WestConnex M4-M5 Link Mainline Tunnels

Operational Surface Water Quality Management Plan

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WestConnex

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Glossary of terms

Term/acronym	Definition
the Asset	WestConnex M4-M5 Link Mainline Tunnels
BBWQIP	Botany Bay Water Quality Improvement Plan
Bti	Bacillus thuringiensis israeliensis
CDA	Chemical Delivery Area
CoA	Conditions of Approval
EC	Electrical Conductivity
EIS	Environmental Impact Statement
HF	High Flow
HMI	Human Machine Interface
I&M	Incident and Maintenance
LPS	Low point sumps
MF	Minor Flows
MOC	Motorway Operations Complex
OEMP	Operational Environmental Management Plan
OGMP	Operational Groundwater Management Plan
OMCS	Operations Management and Control System
OSWQP	Operational Surface Water Quality Management Plan
OSWQMP	Operational Surface Water Quality Monitoring Program
REMM	Revised Environmental Management Measures
Ops WTP	Operational Water Treatment Plant
PBR	Pyrmont Bridge Road
PREW	Parramatta Road East and West
RMS	Roads and Maritime Services
SPIR	Submissions and Preferred Infrastructure Report
SWQ	Surface Water Quality
TfNSW	Transport for New South Wales (formerly Roads and Maritime Services)
WCX	WestConnex

1 Introduction

1.1 Context

The Operational Surface Water Quality Management Plan (OSWQP) has been prepared for the operation and maintenance phase of the WestConnex M4-M5 Link Mainline Tunnels (the Asset). The Operational Surface Water Quality Monitoring Program (OSWQMP) forms part of this document and can be found in Annexure B. The OSWQP comes under the Operation Environmental Management Plan (OEMP) and should be read in conjunction.

This OSWQP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the WestConnex M4-M5 Link Environmental Impact Statement (EIS), the revised environmental management measures (REMM) listed in the Project Submissions and Preferred Infrastructure Report (SPIR), the WestConnex M4-M5 Link Mainline Tunnel Modification reports and all applicable legislation. The development of the monitoring program has been undertaken in consultation with the EPA; DPE Water; DPE Environment & Heritage (formerly OEH); Sydney Water and the local councils (refer to Section 1.5 of the OEMP).

1.2 Asset Background

An EIS (AECOM 2017) assessed the impacts of construction and operation of the Project on surface water, within Chapter 15 and Appendix Q (Technical working paper: Surface Water and flooding).

The surface water quality was identified within the EIS to be potentially impacted through discharges of poorly treated tunnel water, and through increased pollutant loads associated with surface runoff. However, it concluded these impacts would be managed through the Operational Water Treatment Plant (Ops WTP) and other treatment devices. Section 5 and 6 provides further exploration and explanation on these risks, and the mitigation and management measures that will be implemented as part of the operation of the Asset. Both risks and management measures are described in this OSWQP.

Please refer to Section 2 of the OEMP for Project description.

1.3 Scope of the Sub-plan

The scope of this OSWQP is to describe how the Incident and Maintenance (I&M) contractor will monitor and respond to potential impacts from the operation of the Asset to the local surface water quality. This includes mosquito management as well as the emergency response to hydrocarbon and chemical spills. As noted below in Section 2.1, this plan does not consider potential impact of the Rozelle Interchange on the local surface water quality.

1.4 Implementation of the Sub-plan

This OSWQP must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation.

Operation will not commence until the Secretary has approved all of the required Operational Monitoring Programs (including the OSWQMP), and all relevant baseline data has been collected.

This OSWQP, as approved by the Secretary, must be implemented for the duration identified in this document or as specified by the Secretary, whichever is greater.

1.5 Environmental Management System

The environmental management system overview is described in Section 5.1of the OEMP

2 Purpose and objectives

2.1 Purpose

The purpose of this OSWQP is to describe how the I&M contractor will manage and respond to potential impacts from the operation of the Asset to the local surface water quality. This includes mosquito management and the emergency response to hydrocarbon and chemical spills. This document should be read in conjunction with the OEMP.

This OSWQP will be implemented to monitor the effectiveness of mitigation measures applied during the operation phase of the Asset. Monitoring of the surface water will be undertaken to identify potential impacts and ensure a comprehensive management response can be implemented to address those impacts and protect local surface water quality.

This OSWQP is based on baseline studies developed for the WestConnex M4-M5 Link EIS (AECOM 2017), pre-construction baseline monitoring data and construction monitoring data.

Items that are not considered within this document, include:

- The potential impact of the Rozelle Interchange on the local surface water quality.

2.2 Objectives

The key objective(s) of the OSWQP are to:

- Manage all I&M activities during Asset operation to ensure they do not harm or impact the local surface water quality;
- Ensure the quality of the water discharged to the receiving environment meets statutory requirement and relevant objectives;
- Ensure the required CoAs, REMM, and licence/permit requirements are described, scheduled, and assigned responsibility;
- Monitor the effectiveness of the surface water quality controls of the Asset and outline the procedures in which the I&M Contractor is to follow if the results of the monitoring are unsatisfactory or a non-compliance is identified;
- Management wetlands that have been identified as being affected by the operation of the Asset as well as mosquito breeding;
- Ensure all notification and reporting requirements are complied with and achieved;

2.3 Consultation

This OSWQP was provided to the EPA; DPE Water; DPE Environment & Heritage (formerly OEH); Sydney Water; Inner West Council and the City of Sydney Council in accordance with CoA D8, for review and comment.

