PROJECT MONITORING PROGRAM

Surface Water Quality Monitoring Program

Sydney Metro West – Western Tunnelling Package

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Document Details

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Signature	Signature	Signature
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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	16/03/2022	Early Works Submission	Stephanie Mifsud	Simon Hussey
B	24/05/2022	Revised draft following stakeholder consultation	Stephanie Mifsud	Simon Hussey
C	02/06/2022	Final draft following review from Sydney Metro and Environmental Representative	Stephanie Mifsud	Simon Hussey
D	06/02/2024	Updates to include SOP scope and annual review.	Tahli Moore Hussain Nilar	Simon Hussey
E	01/05/2024	Updated In response to SM/ER Comments	Scott Thomson Hussain Nilar	Simon Hussey
F	17/05/2025	Annual update	Hussain Nilar	Simon Hussey
G	25/07/2025	Update in response to ER/SM Comments	Hussain Nilar	Simon Hussey

Terms and Definitions

Term	Definition
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARMCANZ	Australian and Resource Management Council of Australia and New Zealand
AFJV	Acciona Ferrovial Joint Venture
CEMP	Construction Environmental Management Plan
CEMF	Construction Environmental Management Framework
CoA	Conditions of Approval
CSSI	Critical State significant Infrastructure
DO	Dissolved Oxygen
DPHI	Department of housing and Infrastructure (formerly DPE)
DSI	Detailed Site Investigation
EC	Electrical conductivity
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A	Environmental Planning and Assessment Regulation Act (NSW) (2000)
EPL	Environmental Protection Licence (No. 21676)
ER	Environmental Representative
GLC	Gamuda Engineering (Australia) Laing O'Rourke Consortium
GWMP	Ground Water Management Plan
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PFAS	Per- and Polyfluoroalkyl substances
REMMs	Revised Environmental Measures
SEPP	State Environmental Planning Policy (NSW)
SM	Sydney Metro
SOP	Sydney Olympic Park
SOPA	Sydney Olympic Park Authority
SWMP	Soil and Water Management Plan
SWQMP	Surface Water Quality Monitoring Program
SWQMR	Surface Water quality Monitoring Report
TDS	Total Dissolved Solids
WQO	Water Quality Objectives
WTP	Western Tunnelling Package

1 INTRODUCTION

1.1 Project Description

The scope of the work being undertaken under the Sydney Metro West 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.

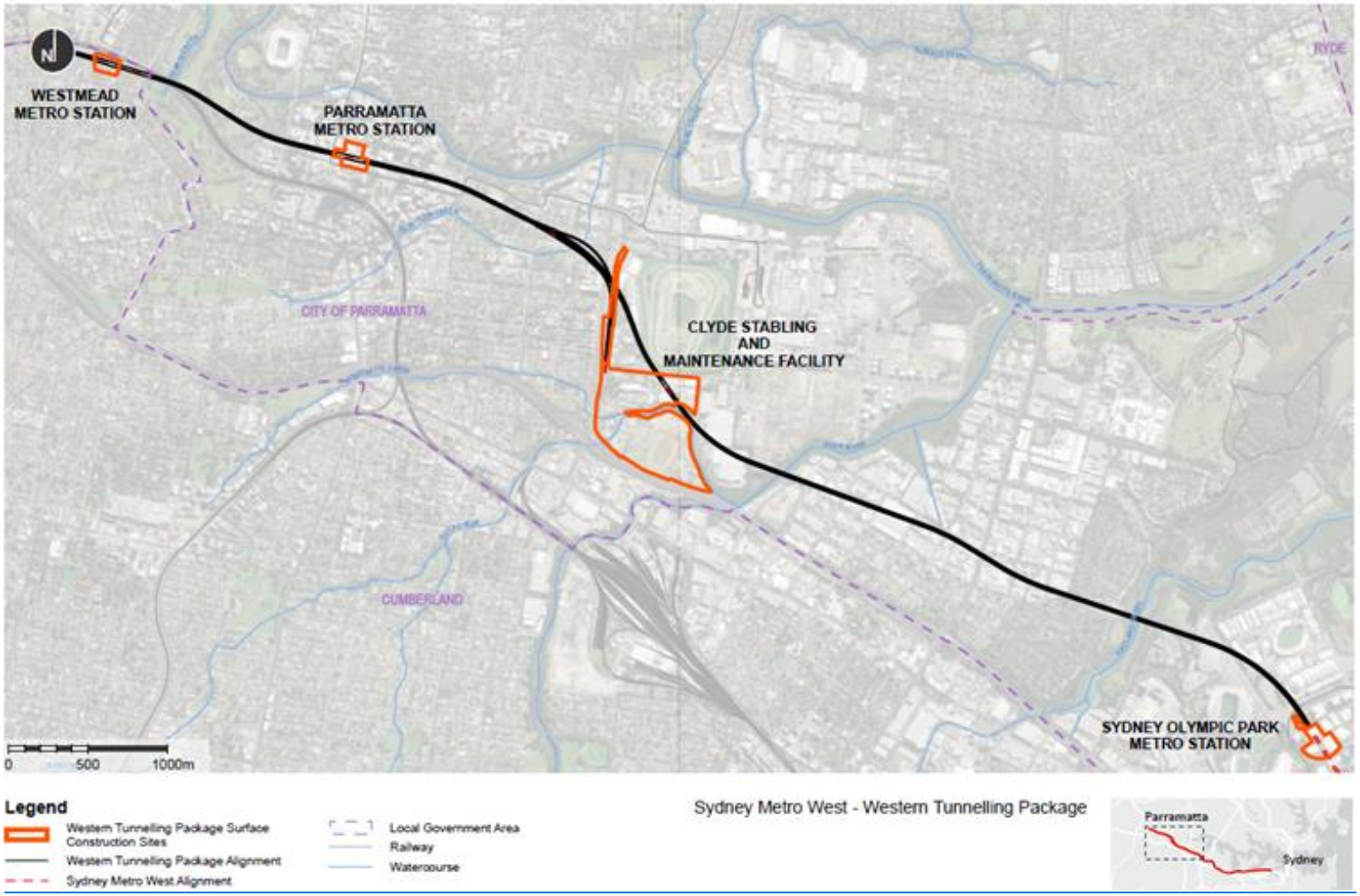


Figure 1: WTP Project Location

1.2 Context

The Construction Environmental Management Plan (CEMP) and sub-plans have been developed for the delivery of the WTP. It will be delivered by Gamuda Engineering (Australia) Laing O'Rourke Consortium (GLC). This Surface Water Quality Monitoring Program (SWQMP) forms part of the CEMP (SMWSTWTP-GLO-1NL-EV-PLN-000001).

