, 4:01:35 PM	3/24/2022, 4:46:36 PM	45m
Ian Subramaniam	3/24/2022, 4:01:35 PM	3/24/2022, 4:46:35 PM	45m
Simon Hussey (GAB)	3/24/2022, 4:01:55 PM	3/24/2022, 4:46:36 PM	44m 41s
Adrian Mihaila	3/24/2022, 4:03:52 PM	3/24/2022, 4:46:36 PM	42m 44s
Stuart Pike	3/24/2022, 4:04:52 PM	3/24/2022, 4:46:36 PM	41m 43s
Matthew Marrinan	3/24/2022, 4:05:05 PM	3/24/2022, 4:46:36 PM	41m 30s
Sasi Kumar	3/24/2022, 4:06:28 PM	3/24/2022, 4:46:36 PM	40m 8s

Email	Role
Tania.Page2@transport.nsw.gov.au	SM, Snr Project Manager Interfaces West
andy.thompson@gamuda.com.au	GALC, Surface Works Construction Manager
Sarah.Lepre@transport.nsw.gov.au	SM, Project Officer Environment
agiusa@cityofparramatta.nsw.gov.au	CoPC, Heritage Advisor
LNgo@laingorourke.com.au	GALC, Stakeholder & Engagement Manager
steph.mifsud@gamuda.com.au	GALC, Environmental Manager
HuwGriffiths@Laingorourke.com.au	GALC,
Andrew.Hendy@transport.nsw.gov.au	SM, Manager Environment
BMishra@cityofparramatta.nsw.gov.au	CoPC, Senior Catchment Referral Engineer
Nikkita.Cullum@transport.nsw.gov.au	SM, Graduate
JTsom@cityofparramatta.nsw.gov.au	CoPC, Supervisor Catchment Management
hayley.young@gamuda.com.au	GALC, Environment & Sustainability Lead
PTodarello@cityofparramatta.nsw.gov.au	CoPC, Supervisor Open Space & Natural Resources
Phillip.Kelly2@transport.nsw.gov.au	SM, Stakeholder & Engagement Manager
Ian.Subramaniam@transport.nsw.gov.au	SM, Project Manager Interfaces West
simonhussey@gamuda.com.au	GALC, Deputy Project Director
AMihaila@cityofparramatta.nsw.gov.au	CoPC, Health & Building Services Manager
SPike@cityofparramatta.nsw.gov.au	CoPC, Team Leader Evironmental Health Compliance
Matthew.Marrinan@transport.nsw.gov.au	SM, Snr Manager Environment
SKumar@cityofparramatta.nsw.gov.au	CoPC, Development Manager Sydney Metro

Copies of Correspondence

22 April 2022

Attn Mr Daniel Cavallo
Executive Manager City Strategy
Cumberland City Council
PO Box 42
MERRYLANDS NSW 2160

Dear Daniel,

Sydney Metro SSI 10038 – Western Tunnelling Package – Gamuda Australia and Laing O'Rourke Consortium – Construction Soil and Water Management Sub-Plan

The Western Tunnelling Package (WTP) Package was recently awarded to Gamuda Australia and Laing O'Rourke Consortium (GALC). These works form part of the Sydney Metro West – Concept and Stage 1 (major civil construction between Westmead and The Bays) planning approval.

An introductory presentation was arranged by Sydney Metro to be provided by GALC on 7 April 2022.

The planning approval requires the preparation of environmental management plans prior to construction commencing. Please find attached the Western Tunnelling Package (WTP) Soil and Water Management Sub-Plan, issued to the Cumberland City Council for consultation in accordance with CSSI 10038 Condition of Approval C5.

Accompanying this letter are the following documents:

- WTP Soil and Water Management Sub-Plan

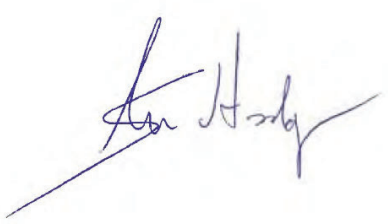
Consultation on this document(s) is required under condition C5 of SSI 10038 and we are commencing a 3-week consultation process with you as of 22 April 2022 with this submission. During this period, we will hold a comment workshop in the third week (week commencing 10 May 2022). Your attendance is not mandatory, but highly advised to ensure you get the most out of the opportunity.