A document titled ‘Consultation for the M4-M5 Link Tunnels OEMP and sub-plans’ has been prepared separately to this plan to provide detail relating to the consultation received and where feedback has been covered or addressed in this plan. Subsequent feedback will be documented and used to inform revisions and updates of this plan (refer Section 10.1 of the OEMP).

Ongoing consultation with relevant councils and other stakeholders, including any unique local receivers, may be undertaken for particular issues pertaining to the operation and maintenance of the Asset on surface water quality. All community complaints, issues and notifications (this includes those relating to surface water quality) will be managed in accordance with section 7.3 of the OEMP.

3 Environmental obligations

3.1 Conditions of Approval

An OSWQP is required by CoA D8. A description of compliance with the requirements of this CoA, as well as other CoA identified to be relevant to the management of surface water quality during the I&M phase of the Asset is provided below in Table 3-1.

Table 3-1: CoA Compliance

CoA Reference	Requirement	Document Reference
A6	Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Secretary with the document. The evidence must include: (a) Documentation of the engagement with the party(s) identified in the condition of approval that has occurred prior to submitting the document for approval; (b) Log of the points of engagement or attempted engagement with the identified party(s) and a summary of the issues raised by them; (c) Documentation of the follow-up with the identified party(s) where feedback has not been provided to confirm that they have none or have failed to provide feedback after repeated requests; (d) Outline of the issues raised by the identified party(s) and how they have been addressed; and (e) A description of the outstanding issues raised by the identified party(s) and the reasons why they have not been addressed.	Evidence of consultation with the relevant authorities outlined in CoA D8 was provided to the Secretary along with the monitoring program.
D2	An OEMP is not required for the CSSI if the Proponent has an Environmental Management Sydtem (EMS) or equivalent as agreed with the Secretary, and can demonstrate, to the written satisfaction of the Secretary, that through the EMS: (a) The performance outcomes, commitments and mitigation measures, detailed in the documents listed in Condition A1, and specified relevant terms of this approval, can be achieved; (b) Issues identified through ongoing risk analysis can be managed; and (c) Procedures are in place for rectifying any non-compliance with this approval identified during compliance auditing, incident management or any other time during operation.	This section, Section 3, outlines the operations commitments of the tunnel during the I&M phase; (a – b) Section 5.3 lists the identified potential risks and impact to the local surface water quality during the I&M phase of the Asset. Section 6 and Table 6-1 outlines the control mechanisms included within the permanent design of the Asset to address the risks identified in Section 5.3 and the management measures to be implemented by the I&M and Project Company. (c) Non-compliances identified during the management of an incident will be addressed in accordance with the OEMP Annexure D and Annexure B Section 4.2.2.2 .

<table>
<tr><th>CoA Reference</th><th>Requirement</th><th>Document Reference</th></tr>
<tr><td></td><td></td><td>Non-compliances identified during a compliance audit will be managed in accordance with Section 9 and 10 of the OEMP.</td></tr>
<tr><td>D4</td><td>Each of the OEMP Sub-plans must include the information set out in Condition D2 (a), (b) and (c).
The OEMP Sub-plans must be developed in consultation with relevant authoirities as identified in Condition D3.</td><td>Refer to D2 document reference(s).
CoA D3 outlines only those relevant authorities applicable for the Groundwater Management Subplan and therefore is not relevant to the OSWQP and the OSWQMP.</td></tr>
<tr><td>D8</td><td>The following Operational Monitoring Programs must be prepared in consultation with the relevant authorities identified for each Operational monitoring program to compare actual performance:
<table><tr><th></th><th>Required Operational Monitoring Programs</th><th>Relevant authority(s) and council(s) to be consulted for each Operational Monitoring Program.</th></tr><tr><td>(a)</td><td>Surface Water Quality Plan & Monitoring Program</td><td>EPA; DPI Water; OEH; Sydney Water; and relevant council(s)</td></tr><tr><td>(b)</td><td>Groundwater Monitoring Program</td><td>DPI Water, relevant council(s), EPA and Sydney Water</td></tr></table></td><td>This document. Note the OSWQMP can be found in Annexure B.
Evidence of consultation with the relevant authorities outlined in CoA D8 was provided to the Secretary along with the monitoring program.
The Operational Groundwater Monitoring Program is a separate document that forms part of the Operational Groundwater Management Plan. Document reference number: M4M5-LSBJ-PRW-GEN-OP01-PLN-0003.</td></tr>
<tr><td>D9</td><td>Each Operational Monitoring Program must include:
(a) Details of baseline data;
(b) Details of all monitoring of the project to be undertaken;
(c) The parameters of the project to be monitored;
(d) The frequency of monitoring to be undertaken;
(e) The location of monitoring;
(f) The reporting of monitoring and analysis results against relevant criteria;
(g) Details of the methods that will be employed to analyse the monitoring data;
(h) Procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and
(i) Any consultation to be undertaken in relation to the monitoring programs.</td><td>(a – h) Refer to Table 6-1 and Annexure B Section 4.2 and 6.2

(i) Refer to Section 7.3 of the OEMP</td></tr>
<tr><td>D10</td><td>The Operational Surface Water Quality Plan and Monitoring Program must address wetland and mosquito management.</td><td>Wetland management and details of how the I&M will manage mosquito breeding and population is addressed in Section 6.2.</td></tr>
</table>