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 SWQMP has been prepared to address requirements of the Minister's Conditions of Approval (MCoA) and any modifications to the 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 Section 3 of the CEMP.

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

- Site Establishment Management Plan
- Soil and Water Management Plan
- Groundwater Management Plan
- Groundwater Monitoring Program
- Flora and Fauna Management Plan
- Waste Management Plan
- Spoil Management Plan.

1.4 Consultation Requirements

This monitoring plan builds on the consultation that had been undertaken during the Environmental Impact Statement (EIS) and Response to Submissions, managed by the project proponent, Sydney Metro (SM).

Consultation of this surface water quality monitoring program will be undertaken with:

- Department of Planning, Housing, and Infrastructure (DPHI) (formerly DPE), Sydney Water (if any Sydney Water assets are impacted), Cumberland City Council, City of Paramatta Council and Sydney Olympic Park accordance with the MCoA C14(c); and
- NSW Environment Protection Authority (EPA) and the abovementioned Councils in accordance with REMM SSWQ6

Consultation was undertaken over a 21-day period, commencing from 5 May 2022 with the submission of the SWQMP. 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.

An introductory meeting was held on 24 March with City of Parramatta Council and 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.

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 3, including copies of correspondence in accordance with MCoA A6. The approach to consultation is further outlined in the CEMP.

Ongoing consultation with stakeholders may be undertaken as required during project delivery. In line with MCoA B11, a copy of the Construction Monitoring Reports will be published on the GLC project website.

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.

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.

This SWQMP was submitted to the ER for endorsement and the Planning Secretary for approval on the 8 June, following endorsement from the Environmental Representative (ER) on the 7 June 2022. Approval from the Planning Secretary was received on the 11 July 2022. Construction commenced on the 19 July 2022 following approval of the SWQMP in compliance with MCoA 21.

This SWQMP, as submitted to the ER, including any minor amendments approved by the ER, will be implemented for the duration of construction.

2 PURPOSE AND OBJECTIVES

2.1 Purpose

The purpose of this SWQMP is to describe how Gamuda Engineering (Australia) – Laing O'Rourke Consortium (GLC) and its subcontractors proposes to monitor potential impacts to surface water during construction of the Project. This SWQMP forms an integral part of the project CEMP and GLC's EMS. It applies to all works associated with Project works and establishes the environmental management controls to be implemented.

This SWQMP outlines how GLC will comply with and implement the applicable surface water quality monitoring 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 (determined 28 July 2021)
- SSI Modifications – Modification 2 Clyde Stabling and Maintenance Facility (determined 03 June 2022)
- SSI Modifications – Modification 3 Administrative Modification (determined 4 July 2022)

  SSI Modifications – Modification 4 Administrative Modification (determined 22 December 2022)

  SSI Modifications – Modification 5 Administrative Modification (determined 20 September 2023)

  SSI Modifications – Modification 6 Administrative Modification (determined 6 November 2024)
- Infrastructure Sustainability Council (ISC) Infrastructure Sustainability (IS) rating tool.

2.2 Scope

The Program will be implemented to monitor the effectiveness of mitigation measures applied during the construction phase of the Project. Monitoring of surface water will be undertaken to identify potential impacts and ensure an appropriate management regime can be implemented to address those impacts and manage local surface water quality.

The Program provides details of the surface water monitoring network, frequency of monitoring, and test parameters.

The following are not within the scope of this SWQMP:

- The management of surface water (e.g. collection, testing, and discharge) is not discussed in this SWQMP. These water management aspects are addressed separately in the Soil and Water Management Plan (SWMP) or the Groundwater Management Plan (GWMP).
    - The SWMP focuses on surface water collected within the construction site footprint (with the exception of the station boxes); and
    - 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 GWMP. This is due to most of these flows coming from groundwater sources/underground processes.
- Operational monitoring does not fall within the construction phase, and thus is not discussed in this SWQMP.

2.3 Objectives

This Program will be utilised to define, address, and implement surface water quality monitoring requirements and will apply for the duration of construction and following the progression to Site handover following construction completion. This SWQMP outlines how GLC will comply with and implement the requirements from the following project documents:

- NSW Ministers' MCoA (first issued on 11 March 2021 and later modified on 28 July 2021, 3 June 2022, 4 July 2022, 22 December 2022, and 20 September 2023 respectively)
- Sydney Metro CEMF
- The REMMs listed in the Sydney Metro West – Submissions Report, dated 20 November 2020
- The Sydney Metro West – Concept and Stage 1 EIS[1].

[1] Sydney Metro West – Concept and Stage 1 Environmental Impact Statement (EIS) prepared by Jacobs/Arcadis, dated 15 April 2020. Planning approval no. SSI-10038.

3 LEGAL AND OTHER REQUIREMENTS

Relevant legislation and guidelines and project specific requirements are detailed herein.

3.1 Legislation and Guidelines

The SWMP details a comprehensive list of legislation and guidelines relevant to the management of soil and water during the construction phase of the WTP. Specific water quality guidance and standards are listed below:

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

3.2 Environmental Protection Licence (EPL)

GLC was issued an Environmental Protection Licence (EPL No. 21676) from the NSW EPA for the Sydney Metro WTP Project, 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.