As the comment workshop is intended to respond to your comments, we would also like to receive comments prior to the workshop date, preferably by 6 May 2022. Please provide any comments via a comments register.

The consultation process will conclude on the date of the final workshop.

Should you have any questions or comments on the attached, please do not hesitate to contact Matthew Marrinan, Senior Manager Environment on Matthew.Marrinan@transport.nsw.gov.au or 0475 966 938.

Yours sincerely



Stuart Hodgson
Director Sustainability, Environment & Planning
Metro West
Sydney Metro

22 April 2022

Attn Mr Sasi Kumar
Development Project Manager – Sydney Metro West
City of Parramatta Council
PO Box 32
PARRAMATTA NSW 2124

Dear Sasi,

Sydney Metro SSI 10038 – Western Tunnelling Package – Gamuda Australia and Laing O'Rourke Consortium – Construction Soil and Water Management Sub-Plan

The Western Tunnelling Package (WTP) Package was recently awarded to Gamuda Australia and Laing O'Rourke Consortium (GALC). These works form part of the Sydney Metro West – Concept and Stage 1 (major civil construction between Westmead and The Bays) planning approval.

An introductory presentation was arranged by Sydney Metro and provided by GALC on 24 March 2022.

The planning approval requires the preparation of environmental management plans prior to construction commencing. Please find attached the Western Tunnelling Package (WTP) Construction Soil and Water Management Sub-Plan, issued to the Parramatta City Council for consultation in accordance with CSSI 10038 Condition of Approval C5.

Accompanying this letter is the following documents:

- WTP Soil and Water Management Sub-Plan

Consultation on this document(s) is required under condition C5 of SSI 10038 and we are commencing a 3-week consultation process with you as of 22 April 2022 with this submission. During this period, we will hold a comment workshop in the third week (week commencing 10 May 2022). Your attendance is not mandatory, but highly advised to ensure you get the most out of the opportunity.

As the comment workshop is intended to respond to your comments, we would also like to receive comments prior to the workshop date, preferably by 6 May 2022. Please provide any comments via a comments register.

The consultation process will conclude on the date of the final workshop.

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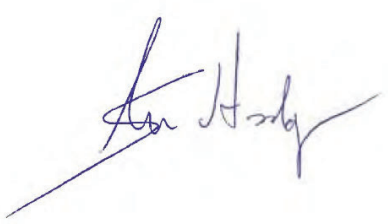
Yours sincerely



Stuart Hodgson
Director Sustainability, Environment & Planning
Metro West
Sydney Metro

22 April 2022

Attn: Sally Hamilton
Director, Environment and Planning
Sydney Olympic Park Authority
Locked Bag 3
SYDNEY OLYMPIC PARK NSW 2127

Dear Sally,

Sydney Metro SSI 10038 – Western Tunnelling Package – Gamuda Australia and Laing O'Rourke Consortium – Construction Soil and Water Management Sub-Plan

The Western Tunnelling Package (WTP) Package was recently awarded to Gamuda Australia and Laing O'Rourke Consortium (GALC). These works form part of the Sydney Metro West – Concept and Stage 1 (major civil construction between Westmead and The Bays) planning approval.

An introductory presentation was arranged by Sydney Metro and provided by GALC on 1 April 2022.

The planning approval requires the preparation of environmental management plans prior to construction commencing. Please find attached the Western Tunnelling Package (WTP) Construction Soil and Water Management Sub-Plan, issued to the Sydney Olympic Park Authority (SOPA) for consultation in accordance with CSSI 10038 Condition of Approval C5.