CoA Reference	Requirement	Document Reference
D13	The Operational Monitoring Program must be developed in consultation with relevant authorities outlined in CoA D8 of this approval.	Refer to CoA A6 and D8
D14	The Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation.	Section 1.4.
D15	Operation must not commence until the Secretary has approved all of the required Operational Monitoring Programs, and all relevant baseline data has been collected.	Section 1.4.
D16	The Operational Monitoring Programs, as approved by the Secretary, must be implemented for the duration identified in the relevant Operational Monitoring Program or specified by the Secretary, whichever is the greater.	Unless specified by the Secretary, the duration at which surface water quality monitoring is to be undertaken by the I&M contractor is outlined in Section 4.2 of Annexure B
D17	The results of the Operational Monitoring Programs must be submitted to the Secretary, and the relevant regulatory authorities, for information in the form of the Operational Monitoring Report at the frequency identified in the Operational Monitoring Program.	The frequency of reporting the surface water quality monitoring results to the relevant authorities and Secretary are described in Table 7.1 and Section 4.2 of Annexure B.
D18	Where the relevant OEMP Sub-Plan exists, the relevant Operational Monitoring Program may be incorporated into that the OEMP Sub-plan.	The OSWQP (including OSWQMP) is a stand-alone document which will be incorporated into the OEMP.
E187	The CSSI operational water treatment plant discharge criteria must comply with the ANZECC (2000) 95 per cent species protection level and a 99 per cent protection level for contaminants that bioaccumulate unless other discharge criteria are agreed in consultation with relevant stakeholders including EPA, DPI Water and Sydney Water. Discharge criteria for iron during operation must comply with the ANZECC (2000) recreational water quality criteria.	The Operations Water Treatment Plant discharge criteria is outlined in Section 6.3 and the Operational Groundwater Management Plan (M4M5-LSBJ-PRW-GEN-OP01-PLN-0003).

3.2 Revised Environmental Mitigation Measures

Those REMMS which have been identified as applicable to the OSWQP are presented below in Table 3-2

Table 3-2: REMM Compliance

REMM Reference	Requirement	Document Reference
OSW12	Stormwater from the project during operation will be treated prior to discharge. Where space is available, bioretention systems or constructed wetlands will be installed. Where space is not available other smaller devices, such as proprietary stormwater treatment devices, will be installed. The final design of treatment will be supported by MUSIC modelling and water sensitive urban design principles.	A general overview of stormwater runoff management is provided in Section 6.1. Section 6.1.1.1 provides a summary of the MUSIC modelling that was undertaken comparing the surface water quality of the 9.SWB.02 Biofiltration Swale Basin against the Botany Bay Water Quality Improvement Plan

REMM Reference	Requirement	Document Reference
		and the incorporation of a HumeCeptorSTC23 GPT into the design.
OSW13	Maintenance requirements for all stormwater treatment systems and devices installed as part of the project will be identified and included in relevant operational maintenance schedules/systems.	Noted. Operation and Maintenance Manuals that detail the required operational maintenance requirements will be prepared for all stormwater treatment systems and devices including the WTP
OSW14	Spill containment will be provided on the motorway. Spill management and emergency response procedures will be documented in the OEMP and/or Emergency Response Plan	The I&M contractor will implement the procedures outlined in Annexure A for spill and leak response, as well as tunnel washing (Section 6.4 and 6.5).
OSW15	The constructed wetland at the Rozelle interchange will be appropriately designed considering Water Sensitive Urban Design Principles to cater for the continuous release flow of treated groundwater from the water treatment plant and onsite stormwater flows and lined to prevent potential interaction with groundwater.	As outlined in Section 2.1, this OSWQP and OSWQMP does not include the Rozelle Interchange. This REMM condition will be included in a separate Operational Surface Water Quality Plan and Monitoring Program.
OSW16	The operational water treatment facilities will be designed and managed such that effluent will be of suitable quality for discharge to the receiving environment. Discharge criteria will be in accordance with the ANZECC (2000) and relevant NSW WQOs, including the following discharge criteria: • 0.3 milligrams per litre for iron • 1.9 milligrams per litre for manganese The discharge criteria for the treatment facilities will be nominated during detailed design in consultation with relevant stakeholders and included in the OEMP.	The Operations Water Treatment Plant discharge criteria is outlined in Section 6.3 and the Operational Groundwater Management Plan (M4M5-LSBJ-PRW-GEN-OP01-PLN-0003).
OSW17	New discharge outlets will be designed with appropriate energy dissipation and scour protection measures as required to minimise the potential for sediment disturbance and resuspension in the receiving waters. Outlet design and energy dissipation/scour protection measures will be informed by drainage modelling.	Section 6.1.1.
OSW18	Existing drainage outlets that be subject to increased inflow from the project will be assessed. If necessary, energy dissipation or scour protection will be added to prevent sediment disturbance and resuspension in receiving waters.	Section 6.3
OpCM01	Procedures to address spill, leaks and tunnel washing will be developed as part of an OEMP and implemented during operation of the project.	Refer to REMMs OSW14.
CM08	Measures identified in Chapter 25 (Hazard and Risk) of the EIS will be implemented to store contaminated materials and materials with the potential to cause contamination due to spills and leaks.	Hazardous chemical storage is addressed in Section 6.4 and 6.5.