This is discussed in Attachment 1 of the SWMP. Any EPL conditions relevant to surface water monitoring are incorporated into this program and will be reviewed during the document review process.

Figure 2 depicts sections of the EPL that identifies the approved discharge points and concentration limits from WTP's construction sites.

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Pre-Cast Yard Stormwater Discharge Point	Pre-Cast Yard Stormwater Discharge Point	Eastern Creek Pre-Cast Yard Stormwater Discharge Point
3	Westmead permanent WTP Discharge and monitoring	Westmead permanent WTP Discharge and monitoring	Discharge from the Westmead permanent water treatment plant to Domain Creek
4	Rosehill permanent WTP monitoring and discharge	Rosehill permanent WTP monitoring and discharge	Discharge from the Rosehill permanent water treatment plant to Duck River
5	Parramatta Construction WTP monitoring and discharge	Parramatta Construction WTP monitoring and discharge	Discharge from the Parramatta Construction water treatment plant to Parramatta River
6	Temporary discharge point	Temporary discharge point	Rosehill discharge from the Sydney Water pipeline commissioning to Duck Creek

Figure 2. EPL P1.1 Discharge Points as of May 2025. Discharge points are subject to change based on project needs and notification to the EPA which would result in changes to the Projects EPL.

3.3 Project Requirements

This monitoring program has been developed to satisfy the requirements of MCoA C14 and C15. A full list of applicable MCoAs, REMM requirements, CEMF requirements, and EPL requirements are provided in Attachment 1.

3.4 Smart Principles

In accordance with the requirements of MCoA C15(j) the SWQMP is to be developed with consideration of SMART principles. This plan achieves this as follows:

1. Specific – the SWQMP for the WTP includes specific background data, sampling locations, as well as trigger values relating to specific construction sites
2. Measurable – parameters requiring reporting are all measurable
3. Actionable – the methodology for the collection and analysis of data is provided
4. Realistic – the SWQMP is achievable and not overly onerous
5. Timely – specific timeframes for the completion of tasks is provided.

4 EXISTING ENVIRONMENT

4.1 Catchment Description

The data related to existing environment is sourced from Chapter 19 (Soils and surface water quality) of the Sydney Metro West Stage 1 Environmental Impact Statement (April 2020).

The construction sites for the WTP lie entirely within the upper estuary of the Parramatta River Catchment, 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 influence the water quality and quantity and speed of flows within the catchment. The catchment is estuarine up until the Charles Street Weir is reached, adjacent to the business district of Parramatta. Above 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 construction sites drain into sub-catchments of Parramatta River. These watercourses have generally been lined with concrete and channelised. Table 1 identifies the distance from the site to the listed receiving creeks, as well as the classification of creek as Key Fish Habitat and the proximity to State Environmental Planning Policy (SEPP) Coastal Wetlands.

Table 1: Watercourses relevant to WTP

WTP Site	Watercourse	Distance from site	Receiving Waters	Sensitive Receiving Environments?
Westmead Metro	Domain Creek	360 m	Parramatta River	• No SEPP coastal wetlands within 500m • Not Type 1 Key Fish Habitat
Parramatta Metro	Parramatta River	250 m	Parramatta River	• Type 1 Key Fish Habitat • Numerous SEPP Coastal Wetlands • Potential habitat for threatened aquatic species and protected aquatic vegetation
	Clay Cliff Creek	450 m	Parramatta River	• No SEPP coastal wetlands within 500m • Not Type 1 Key Fish Habitat
Clyde Stabling and Maintenance Facility	Duck River	Immediately adjacent to site	Parramatta River	• Type 1 Key Fish Habitat • SEPP Coastal Wetlands within 500 metres
	Duck Creek	Immediately adjacent to site	Parramatta River	• Type 1 Key Fish Habitat • SEPP Coastal Wetlands within 500 metres
	A'Becketts Creek	Immediately adjacent to site	Parramatta River	• SEPP coastal wetlands within 500m • Type 1 Key Fish Habitat

WTP Site	Watercourse	Distance from site	Receiving Waters	Sensitive Receiving Environments?
Sydney Olympic Park	Haslams Creek	1.2km	Homebush Bay	• Type 1 Key Fish Habitat • SEPP Coastal Wetlands within 500 metres

4.2 Water Quality Objectives (WQOs)

The NSW Water Quality and River Flow Objectives (NSW Department of Environment, Climate Change and Water, 2006) provide environmental values (EVs) for the Sydney Harbour and Parramatta River regional catchments. The water quality objectives (WQOs) provide a framework to assess water quality in terms of whether the water is suitable for a range of EVs. Table 2 shows the EVs assigned to each of the watercourses relevant to the Project (referenced from NSW Water Quality and River Flow Objectives, DECCW).

Table 2: Environmental Values

Watercourse and/or receiving waters	Environmental Value (EV)				
	Aquatic ecosystems	Visual amenity	Primary contact recreation	Secondary contact recreation	Aquatic foods (cooked)
Domain Creek	X	X	X	X	-
Parramatta River and Sydney Harbour	X	X	X	X	X
Clay Cliff Creek	X	X	-	X	-
Duck River	X	X	X	X	X
Duck Creek	X	X	X	X	X
A'Becketts Creek	X	X	X	X	-
Haslams Creek	X	X	-	X	-

4.3 Baseline Surface Water Data

There has been no detailed pre-project baseline surface water monitoring data identified in the Sydney Metro West EIS documentation. As part of the EIS, a review of available existing water

quality data collected from Sydney Water, Local Councils, University of Western Sydney and the WestConnex M4 East project was undertaken. This review indicated:

- Watercourses relevant to Stage 1 are generally in poor condition and are representative of a heavily urbanised system; and
- Some background levels exceed the ANZECC (2000) water quality trigger values for slightly to moderately disturbed ecosystems. These are summarised in Table 3.