Accompanying this letter is the following documents:

- WTP Soil and Water Management Sub-Plan

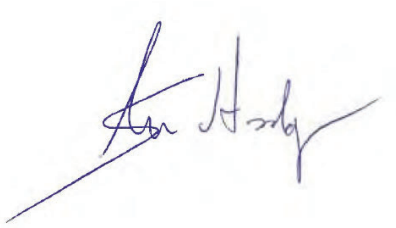
Consultation on this document(s) is required under condition C5 of SSI 10038 and we are commencing a 3-week consultation process with you as of 22 April 2022 with this submission. During this period, we will hold a comment workshop in the third week (week commencing 10 May 2022). Your attendance is not mandatory, but highly advised to ensure you get the most out of the opportunity.

As the comment workshop is intended to respond to your comments, we would also like to receive comments prior to the workshop date, preferably by 6 May 2022. Please provide any comments via a comments register.

The consultation process will conclude on the date of the final workshop.

Should you have any questions or comments on the attached, please do not hesitate to contact Matthew Marrinan, Senior Manager Environment on Matthew.Marrinan@transport.nsw.gov.au or 0475 966 938.

Yours sincerely



Stuart Hodgson
Director Sustainability, Environment & Planning
Metro West
Sydney Metro

27 April 2022

Attn: Hanka Shabilla
Account Manager (Sydney Metro), Infrastructure Development
Sydney Water
PO Box 399
PARRAMATTA NSW 2124

Dear Hanka,

Sydney Metro SSI 10038 – Western Tunnelling Package – Gamuda Australia and Laing O'Rourke Consortium – Construction Soil and Water Management Sub- lan

The Western Tunnelling Package (WTP) Package was recently awarded to Gamuda Australia and Laing O'Rourke Consortium (GALC). These works form part of the Sydney Metro West – Concept and Stage 1 (major civil construction between Westmead and The Bays) planning approval.

The planning approval requires the preparation of environmental management plans prior to construction commencing. Please find attached the Western Tunnelling Package (WTP) Construction Soil and Water Management Sub-plan, issued to the Sydney Water for consultation in accordance with CSSI 10038 Condition of Approval C5.

Accompanying this letter is the following documents:

- WTP Soil and Water Management Sub-plan

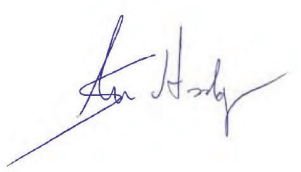
We are commencing a 3-week consultation process with you as of 27 April 2022 with this submission. During this period, we can hold an initial briefing session next week (week commencing 2 May 2022) at a time suitable to you. We can also hold a comment workshop in the third week (towards end of week commencing 9 May 2022). Your attendance is not mandatory, but highly advised to ensure you get the most out of the opportunity.

As the comment workshop is intended to respond to your comments, we would also like to receive comments prior to the workshop date, preferably by 11 May 2022. Please provide any comments via a comments register.

The consultation process will conclude on the date of the final workshop.

Should you have any questions or comments on the attached, please do not hesitate to contact onny Killen - tilities Project Manager Sydney Metro West on 0420 497 647

Yours sincerely



Stuart Hodgson
Director Sustainability, Environment & Planning
Metro West
Sydney Metro

Attachment 3 – Erosion and Sediment Control (ESCP) Procedure

This procedure outlines the fundamental principles and process that will be followed in the development of Erosion and Sediment Control Plans to ensure they are planned and implemented in accordance with Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) (the "Blue Book") Volume 1, 2 and Volume 2D Main Roads Construction (DECCW 2008).

It is noted that the Blue Book is a comprehensive technical guideline, and this procedure only addresses the key management principles that are likely to be relevant to the Project works. Where relevant, other erosion and sediment control techniques that are outlined in the Blue Book, however not included in this procedure, may be used.

Preparation of Erosion and Sediment Control Plans

Erosion and sediment control plans (ESCP) will be prepared prior to the commencement of construction at each surface worksite in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Volume 2 (Department of Environment and Climate Change, 2008).

ESCPs will be prepared and maintained by Environmental Coordinators and progressively updated as construction progresses and the site conditions change.