REMM Reference	Requirement	Document Reference
OpHR3	The transport of dangerous goods and hazardous substances will be prohibited through all tunnels associated with the project.	Section 6.6
OpHR6	Storage of dangerous goods and hazardous materials will occur in accordance with suppliers' instructions and relevant Australian Standards and legislation including the: – Work Health and Safety Act 2011 (NSW) – Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW 2005) – Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (NSW EPA 1997). Storage methods may include bulk storage tanks, chemical storage cabinets/ containers or impervious bunds.	Section 6.6
OpHR7	Secure, bunded areas will be provided around storage areas for oils, fuels and other hazardous liquids. Impervious bunds will be of sufficient capacity to contain at least 110 per cent of the volume of the largest stored container.	Section 6.6
OpHR8	Management measures to reduce the potential for spills, reduce potential spill volumes and prevent any contamination will be developed and implemented for activities such as vehicle refuelling, servicing, maintenance or washdown, where there is a potential for spills and contamination.	Section 6.6
OpHR9	Material Safety Data Sheets for dangerous goods and hazardous substances will be stored on site prior to their arrival.	Section 6.6

3.3 Legislation

All legislation relevant to the OSWQP is described in Appendix A1 of the OEMP.

3.4 Guidelines and Standards

The environmental policies, guidelines and principles relevant to the management of surface water during operation and maintenance of the Asset are identified in Table 3-3.

Table 3-3: Environmental policies, guidelines and principles

Policy / Guideline / principles	Relevance
Surface water quality and hydrology	
• Stockpile Site Management Guidelines (Roads and Maritime, 2008) • Code of Practice for Water Management: Road Development and Management (Roads and Maritime, 1999) • Australian Standard: AS1940 The Storage and Handling of Flammables and Combustibles (Standards Australia, 1994) • Australian Standard: AS4452 The Storage and Handling of Toxic Substances (Standards Australia, 1997) • Storage and Handling Liquids: Environmental Protection: Participant's Manual (DECC, 2007) • Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council, 2000) • Australian National Water Quality Management Strategy	Soil and water quality management
• Bunding and Spill Management Guidelines (NSW EPA, 2017) • Australian Standard: AS1940 The Storage and Handling of Flammables and Combustibles (Standards Australia, 1994) • Australian Standard: AS4452 The Storage and Handling of Toxic Substances (Standards Australia, 1997) • Storage and Handling Liquids: Environmental Protection: Participant's Manual (DECC, 2007)	Working with chemical substances near watercourses
• Code of Practice for Water Management: Road Development and Management (Roads and Maritime, 1999) • Guidelines for Treatment of Stormwater Runoff from the Road Infrastructure (AP- R232, Austroads, 2003) • Technical Guideline: Temporary Stormwater Drainage for Road Construction (Roads and Maritime, 2011) • Managing Urban Stormwater Soils and Construction: Volume 2D Main Road Construction (DECC, 2008) • The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 (Landcom, 2004)	Stormwater runoff management
• Australian/New Zealand Standard: AS/NZS5667.1 Water Quality – Sampling, Guidelines on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples (Standards Australia, 1998) • Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Volume 1 –The Guidelines ('the ANZECC guidelines', ANZECC, 2000) • The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (Landcom, 2004)	Water quality sampling

Policy / Guideline / principles	Relevance
• Environmental Direction: Management of Tannins from Vegetation Mulch (Roads and Maritime, 2012) • Guideline for the Management of Contamination (Roads and Maritime, 2013) • Environmental Incident Classification and Reporting Procedure (Road and Maritime, 2017)	Contaminated waters and leachate management
• Best Practice Guidelines for Contaminated Water Retention and Treatment Systems (NSW Government, 1994)	Storage and treatment of firefighting water
Waste and resource management	
• Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management (NSW DEC, 2005) • Storing and Handling Liquids, Environmental Protection: Participants Manual (NSW DECC, 2007) • Stormwater Exemption 2014 (NSW EPA, 2014) • Waste Classification Guidelines (NSW EPA, 2014)	Materials handling and storage, and waste management
Chemical Management	
• Australian Dangerous Goods Code • Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (EPA, 1997) • Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005) • Relevant Australian Standards	Dangerous good storage and handling

3.5 Licences, permits and approvals

The Asset does not routinely operate under any additional permits, licences and/or approvals. However, permissions and licences may be needed for maintenance activities as described in Table 3-4.

The need for any permit or licence would be determined by the Project Company Representative on a case-by-case basis depending on the nature of the proposed work.

Table 3-4: Licences, permits and approvals for operation of the Asset

Requirement	Comment
Environment Protection Licence (EPL) under Schedule 1 of the POEO Act	The operation (activity) of the Water Treatment Plant at the St Peter's Ops WTP is considered to be a scheduled activity identified in the *Protection of the Environment Operations Act 1997* (POEO Act) - treatment of contaminated groundwater. The Ops WTP will operate under an EPL. Details regarding the specific monitoring locations and targets are included in section 4.2 of Annexure B.
Licence for Storage of Dangerous Goods Australian Standard: AS1940 The Storage and Handling of Flammables and Combustibles (Standards Australia, 1994) Australian Standard: AS4452 The Storage and Handling of Toxic Substances (Standards Australia, 1997)	The Asset must obtain a licence where the storage of dangerous goods for operations and maintenance is in licensable quantities.

4 Existing Environment

The following sections below summarise what is known about factors influencing the existing surface water quality within and adjacent to the Asset's corridor and are applicable to the I&M phase.

4.1 Surface Water

4.1.1 Catchments and Waterways

The Asset is predominantly located within the Sydney Harbour and Parramatta River catchment (Dobroyd Canal and Johnstons Creek). The southern portion of the tunnel's alignment and the Campbell Road Motorway Operations Complex (MOC 5) is located within the Cooks River catchment (Alexandra Canal), which discharges into Botany Bay (Mascot).