Table 3: Existing water quality conditions of watercourses relevant to WTP (taken from table 19-6 of EIS)

Watercourse	Water quality characteristics relevant to ANZECC/ARMCANZ (2000) indicators[1]
Domain Creek	Low dissolved oxygen levels Elevated nutrient concentrations
Parramatta River (monitoring locations at Johnsons Bridge and Cumberland Hospital)	Elevated nutrient concentrations Elevated heavy metal concentrations High turbidity
Clay Cliff Creek	No existing data
Duck River	Low dissolved oxygen levels Elevated nutrient concentrations High turbidity
Duck Creek and A'Becketts Creek	Elevated nutrient concentrations Elevated concentrations of faecal coliforms
Haslams Creek	Elevated nutrient concentrations Elevated concentrations of faecal coliforms

Note 1: Sources: City of Parramatta Council, Sydney Water, Cumberland City Council, WestConnex M4 East.

In lieu of baseline surface water monitoring data from the EIS, monitoring data was sourced from other major projects to provide an indication of general waterway health. The monitoring data that was gathered from other projects was generally the background or median data that was used for those projects, as current monitoring data was not always readily available. The water quality data sourced from Appendix G of the WestConnex M4 Widening project EIS and Technical Paper 6 of the Parramatta Light Rail Stage 1 EIS (Jacobs, 2017) is presented in Table 4. , noting some of this data was sourced from Parramatta River Estuary Coastal Zone Plan (Cardno, 2012). A summary provided within Cardno (2012) reports average concentrations of nutrients and other parameters above ANZECC (2000) guidance.

Table 4: Baseline Water Quality Data (Source: Table 4.2 WestConnex M4 Widening and the Parramatta Light Rail Stage 1)

Indicator	ANZECC/ ARCANZ WQ Guidelines 2000	Duck River	Duck Creek (Kay St)	Parramatta River (Barry Wilde Bridge)	Parramatta River (Elizabeth St Footbridge)	Parramatta River (Upstream of Ferry Wharf)	Haslam Creek
Turbidity (NTU)	0.5–10	37.1	24.1	14.3	10.05	14	9.8[1]
Dissolved Oxygen (mg/L)	N/A	4.9	7.4	8.7	9.0	7.6	8.1[2]
Dissolved Oxygen (%)	85-110	49.2	67.3	95.4	98.2	82.4	88.7[1]
Conductivity (mS/cm)	Lowland rivers: 125–2200 µS/cm	7.00	1.42	452.5	457	432	31.85[1]
Salinity (ppt)	N/A	7.5	0.71	-	-	-	-
pH	7.0 – 8.5	7.50	7.98	7.97	8.20	7.4	7.5[1]

Note:
1 - Values obtained by averaging monthly sampling data of Haslam's Creek from AFJV's 6 Monthly monitoring report between December 2021 and June 2022. (*n* = 6, location = -33.834564° S, 151.075772° E)
2 – Values obtained by averaging monthly sampling data of Haslam's Creek from AFJV's 6 Monthly monitoring report between July 2022 and December 2022. (*n* = 6, location = -33.834564° S, 151.075772° E)

Recent water quality data for Domain Creek is limited, comprising of a short-term monitoring program carried out in 2015 by the University of Western Sydney, as identified in Technical Paper 6 Jacobs, 2017. Monitoring indicated that the water quality of Domain Creek near its confluence with the Parramatta River was poorly oxygenated (median ~62 per cent saturation). It was inferred that Domain Creek is slightly eutrophic and that other indicators including pH, turbidity and conductivity fell within recommended guideline limits for protection of aquatic ecosystems. Additional baseline data will also be gathered prior to the commencement of construction – and in particular, the commencement of ground disturbance that has the potential to cause runoff. A minimum of at least two monthly baseline monitoring events will be carried out to allow for direct comparison to baseline data captured immediately prior to construction commencing.

Similarly, Haslam Creek which is the closest receiving water body to Sydney Olympic Park Station has limited background monitoring data available. Given GLC began site activities at SOP from December 2023, and would achieve TBM breakthrough in the second quarter of 2024, background monitoring data of Haslams Creek from Central Tunnelling Package (Acciona Ferrovial Joint Venture) was obtained from their two earliest Surface Water Quality Monitoring Reports. These date from December 2021 through to December 2022.

5 SURFACE WATER QUALITY MONITORING

5.1 Proposed Monitoring Locations

The proposed surface water quality monitoring sites are presented in Table 5 below and shown in the maps included in Attachment 2. These sites have been chosen (where applicable) as they are similar to surface water monitoring locations from previous infrastructure projects such as the Parramatta Light Rail, M4 Widening and the Central Tunnelling Package, to enable a continuation of existing information. The locations comprise monitoring locations which allow GLC to isolate potential or actual impacts introduced by GLC's construction sites, including any discharge points. As such, the monitoring locations selected are located upstream and downstream of construction sites and or discharge points.

There may be instances during the monthly sampling where sampling points cannot be accessed, or where they need to be altered for reasons such as:

a) Potential access constraints - which could place an individual's health and safety at risk such as due to intense rainfall, venomous or aggressive fauna or unstable sampling locations following recent weather events.
b) Changes in construction which render sampling point access temporarily or permanently inaccessible – this could be a product of the natural progression of works, or where sampling points are no longer representative of either conditions up or downstream of construction.
c) GLC maintains an Environmental Protection License (EPL). The proposed monitoring locations will align with the discharge locations stated in the EPL and would be moved in response to changes in the EPL discharge points so as to capture any discharge related impacts to surface water quality.

In all cases where sampling points are relocated or unable to be sampled, these changes would be discussed in the relevant monitoring report. This ensures GLC are able to achieve the objectives of their sampling program, including frequency and intent and ensure surface water quality impacts are continued to be monitored without delay.