A template ESCP is provided in Attachment D1 of this procedure.

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: provides 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: 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' water from undisturbed areas so that it does not flow onto the works. • Pass 'clean' water through the site without mixing it with 'dirty' water from disturbed areas. 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 and use on site markers to delineate clearance limits. • Staging of clearing operations where possible

Key Principle	Control Measures
	• 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 when unused, and temporarily exposed soil surfaces.
Erosion control: management of soils	• Protection of disturbed areas as soon as practical. Short to medium term protection (0–3 months) may include: – Soil polymer application – Geotextiles/linings/coverings Longer term protection may include: – Geotextile linings or – Topsoil, jute matting and seeding with cover crop – Hydro mulching / hydroseeding. – Geotextile or plastic linings areas of concentrated flow such as flow channels or batter chutes. – Stockpiling 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. • Use of sandbags / 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 EPL discharge criteria • Regulating water quality during dewatering activities (e.g., filtering techniques and flocculation with gypsum or approved 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.

Inspection, Review and Audit

Inspections will also take into consideration the best practice requirements (IECA, 2008). Best practice site management requires all ESC measures to be inspected by GLC's nominated

representative at least daily when rain is occurring, within 24 hours prior to expected rainfall, and within 18 hours of a rainfall event of sufficient intensity and duration to cause onsite runoff (IECA, 2008). Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours). Such inspections must check:

- Daily site inspections (during periods of runoff producing rainfall)
  - All drainage, erosion, and sediment control measures
  - Occurrences of excessive sediment deposition (whether on-site or off-site)
  - All site discharge points
- Weekly site inspections (even if work is not occurring on-site)
  - All drainage, erosion, and sediment control measures
  - Occurrences of excessive sediment deposition (whether on-site or off-site)
  - Occurrences of construction materials, litter or sediment placed, deposited, washed, or blown from the site, including deposition by vehicular movements
  - Litter and waste receptors
  - Oil, fuel, and chemical storage facilities
- Prior to anticipated runoff producing rainfall
  - All drainage, erosion, and sediment control measures
  - All temporary flow diversion and drainage works
- Following runoff producing rainfall
  - Treatment and de-watering requirements of sediment basins
  - Sediment deposition within sediment basins and the need for its removal
  - Condition of all drainage, erosion, and sediment control measures
  - Occurrences of excessive sediment deposition (whether on-site or off-site)
  - Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements

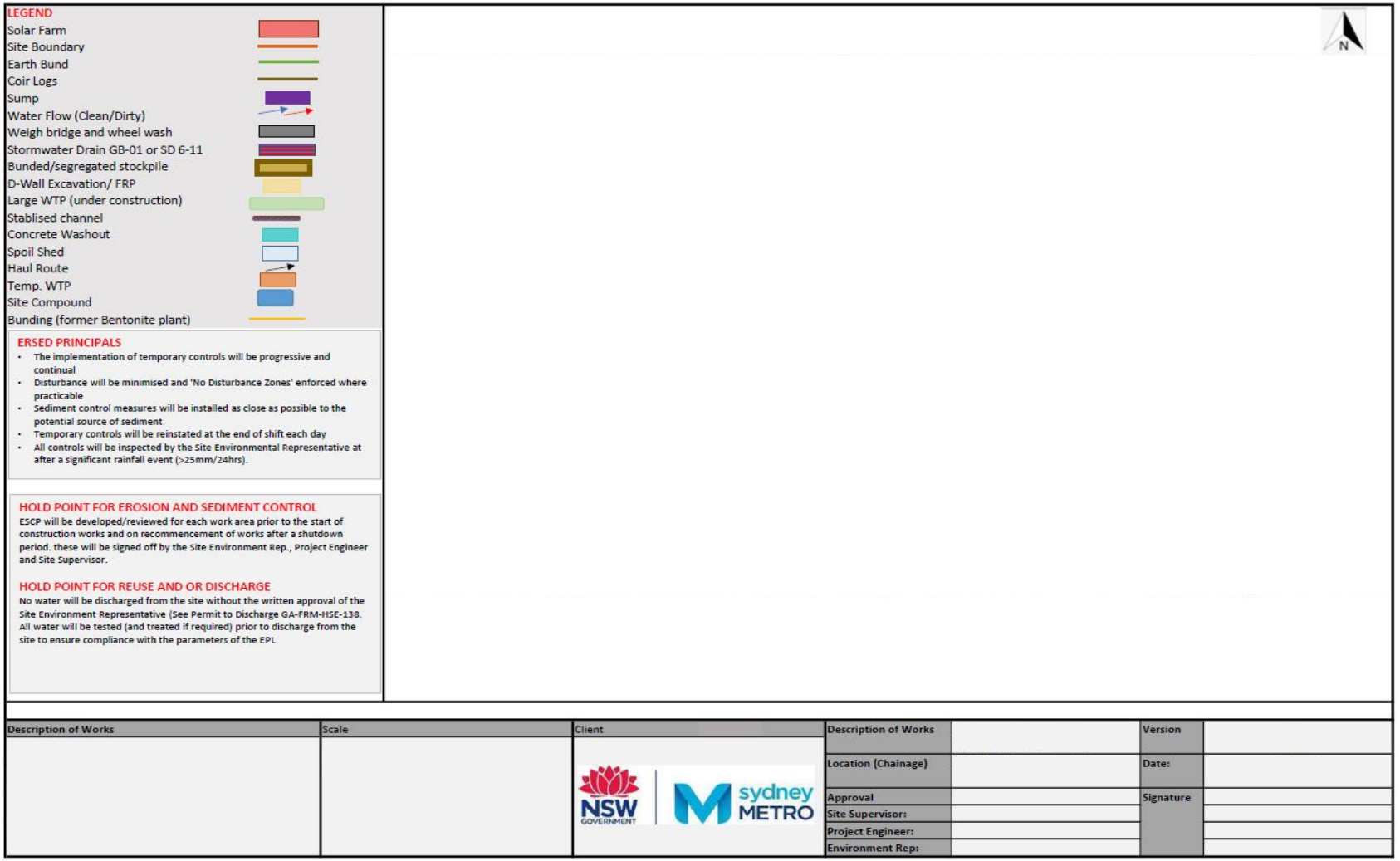
Competency, Training and Awareness

Persons involved in the preparation and review of ESCPs would have completed the IECA-Approved Erosion and Sediment Control Workshops, Blue Book Training.

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 including:

- ERSED control planning and installation methodology
- Stockpile location criteria
- Sediment basin construction
- Sediment basin maintenance
- Preparedness for high rainfall events.

Attachment D1: Erosion and Sediment Control Plan (ESCP) Template



Attachment 4 – Unexpected Contaminated Land and Asbestos Finds Procedure

UNEXPECTED CONTAMINATED LAND AND ASBESTOS FINDS PROCEDURE

Unexpected Finds Procedure

INTERNAL HOLD POINT : Evidence of Contamination Observed

If observations indicate presence of potential contamination, then STOP all work in the immediate area and prevent further activity in the area.

- Do not touch or disturb the item/ materials.
- If material is suspected to be asbestos, cover with geofabric and secure.
- Set up appropriate barricades to prevent access to the area.
- Notify the Site Supervisor, Environmental Advisor and Safety Advisor

→ Workforce

Record the following details of the unexpected contamination find:

- Location of the potential contamination
- Visual appearance (including notes and or photographs)
- Odour (if any)
- Depth
- Surrounding material and works being undertaken at the time of discovering the material

→ Project Engineer Supervisor

As soon as reasonably practicable, GLC Environment Manager is to notify the Sydney Metro representative of unexpected find.

→ Environment Manager

- Sampling and laboratory analysis of materials may be undertaken in accordance with relevant guidelines.
- Implement procedures from SWMP for contaminated land management.
- If required, the GLC Environment Manager is to seek advice from a **Contaminated Land Consultant** while testing occurs, on the appropriate controls to be emplaced to safeguard human health or the environment. i.e set up of exclusion zones and closure of key work areas.