Alexandra Canal will receive treated water from the Asset during operation. Table 4-1 summarises its key features.

Table 4-1: Sub-catchments and Waterways applicable to the I&M phase of the Asset

Catchment	Waterway	Waterway Description	Applicable Asset Facilities
Cooks River catchment	Alexandra Canal	The Alexandra Canal catchment (including Sheas Creek) comprises of an area of around 23km^{2}and receives runoff from Alexandria, Rosebery, Erskineville, Beaconsfield, Zetland, Waterloo, Redfern, Newtown, Eveleigh, Surry Hills, and Moore Park. Near the Campbell Road MOC 5, Alexandra Canal is a 2nd order stream.	Campbell Road MOC 5 and Ops WTP. During the construction phase of the Asset, the Campbell Road construction WTP discharged into Alexandra Canal, as will the Ops WTP.

4.1.2 Geomorphology

The catchments and waterways within and surrounding the Asset are highly urbanised, disturbed environments. The waterways are all artificial, hard-lined (ie. concrete, piped, brick or underground concrete channel) stormwater channels, with the exception of Alexandra Canal, which has an unlined base and hard-lined banks.

The geomorphic characteristics of the watercourse reflect their urban and anthropogenic nature.

4.1.3 Surface Water Quality

The surface water quality within and surrounding the Asset is influenced by several factors including:

- Current and former polluting land uses within the catchments;
- Stormwater and sewage overflows and leachate from contaminated and/or reclaimed land;
- Urbanisation of the catchments and subsequent reduction in permeable area, increasing run-off and pollutant loads entering waterways;
- Illegal dumping

A review of the baseline water quality data, undertaken for the EIS (AECOM 2017) along with the inclusion of construction phase data, is detailed in Section 3 of the OSWQMP in Annexure B.

4.1.4 Sensitive receiving environments

A sensitive receiving environment is an environment that has high conservation or community value, or that supports an ecosystem or human uses of water, and that is particularly sensitive to pollution or degradation of water quality.

The receiving surface water environments associated with the Asset are characterised as highly urbanised, degraded and are typically concrete lined storm channels. The environments do not support ecosystems sensitive to operation of the Asset (AECOM 2017). Human uses for the watercourses are limited.

5 Incident Management and Maintenance of the Asset and Environmental Impacts

5.1 Transition from Construction to Operation Phase

5.1.1 Previous Ancillary Facilities

During the construction phase of the Asset, the WestConnex M4-M5 Link Mainline Tunnel project included four main ancillary facilities located at the Haberfield, Parramatta Road East and West (PREW); PBR, and Campbell Road. These facilities acted as both car parks for employees and subcontractors; equipment and material laydown and access into the on and off ramps at Wattle Street and the St Peters Interchange as well as the mainline and ventilation tunnels.

At completion of the Project three of the four ancillary facilities (Haberfield, PREW and PBR) were reinstated to level hardstand only and will be returned to WestConnex.

During the operation phase of the Asset the Campbell Road MOC 5, once known as the Campbell Road ancillary facility, will house the WestConnex M4-M5 Link mainline tunnel ventilation facility which contains the mechanical and electrical services required to exhaust the tunnel. The building occupies a footprint of 4,100m^2 and is the largest structure within the Campbell Road MOC 5 (refer to Figure 1). In addition to the ventilation facility, the Campbell Road MOC 5 also contains the Ops WTP; staff amenities; workshop and storage building; substation and ventilation fan crane pad; and staff car parking.