Table 5: Proposed Monitoring Locations

Sample Name	Waterway	Rationale	Nearest Access Point	Coordinates
SW01-WTP	Duck Creek	Upstream of Clyde MSF Construction sites (Duck Creek)	James Ruse Drive	33° 49' 53.17" S 151° 1' 12.02" E
SW09-WTP	A'Becketts Creek	Upstream of Clyde MSF construction sites (A'Becketts Creek)	Clyde Dive Construction Site	33°49'46.2"S 151°01'12.3"E
SW02-WTP	Duck Creek	Downstream of Clyde MSF Construction sites / before confluence with Duck River	Deniehy Street	33°49'58.58"S 151° 1'41.11"E

Sample Name	Waterway	Rationale	Nearest Access Point	Coordinates
SW08-WTP	Duck River	Upstream of confluence with Duck Creek. Upstream of Clyde MSF discharge point.	Access from Deniehy Street via cycle path	33°83'52.91"S 151°02'94.05"E
SW03-WTP	Duck River	Downstream of confluence with Duck Creek Downstream of Clyde MSF discharge point.	Holker Street, Silverwater	33°82'93.86" S 151° 0'24.68"E
SW06-WTP	Parramatta River	Upstream of Parramatta discharge point	Parramatta River Walk (upstream Ferry Wharf)	33°48'47.83"S 151° 0'35.37"E
SW11-WTP	Parramatta River	Downstream of Parramatta Discharge Point	Queens Wharf Park (south of Parramatta River)	33°48'54.5''S 151°00'42.1''E
SW10-WTP	Domain Creek	Upstream of Westmead Construction Site	Parramatta Park (south of Park Parade)	33°81'105''S 150°99'175''E
SW07-WTP	Domain Creek	Downstream of Westmead Construction Site	West Domain Avenue	33°48'33.46"S 150°59'35.58"E
SW08-WTP	Duck River	Upstream of confluence with Duck Creek	Access from Deniehy Street via cycle path	33°83'52.91"S 151°02'94.05"E

Sydney Water Asset and Property Owner Access impacts:

The proposed monitoring locations may also be subject to discussion with Sydney Water Corporation who manage the drainage assets. In these circumstances, they may be revised following further ground truthing and consultation to ensure the monitoring locations are representative of potential impacts, and to minimise (wherever possible) potential confounding issues of non-project impacts. Monitoring locations will also be determined in consideration of safe access and any property owner access/permission requirements. In these circumstances, changes would be communicated in advance to the ER for further discussion, noting that these changes are product of directives from Sydney Water or an Asset owner.

5.2 Monitoring Schedule

Monitoring) would occur prior to and during construction where there is a risk to surface water quality. Monitoring may cease in accordance with Section 5.2.1, following review and endorsement of this Monitoring Program by the Environmental Representative and be based on project risk.

During construction, surface water quality monitoring will be undertaken monthly. In accordance with the CEMF, additional wet weather Inspections would occur when a rainfall event of >20mm is received in the local catchment during a 24-hour period (as recorded at the Project rain gauge).

Where monthly water sampling falls on a day during or following heavy rainfall, sampling may not be undertaken during peak stormflows due to safety concerns. Instead, samples will be collected when conditions are reasonably constant and monitoring locations can be safely accessed.

The monitoring data will be collated and compared against the WQOs and performance criteria (Section 4.2). Monitoring will also be completed after significant wet weather events and when surface water is discharged from construction sites (note this is untreated water, not water discharging from the water treatment plants).

Table 6: Monitoring Schedule

Type	Frequency	Responsibility	Reference
Baseline Water Quality Monitoring[1]	At least one round prior to the commencement of construction at each of the construction sites.	Environmental Coordinator/ Manager	CEMF 12.2 MCoA C15
Monthly Water Quality Monitoring	Monthly	Environmental Coordinator/ Manager	MCoA C14
Wet Weather Inspections[2]	Additional inspections would occur (where safe/practical) when more than 20mm of rain is received within a 24 hour period.	Environmental Coordinator/ Manager	CEMF12.2 (e) (ii)
Incident Response	At any time in response to a complaint or incident	Environmental Coordinator/ Manager	MCoA A43

Note:
1- Background date for Haslam's Creek, which is nearest to SOP was obtained from water quality data gathered by AF JV for a period of time before CTP and WTP activities at SOP respectively on account of limited background data available for this specific Creek. Background data for Haslam's creek is presented in Table 4, with footnotes specifying the periods to which monitoring data was obtained.
2- GLC may also undertake additional sampling of receiving waterways following rainfall events exceeding 20mm in 24 Hours. The frequency of which will be undertaken at the discretion of GLC.

Furthermore, water quality monitoring and/or sampling may be directed by the ER as part of an inspection action. All water quality monitoring will also include a visual inspection of the receiving waters to identify any anomalies.

5.2.1 Cessation of sampling, monitoring and reporting.

GLC recognises that the project influences surface water quality via surface water runoff as well as via the discharge or water from the Water Treatment Plant ('s). Monitoring at the nominated monitoring locations may therefore cease where activities on each respective site has progressed to a point that where there is a negligible risk to depreciating surface water quality via surface water runoff, or via discharge from a Water Treatment Plant. In all circumstances where a sampling point is proposed for removal, GLC would follow a risk-based process approach in which there would be a review of activities occurring at the time, including a demonstration of a reduction in

overall risk to surface water quality (i.e fulfillment of criteria 1-2 below), and communication to the ER and SM prior to amendment. This may, for example be communicated during fortnightly meetings, emails etc. In all cases where sampling points are proposed to be removed and monitoring stopped; these changes would be communicated to the ER and SM verbally and in writing in advance of their removal and discussed in detail in the relevant monitoring report.

Criteria to determine the removal of surface water quality sampling points:

Where GLC determines that the following two criteria are met, sampling and monitoring of receiving water ways would cease:

1) Following stabilisation of site in accordance with Volume 1 of Managing Urban Stormwater: Soils and Construction – the "Blue Book" (MCoA D116, REMM SSWQ3). This includes:
   i. The completion of major (surface) earthworks on site, including any active stockpiling and stockpile management, and
   ii. The rehabilitation and stabilisation of the surface construction site in accordance with the Blue Book including but not limited to (where applicable):
      - The establishment of healthy, permanent and continuous vegetative ground cover, and or
      - Installation of permanent erosion and sediment controls such as swales, concrete hardstand, rock armouring etc, and
      - Where there is no ongoing risk of erosion as evidenced by observing the overall performance of stabilised areas following rainfall. This could be evidenced by post-rainfall inspections, or photographic evidence following rainfall events.