→ Environment Manager
Suitably Qualified Contamination Specialist
Site Auditor
Project Engineer

HOLD POINT: Environmental Protection

Activities within the vicinity of actual or suspected contaminated land require assessment in accordance with the SWMP, and as per the advice of the Contamination Specialist (as relevant)*

→ Environment Manager
Contamination Specialist*

HOLD POINT RELEASE: Environmental Protection

→ Environment Manager

- Construction activities to recommence once CLM procedures have been implemented and completed as required (investigation/ remediation/validation)

→ Environment Manager
Supervisor
Construction Manager

- If contaminated material requires offsite disposal, refer to Waste and Spoil Management Sub-plans for guidance on management, handling, classification, disposal and tracking requirements.
- Unexpected finds to be recorded in the Unexpected Finds Register with remediation, validation and/or management of each unexpected find and how each unexpected find is closed. The unexpected finds register must be provided to the environmental consultant for inclusion in a site condition/site validation report and to the Auditor for review.

→ Construction Manager
Supervisor
Project Engineer
Environmental and Sustainability Manager

PROTOCOL

This Unexpected Contaminated Land and Asbestos Finds Procedure must be followed should unexpected contamination or asbestos (or suspected contamination) be excavated or otherwise discovered. This procedure has been developed for compliance with CoA D77 and will be implemented as per requirements of CoA D78.

Note:

- **Where a responsibility is allocated to the Environment Manager, a delegate in the form of a Senior Environmental Advisor or similar may assume this responsibility.**
- **The UF Register can be provided to the ER and Site Auditor upon request.**

Likelihood of contamination

The presence of potentially contaminated material can be detected where material is uncovered which displays some or all of these characteristics:

- Unusual odour from soils that are not detected in other similar areas
- Discolouration or staining of soil or rock
- Seepage of unusual liquids from soil or rock
- Unusual odours, sheen or colour on groundwater and/or surface water
- Unusual metal objects
- Unexpected underground storage tanks, buried drums or machinery etc.
- Presence of waste or rubbish above or below ground
- Potential asbestos containing material

Where these factors are identified, the material is considered to be possibly contaminated and the flowchart is to be followed.

Asbestos

An unexpected asbestos find occurs when Asbestos Containing Materials (ACM), not identified in the Asbestos Register, are found on site. In the event of an unexpected asbestos find, the below steps are to be followed along with the flowchart.

1. The area is to be delineated, works in the immediate vicinity to cease.
2. Notify the Environmental Advisor, Safety Advisor and Site Supervisor. Site Supervisor to notify workers in the vicinity of find.
3. Ensure the soil and potential asbestos remain damp with dust suppression or securely covered where water cannot be accessed. If material is to be left over night, exposed area is to be securely covered.
4. Project Engineer must arrange for testing of the suspected ACM and arrange for a occupational hygienist to undertake monitoring of the area (if required).
5. A licenced asbestos removalist is to be engaged to provide recommendations to treat the area, as required.
6. A clearance certificate is required from the asbestos removalist to confirm that the area is to be made safe.

If assessed to be present through soil:

7. Notify the contaminated land management team for inclusion on the Contamination Register
8. Implement procedures in accordance with the contaminated land framework

Attachment 5 – Construction Site Water Reuse and Dewatering Procedure

Introduction

This procedure regulates both onsite reuse of water and provides dewatering guidance.

Dewatering, for the purposes of this procedure, is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location on site and the subsequent reuse or discharge of that water.

Captured stormwater and infiltrating groundwater will fill sedimentation controls and pool in low lying areas of construction formations and excavations. These areas will be dewatered to maintain the effectiveness of sedimentation controls and to ensure formations and excavations are not adversely affected by long periods of inundation.

Legislative Obligations

The *Protection of the Environment Operations (NSW) Act 1997* (POEO Act) is the key piece of environment protection legislation in NSW, administered by the Environment Protection Authority (EPA). Under section 120 of this Act, the pollution of waters, no matter how minor, is illegal.