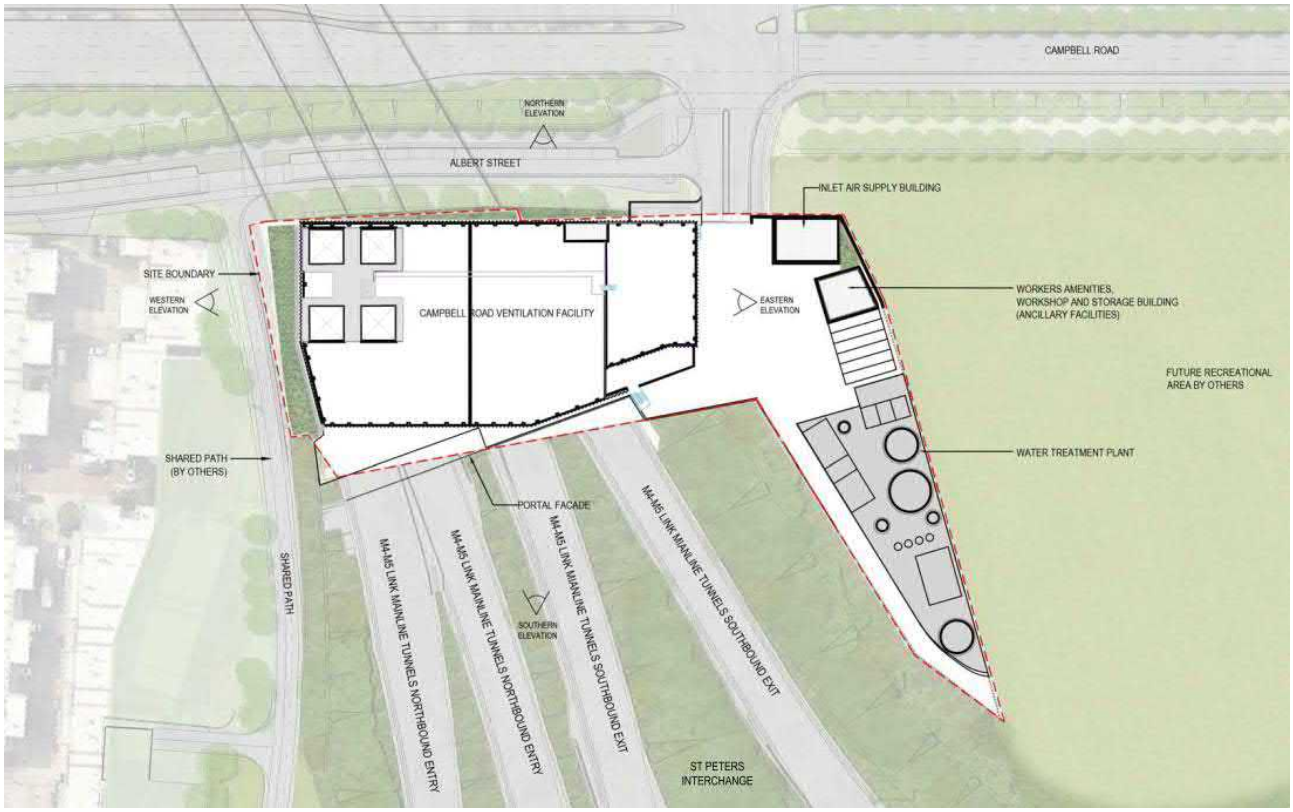


Figure 1: Overview of the Campbell Road MOC 5

5.2 Incident and Maintenance Activities

I&M activities undertaken throughout the operation phase of the Asset that are relevant to the management of surface water quality are outlined below in Table 5-1:

Table 5-1: I&M Activities relevant to surface water quality

O&M Activity	Description
Routine Operation	• Traffic operations and monitoring • Operation and monitoring of the Ops WTP and stormwater treatment devices
Routine Maintenance / Repair Work	• Vegetation clearing and landscape management • Road infrastructure maintenance and repair • Pavement renewal and resurfacing • General maintenance and repair work
Routine equipment maintenance	• Tolling equipment • Intelligent Transport Systems Sediment Basins • Gross Pollution Traps (e.g. Stormceptors) • WTP
Non-routine Operation	• Tunnel washing • Road traffic accidents and incidents • Vehicle washing • Road maintenance plant and machinery • I&M vehicles
Non-routine Maintenance and Repair	• Asset damage (e.g. Vehicle strike) • Major spills including clean-up • Equipment failure leading to damage, spill or an uncontrolled outcome

5.3 Potential Environmental Impacts

Potential risks and impacts to the local surface water quality associated with the operation of the Asset may include:

- Exposure and erosion of soils causing pollution of receiving waters and sedimentation of drains (REMM OSW17 and OSW18);
- Breeding habitat for mosquitoes in stormwater retention basins (CoA D10);
- Contamination of waterways associated with mobilisation of pollutants in stormwater runoff (eg. Fuel and chemical spills, seepage spills, washing contaminated water release, water discharge, firefighting activities) (REMM OSW14, OpCM01 and CM08);
- Reduction of water quality and degradation of natural habitats in sensitive receiving environments from the uncontrolled discharge of untreated tunnel wastewater. Tunnel wastewater not only can contain groundwater that has entered the tunnel drainage system, but also spills of fuel; oil; hazardous chemical spills; fire suppressant, and tunnel wash water (REMM OSW16 and OpCM01);
- Spills of hazardous chemicals stored and used within the Ops WTP into the surrounding environment (REMM OSW14, OpCM01 and CM08).

Control measures that will be implemented during the operation phase of the Asset to manage the risks and potential impacts outlined above, are included below in Section 6.