2) Following the cessation of discharge to stormwater or waterways from the Water Treatment Plant ('s)

5.3 Sampling Methodology

The sampling methodology to be adopted for the surface water quality monitoring program investigation is detailed in Table 7**.**

Table 7: Surface Water Sampling Methodology

Action	Description
Sample Naming Convention	All samples will be labelled with 'SW01-WTP,SW02-WTP/etc' so as to facilitate their interpretation and compilation.
Sample Collection	Sampling will be undertaken in accordance with the NSW EPA (2004) *Approved methods for the sampling and analysis of water pollutants in NSW* publication. Grab samples will be taken by using a sampling pole/bucket on string attachment. The apparatus includes a fixed bottle attached to the end, or bucket attached to a string that is used to take the sample. This will be lowered, where possible, to at least 0.3m from the surface and at least 0.3m from the floor of the water body. The volume of sample collected will be sufficient for the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s).

Action	Description
	To ensure representative samples, the bottle/bucket is triple rinsed at the new sampling location prior to retrieving a sample. In between sampling events the sampling apparatus will be decontaminated and stored securely. A clean pair of nitrile gloves will be used to collect the surface water samples.
Field Measures	Field physio-chemical parameters including electrical conductivity (EC), pH, Dissolved Oxygen (DO), Total Dissolved Solids (TDS), Oxidation-Reduction Potential (ORP), temperature, and turbidity will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s) / turbidity kit or provided for laboratory analysis. Other observations including cloudiness, sheen, odour and colour may also be recorded. The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.
Field Results	Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date/time, location, sampler details, flow direction, type and model number of instruments and measurement location.
Decontamination	Decontamination procedures will be performed before initial use and after each subsequent use. Any re-usable sampling equipment will be decontaminated between each sample location by scrubbing first with potable water, then scrubbing with a solution of Decon 90 (a phosphate-free detergent) in potable water, followed by a rinse in de-ionised water and placing the equipment on clean plastic or paper sheet prior to re-use.
Field QA/QC	Any sample to be sent to a laboratory will be subject to quality assurance protocols. As part of sampling the following will be undertaken: • Duplicates will be collected and analysed at a rate of 1 in every 10 primary samples • Triplicates will be collected and analysed at a rate of 1 in every 20 primary samples • Rinsate samples will be collected and analysed at a rate of one every sampling event
Calibration	All instruments will be calibrated in accordance with manufacturers specifications or relevant Australian Standards. Records of monitoring equipment calibration will be maintained by GLC throughout delivery of the Project. Any field calibrations will only use standard solutions that are within their recommended use-by date to ensure instruments are field calibrated accurately. Calibration records will be maintained.
Laboratory	Samples are to be transported to a NATA-accredited laboratory under documented chain-of custody protocols.

5.4 Parameters and Contaminants of Concern

The following details the water quality parameters and contaminants of concern that would be measured or analysed as part of the Program.

5.4.1 Water Quality Parameters

Previous monitoring data shows that some surface water quality parameters exceed the default ANZECC water quality trigger values for slightly to moderately disturbed ecosystems. This is not unexpected given the highly urbanised and disturbed area and receiving waterways surrounding the project.

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

Table 8 summarises the adopted protection trigger values, based on the receiving watercourse type classification (i.e. WQO) of 'aquatic ecosystem (estuaries)', for each waterway associated with the project.

Table 8: Adopted Protection Trigger Values to maintain Water Quality Objectives and for Toxicants

Indicator / **Parameter**	Upper Estuary	Lowland Rivers**
Turbidity (NTU)	0.5 – 10	6 - 50
Dissolved Oxygen (%)	80 -110%	85 – 110%
Conductivity (µS/cm)	NA	125 - 2200
pH (units)	7.0 – 8.5	6.5 – 8.5
Oil and grease	None visible on surface	None visible on surface
Toxicants (listed below)	ANZG 2018	ANZG 2018

Note:
* Based on ANZECC WQ Guidelines 2000 – Aquatic Ecosystem (Estuaries)
** Waterways affected by urban development

Water quality will also be assessed against visual amenity guidelines including visual clarity and colour, surface films and debris, and nuisance organisms.

5.4.2 Surface Water Contaminants

As well as water quality parameters, GLC would collect baseline data and ongoing data for potential contaminants within surface water that may be mobilised due to construction activities on the construction sites.

The suite of contaminants is based on a review of the potential contaminants of concern that have been identified at the various construction sites through the EIS and, more recently, the Detailed Site Investigation (DSI) Program. The proposed list of potential contaminants of concern would include:

- Metals (As III, AS V, Cd, Cr III, Cr VI, Cu, Co, Fe, Hg, Pb, Mn, Ni, Zn)
- Benzene, toluene, ethylbenzene, xylene, naphthalene

- Polycyclic aromatic hydrocarbons
- Nutrients and Inorganics – total nitrogen, total phosphorous, total oxidized nitrogen, nitrate, nitrite, total ammonia
- Per- and polyfluoroalkyl substances (PFAS)
- Petroleum hydrocarbons

GLC would also regularly seek input from the DSI program to identify any other contaminants or contaminant groups to be considered within the program.

5.5 Assessment of Results

Results from the construction monitoring program will be compared with the performance criteria (Table 8) and with previous results and will be reported in and construction compliance monitoring reports as detailed in Section 6.3. Due to the highly variable background results outlined in Table 4 a step-based trigger action approach will be applied when reviewing and responding to the surface water quality monitoring results to determine the significance of the exceedance(s) and possible causes.