Under the POEO Act, the pollution of waters is broad and captures the introduction of anything that alters the physical, chemical or biological condition of the receiving waters. Waters include the whole or any part of:

- Any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or
- Any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water

To avoid causing pollution and breaches of section 120, 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).

The discharge criteria have been extracted from the Project EPL (No. 21676) and are detailed in Table 7.2 of the SWMP.

Water Reuse – assessing potential reuse opportunities.

In accordance with the water reuse strategy, opportunities for reuse of water generated through construction activities will be assessed. Onsite reuse of stormwater or detained groundwater should be considered as the first option for dewatering activities. Re-use of groundwater or stormwater on site however, would occur following treatment from the water treatment plan. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation, and plant/vehicle wash-down. Reuse of water on the construction site may reduce the need for imported or extracted water and provide a lower risk to the environment than direct discharge to the environment.

Where water is to be re-used on site the Water Discharge and Reuse Permit will be utilised.

Discharge Criteria

Water Pollution Impact Assessment

In accordance with MCoA D119 Water Pollution Impact Assessments were developed to inform licensing consistent with section 45 of the POEO Act. The assessment takes into consideration the environmental values of the receiving waterway(s) to establish suitable discharge criteria to maintain the identified NSW Water Quality Objectives.

The Water Pollution Impact Assessments were prepared in consultation with the EPA and are consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk. Separate Water Pollution Impact Assessments were prepared for each discharge point as required. The Water Pollution Impact Assessment will be termed the Water Discharge Impact Assessment for consistency with the EPA's adopted nomenclature.

Water discharge must meet the requirements of the EPL.

Correlating Total Suspended Solid (TSS) with Turbidity

Consideration may be given to establishing a site-specific relationship between TSS concentrations and turbidity, measured in nephelometric turbidity units (NTU). This allows the TSS and turbidity to be inferred from an NTU reading. The benefit of using NTU is that it can be quickly measured onsite with a hand-held meter, whereas water quality meters that measure TSS are expensive and the results from samples sent for laboratory analysis will not be available immediately. However, NTU is affected by factors other than suspended solids, such as colour, e.g. tannins may alter the NTU reading.

As such, a correlation analysis must be undertaken between TSS and NTU that is specific to the site to confirm the relationship. The correlation must be determined via analysis by a NATA-accredited laboratory. Thorough records of the site-specific correlation must be kept, and any recommendations and/or limitations should be documented as part of the CEMP. Further information on this can be found in Attachment 5 of the Blue book.

Discharge Location

On site discharge locations were selected to avoid the potential for scouring, prevent water from flowing back onto site and avoid sensitive areas (e.g. wetlands). Energy dissipation must be provided at all dewatering discharge points. Discharge locations have been presented in Section 7.5 of the SWMP.

Discharge Point Register

Dewatering locations will be identified though detailed design, in development of the ESCPs and during construction as earthworks and construction phases result in changing site drainage conditions. These may include:

- Sedimentation controls (e.g., sedimentation basins and sumps)
- Excavations
- Culvert and drainage constructions
- Low lying areas of road formations.
- All proposed dewatering locations must be identified on the EPL Discharge Point Register to be maintained by the EPA. The EPA must be notified at least 48hrs prior to a discharge point being added or removed from the Discharge Point Register.

Locational Criteria

Consideration will be given to the following factors when determining a suitable offsite location:

- Direction of groundwater flow – recharging groundwater that will subsequently flow either back onto site, into excavations or low-lying areas should be avoided.
- Erosion – the receiving area must have complete groundcover (e.g., grass) and established vegetation to minimise the risk of erosion.

- Flora and fauna – water must not be discharged to areas where there is potential to have an adverse effect on any flora or fauna species.
- Flooding – the receiving area must have the infiltration capacity to receive the volume of water to be discharged, without causing flooding or significantly increasing the risk of flooding should subsequent rainfall occur.