6 Control Mechanisms

6.1 Stormwater Runoff Design and Retention

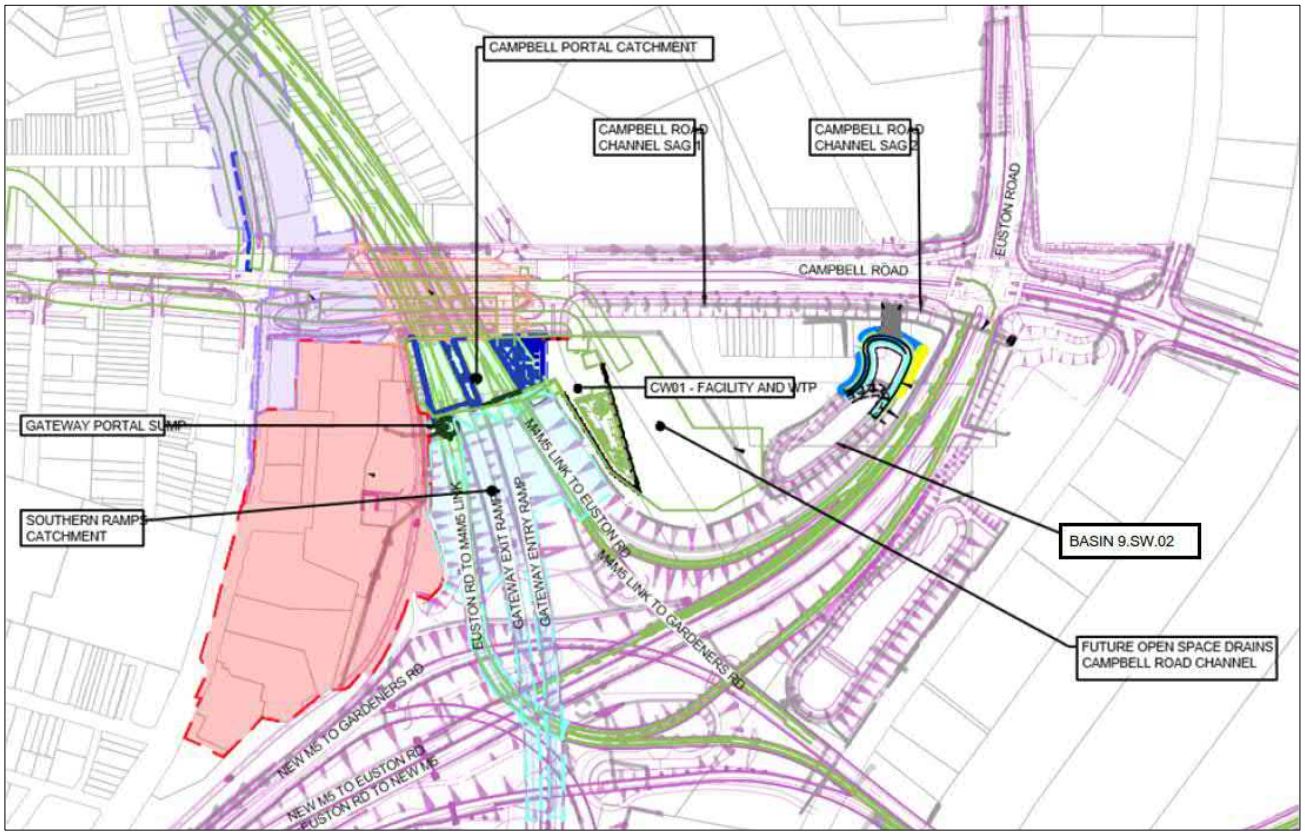


Figure 2: Overview of Campbell Road MOC 5 and Augmented Basin

REMM OSW12 requires stormwater from the project during operation will be treated prior to discharge, and where space is available bioretention systems or constructed wetlands will be installed. Where space is not available other smaller devices, such as proprietary stormwater treatment devices, will be installed. The Campbell Road MOC 5 is considerably constrained for area, includes a vast number of underground facilities and has been designed around the space requirements for the Ops WTP and for vehicles and plant undertaking operation and maintenance activities at the facility (ie. ventilation fan maintenance and transformer removal). Where the ground surface is not covered by either a building, concrete and asphalt (refer to Figure 1), the area will be landscaped with a layer of mulch and plantings of various ground covers; grass; small and large shrubs. Therefore, the potential for 'polluted' stormwater runoff is considered very low risk. A spill kit with spill response materials will be located is an easily accessible and visible location, close to the car park. Annexure A outlines how staff are required to response to hydrocarbon spill.

Stormwater runoff from the car park and workshop facility drains via a pit and pipe network into the existing drainage infrastructure as per part of the M8 (previously known as the NewM5) contract and flows into the operational biofiltration swale (9.SWB.02) (refer to Figure 2). By diverting the stormwater runoff to the swale, this reduces impact on the downstream stormwater systems. 9.SWB.02 was originally constructed by the M8 and was augmented during construction of the Asset. The rainwater collected from the ventilation building roof will also be connected to the same M8 drainage system. Drainage from the M8 ramps to the M180 and M190 On and Off Ramp portals will be connected to a collection sump and pump station which is located underneath the pavement. The collected water is pumped west via a dedicated rising main to a surface water drainage network before entering the 9.SWB.02.

Outside of the Campbell Road MOC 5 perimeter and along the western boundary of the Ops WTP is a clean water diversion drain which captures any rainfall runoff from the M8 landscaped batters and diverts the water into a single stormwater drain, preventing the runoff from entering the site.

The option to retain and reuse harvested rainfall for landscape irrigation and washdown of plant and equipment has been investigated in the Operational Water Reuse Strategy (M4M5-LSBJ-PRW-EN-MP01-PLN-0029). It was concluded not to be viable due to the constrained nature of site and the potential for the water to pose a human and environmental health risk if the water was left untreated prior to reuse. The vast number of underground facilities also prevents on-site detention such as small basin, from being a feasible option.

Operational surface water quality monitoring requirements are outlined in Table 6-1; Section 7 and the OSWQMP (Annexure B).

6.1.1 9.SWB.02 Biofiltration Swale

As part of the flood mitigation strategy, the storage capacity of 9.SWB.02 swale has been increased (1500m^3) to cater for the afflux levels on Burrows Road during the 100-yr ARI. The emergency spillway now also discharges at a maximum flowrate of 0.38m/s into the grassed Campbell Road channel. Should the capacity of the basin be exceeded, and water cannot be discharged out of the pit outlet fast enough, the emergency spillway has been constructed using rip-rap protection (Figure 3) which will attenuate flow velocities and prevent sediment disturbance and resuspension in receiving waters. Scour protection has also been provided in the downstream receiving channel, the design of which was informed by drainage modelling during the development of the flood mitigation strategy.