Step 1	In the event of an exceedance of any of the trigger values, a review will be initiated to determine the significance of the exceedance and the possible causes.
Step 2	A comparison will be undertaken between the pair of upstream and downstream values located in the same catchment (i.e upper estuary and lowland rivers). For the parameters that exceed the adopted assessment criteria, an assessment will be undertaken comparing the results of up and down stream sampling locations. Further investigation is deemed necessary under the following circumstances: 1. Where the downstream value is greater* than 2x the upstream value for any parameter (other than pH/TSS/NTU) that exceeds the adopted trigger values upstream of the project site (i.e., ANZG / ANZECC DGVs), steps 3-4 would be followed. 2. Where the downstream value exceeds* the adopted trigger values (i.e., ANZG / ANZECC DGVs) and upstream value does not exceed the adopted trigger value of the project site, steps 3-4 would be followed. **Note – Terms 'exceed' and 'greater than' would also include parameters which have a range, rather than an upper limiting concentration alone (i.e Zn vs TSS/pH/NTU).* Where the downstream concentration of contaminants are consistent with, or less than the upstream contaminant concentrations, no further action would be taken.
Step 3	Where the exceedance of the preliminary trigger value occurs, a review will be initiated to determine the significance of the exceedance and the possible causes. The review will include: • Assessment of the baseline data for the relevant waterway to determine whether the values are within observed historic ranges • Assessment of water quality data from sampling conducted as part of monitoring for the construction water treatment plant EPL • Assessment of on-site recorded erosion/sediment control incidents or observations

	• Assessment of other activities in the catchment including any local recent activities which may have resulted in the observed impacts • and rainfall, recent rainfall records, other activities within the catchment and recent activities Results will also be assessed as trends to determine whether concentrations of water quality parameters downstream of the site are increasing and present a potential or actual risk to water quality under chronic exposure conditions.
Step 4	If the exceedance is determined to be attributable to Project works, the event will be treated as an environmental incident and managed in accordance with the requirements of Section 3.10 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

6 COMPLIANCE MANAGEMENT

6.1 Roles and Responsibilities

The GLC Environment and Sustainability team's organisational structure and overall roles and responsibilities are outlined in Section 7.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in the SWMP.

All employees, contractors and utility staff working on site will undergo site induction and targeted training relating to surface water management issues, detailed in the SWMP.

Further details regarding staff induction and training are outlined in Section 9 of the CEMP.

6.2 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Program, MCoA, and other relevant approvals, licenses and guidelines. Audit requirements are detailed in Section 11.3 of the CEMP.

6.3 Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions and performance criteria. Within 60 business days of the end of each Monitoring period, the six-monthly Surface Water Quality Monitoring Report (SWQMR) will be submitted for information to the Planning Secretary, ER, EPA and Sydney Water (if Sydney Water assets are impacted) in accordance with MCoA C23.

GLC combine all Monitoring Reports into a single consolidated Construction Monitoring Report prior to publishing on their Project Website. Due to the slight variation in the reporting timeframes between the Surface Water Quality, Noise and Vibration and Groundwater Monitoring Reports, GLC will publish the consolidated Construction Monitoring Report on the Project website within one week of submitting the last Monitoring report for that period to DPHI via the Major Projects Portal in accordance with MCoA B11.

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

Where the Project EPL has additional requirements for reporting results, these will be completed as required.

7 REVIEW AND IMPROVEMENT

7.1 Continuous Improvement

Continuous improvement of this SWQMP 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.

7.2 Document Updates

The processes described above may result in the need to update or revise this SWQMP. This SWQMP will be reviewed and updated as needed and may only be approved by the Environment and Sustainability Lead, or their delegate.

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

7.3 Distribution

A copy of the updated Monitoring Program and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure as detailed in the CEMP.

All GLC personnel and contractors will have access to this SWQMP via the project document control management system. The approved SWQMP will be published on the GLC website within one week of being approved and be publicly available for 24 months following the completion of Construction in accordance with MCoA B11.

Attachment 1 – Compliance Matrix

The Minister's Conditions of Approval (MCoA), Revised Environmental Management Measures (REMMs), Construction Environmental Management Framework (CEMF) requirements and Environmental Protection Licence (EPL) requirements that relate to this SWQMP are detailed in the following table.