Treating Water Prior to Discharge

The treatment and discharge of water on-site is managed through the Permit to Discharge process. Treatments will be designed to achieve the water quality outcomes specified in the Project EPL, as well as to cater for the time constraints that may be applicable to the activity (i.e., 5 day management period for sedimentation basins). Treatments should be applied to waters as soon as the requirement is determined and should be applied only by experienced, trained and competent personnel. Care needs to be taken to ensure treatment methods do not adversely affect water quality.

Turbidity (Total Suspended Solids)

If Total Suspended Solids are greater than the discharge criteria for the relevant Discharge Point in the EPL, the sediment must settle or be removed prior to discharge. This can be achieved via the following methods:

- Natural settlement – process can be timely and is heavily dependent on local soil types.
- Flocculation – chemical treatment with a flocculent (e.g. gypsum). If the flocculant is being applied manually, an even application over the surface of the water is essential. Only environmentally safe flocculants are to be used, with the Environment and Sustainability Managers approval.
- Filtration – using pumps to pass water through a filter medium (e.g., geofabric) to another storage area (e.g., container or sediment basin) to remove sediment.

Re-testing of water is required once treatment has been undertaken to ensure criterion for TSS is met.

pH Levels

If pH is outside the range 6.5-8.5 the water will need to be neutralised. This may be achieved via three methods which are independent on site and time constraints:

- Natural – allowing the water to sit for a period of time, allowing pH to neutralise.
- Mixing – by mixing with water collected from other parts of site, that have a higher or lower pH
- Acid/Base Addition – If the water is above 8.5, acid is used to lower the pH (i.e – HCl). If the water is below 6.5 a based is used to raise the pH (i.e – $NaHCO_3$). To treat water with acid or base, safety requirements must be followed as outlined in the relevant Safety Data Sheet (SDS).

Prior to discharge and following treatment, ensure water is re-tested to meet the desired pH of 6.5-8.5. If not, repeat treatment and testing until the required criteria is achieved.

Oil and Grease

Examine surface of water immediately prior to discharge for evidence of oil and grease (e.g., Sheen, discolouration). No action is required if there is no visual contamination.

If there is contamination, the contaminated water will either be disposed of at a licensed disposal facility, or treated using appropriate absorbent materials, which must be spread on the surface of the water. Any used absorbent materials are to be disposed of appropriately.

Management of dewatering process

The following controls and safeguards are to be implemented when dewatering:

- Pump inlet - pumps inlets require controls to be installed to ensure they do not come into contact with sediment settled at the bottom of the basin or pond. Preventing sediment being drawn up can be achieved using floats to hold the pump inlet high in the water column. In shallow water bodies, a bucket with holes cut in or a stake may be used to ensure the hose inlet does not lower to the floor of the dewatering area.
- Pump outlet - the discharge point chosen should be safe from erosion/scour risks in the first instance. Where the discharge point selected is not already scour protected, it must be protected using temporary measures such as lining with geofabric or rock. In the context of basin spillways, spillways must be appropriately protected prior to use. i.e lined with geo-fabric followed by scour protection rocks.
- Pre-commencement inspection - all dewatering activities must be inspected and monitored by trained, experienced and or competent personnel.
- Commencement of pumping / discharge – monitor the initial flow path of the water away from the job. Ensure water is not flowing back onto the project or across other disturbed ground. If water is flowing over land, the flow path must be free of loose sediment/pollutants to ensure it is not impacting water quality downstream.
- Supervision of discharge – supervision of the discharge process should include:
  - Visual checks of suspended solids within the water body being de-watered.
  - Visual checks of the position of the pump inlet and outlet.
  - General monitoring of downslope water quality to ensure the discharge process is not causing negative downstream water quality impacts.

Continuous supervision of a dewatering activity may be replaced by periodic inspections at basins where hard (fail safe) controls (i.e., basin spears) have been installed that eliminate the risk of causing environmental harm.

It is not anticipated that odours will be present in the stormwater. Stormwater will be generated only from clean surfaces and diverted offsite through appropriate controls.