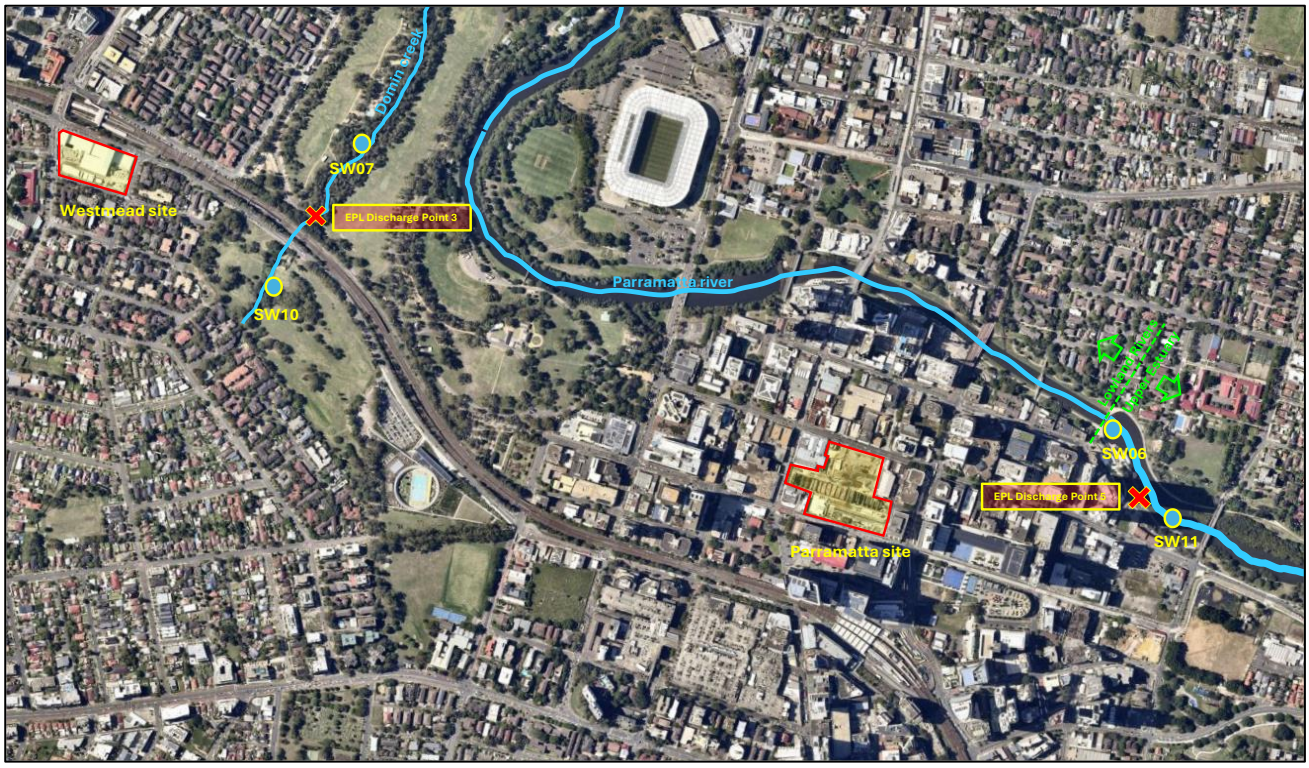
Document	Condition no.	Condition Requirement	Document Reference
MCoA	C14 (c)	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of Stage 1 of the CSSI against the performance predicted in the documents listed in Condition A1 of this schedule or in the CEMP: (c) Surface water quality - DPE (now DPHI) water, Relevant Council(s), and Sydney Water (if Sydney Water's assets are affected)	This document Section 1.4
MCoA	C15	Each Construction Monitoring Program must provide:	-
		(a) details of baseline data available including the period of baseline monitoring	Section 4.3 / Section 5.2
		(b) details of baseline data to be obtained and when	Section 4.3 / Section 5.2
		(c) details of all monitoring of the project to be undertaken	Section 5
		(d) the parameters of the project to be monitored	Section 5.4
		(e) the frequency of monitoring to be undertaken	Section 5.2
		(f) the location of monitoring	Section 5.1

Document	Condition no.	Condition Requirement	Document Reference
			Attachment 2
		(g) the reporting of monitoring results and analysis results against relevant criteria	Sections 5.5
		(h) details of the methods that will be used to analyse the monitoring data	Section 5.5
		(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts	Section 5.5
		(j) a consideration of SMART principles	Section 3.4
		(k) any consultation to be undertaken in relation to the monitoring programs	Section 1.4 Attachment 3
		(l) any specific requirements as required by Conditions C16 to C17 of this schedule	Not relevant to this document
MCoA	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. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 1.5 Section 6.3
MCoA	D116	Before undertaking any works and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with LandCom's Managing Urban Stormwater series (The Blue Book)	Section 5.2.1

Document	Condition no.	Condition Requirement	Document Reference
MCoA	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	Section 4 Section 5.4
REMM	SSWQ3	Erosion and sediment measures would be implemented at all construction sites in accordance with the principles and requirements in Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as the 'Blue Book'. Additionally, any water collected from construction sites would be appropriately treated and discharged to avoid any potential contamination or local stormwater impacts. 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 5.2.1
REMM	SSQW6	A surface water monitoring program would be implemented to observe any changes in surface water quality that may be attributable to Stage 1 and inform appropriate management responses. The program would be developed in consultation with the EPA and relevant Councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the WestConnex M4 East monitoring. Monitoring would occur during pre-construction and during construction at all waterways with the potential to be impacted. Monitoring sites could be located upstream and downstream of the potential discharges and would include sampling for key indicators of concern.	This Plan Section 1.4 Section 5.2

Document	Condition no.	Condition Requirement	Document Reference
CEMF	CEMF12(a) vii	A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the 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 many non-conformances can be rectified.	Section 5
EPL	M2.1	For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns.	Section 3.2

Attachment 2 – Proposed Sampling Locations



Sydney Metro West - WTP western surface water sampling locations (Parramatta and Westmead).

Sydney Metro West - WTP eastern surface water sampling locations (Clyde MSF)

Attachment 3 – Stakeholder Consultation

Engagement Log

Stakeholder	Date of Engagement/ Attempted Engagement
DPI Water	• Sydney Metro sent DPI Water an invitation to review and comment on the SWQMP on 02/05/2022, which included a cover letter and the SWQMP as a PDF document • DPI Water did not provide comments within the 21-day consultation period
Sydney Water	• Sydney Metro sent Sydney Water an invitation to review and comment on the SWQMP on 17/05/2022, which included a cover letter and the SWQMP as a PDF document • Sydney Water did not provide comments within the 21-day consultation period
City of Parramatta Council	• Sydney Metro sent the City of Parramatta an invitation to review and comment on the SWQMP on 05/05/2022, which included a cover letter and the SWQMP 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 SWQMP on 05/05/2022, which included a cover letter and the SWQMP as a PDF document • The Cumberland City Council provided comments on 12/05/2022

Comments Register

Stakeholder	Comment Raised	GLC Response	Where Addressed
Cumberland City Council	Cumberland City Council advised that one section near the end of the Surface Water Quality Plan didn't have attachments – i.e Attachment 1 – proposed sample locations. They would like a copy of the water sample results upon request in case they had customer requests.	Figure now included at Attachment 2. GLC will work collaboratively with Council in the event that complaints are received in relation to water quality.	Attachment 2

Stakeholder	Comment Raised	GLC Response	Where Addressed
DPIE Water	Nil comments received	NA	NA
City Of Parramatta Council	Nil comments received	NA	NA
Sydney Water	Nil comments received	NA	NA

Meeting Minutes

Copies of Correspondence