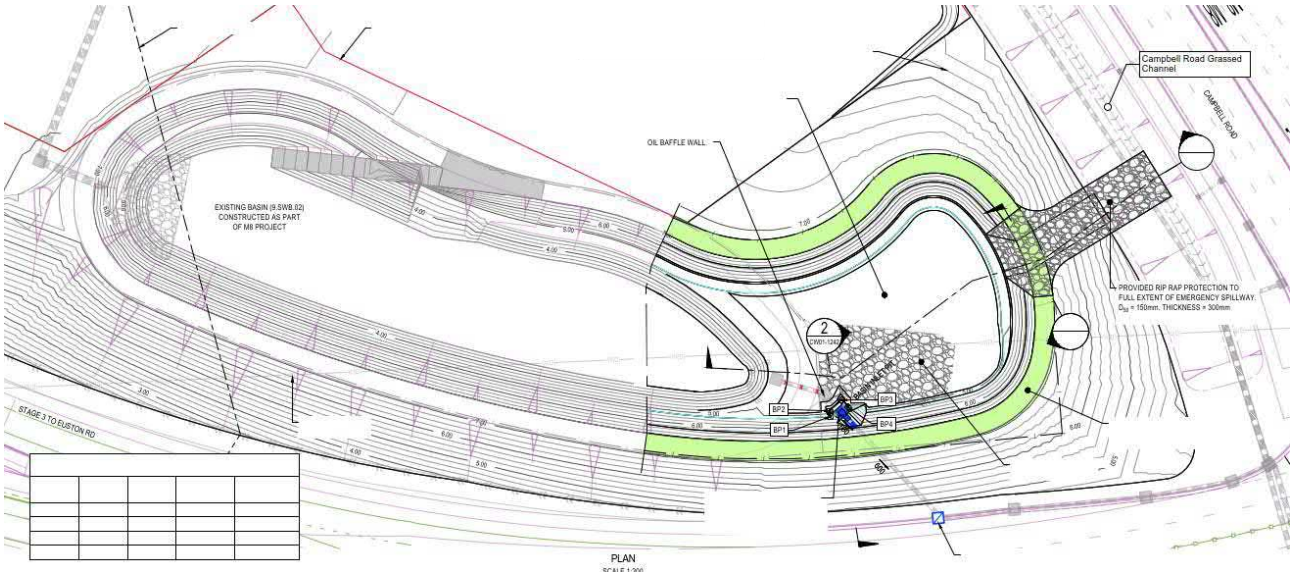


Figure 3: Emergency Spillway Rip Wrap Protection

6.1.1.1 9.SWB.02 Biofiltration Swale SWQ and BBWQIP

SWQ controls have been incorporated into the design of the Asset and Campbell Road MOC 5 to ensure and/or improve the water quality prior to it entering Alexandra Canal and meet the requirements of the Botany Bay Water Quality Improvement Plan (BBWQIP). These controls include: The Ops WTP; the first flush tank; 9.SWB.02 Swale; and the Campbell Road grassed channel.

A water quality assessment was undertaken using the MUSIC program (eWater 6.2) to identify residual pollutant loads discharged from the project works catchment areas into the 9.SWB.02 swale if stormwater

runoff from the ventilation building roof and carpark catchment discharged directly into the basin versus if the water first had to pass through a HumeCeptorSTC23 GPT. The results were also compared to the treatment effectiveness of the basin as constructed during M8 project phase (base case). The MUSIC modelling results demonstrated that the basin alone provides the necessary water quality target reduction without the need of the HumeCeptorSTC23 GPT, whilst also achieving the BBWQIP targets. Therefore because of these results and due to the Campbell Road MOC 5's area constraints, no GPT was incorporated into the final design.

6.2 Wetland and Mosquito Management

Wetland and mosquito management is required to be addressed within this document, as per CoA D10. The Asset is not located within or near a wetland or an existing mosquito breeding habitat. However, it has been identified that 9.SWB.02 basin could pose as a health risk to users of the future recreational park that surrounds the basin, during periods in which the water was to remain below the discharge outlet and stagnant.

The basin as previously stated above was originally constructed by the M8, however wetland and mosquito management was not included within the M8 CoAs, and therefore not within their Operation Water Management Plan (M5N-ES-PLN-PWD-0057) and Water Quality Monitoring Program (M5N-ES-PLN-PWD-0049).

Mosquito breeding times and treatment days are highly dependent on the inflow of water, rainfall and temperature. Most treatments are required to be applied at specific stages of the mosquito lifecycle to be effective, so treatment windows are generally very short. The inspection frequency of the 9.SWB.02 basin is specified in Table 6-1 and if mosquito larvae is identified the I&M operator will engage a qualified and licenced pest controller to ensure that the growth of the larvae is inhibited and prevented.

There are environmentally friendly products already used in Sydney which could be used for the control of mosquito breeding and larvae. Sydney Olympic Park Authority in collaboration with NSW Health pathology currently use the control product containing the bacterium *Bacillus thuringiensis israeliensis* (Bti). Bti is designed to kill mosquito larvae by targeting their gut wall and killing them prior to them becoming adults, without harming people, pets or the general environment.

6.3 Groundwater and Tunnel Wastewater Treatment

Similar to the construction phase of the Asset, groundwater is anticipated to make its way from the water table into the tunnel during the I&M phase and will be managed by the permanent design features such as strip drains; no-fines concrete; in ground drainage and the two low point sumps. Within the in-ground drainage system and low point sumps the groundwater will be mixed in with the tunnel wastewater. As per EIS section 5.10.3 water that is classified as wastewater includes stormwater that enters the tunnels via the on and off ramps portals; washdown water; water from the annual fire deluge testing and fire hydrant water. All these sources of potentially contaminated water have been accounted for into the design of the Ops WTP.

The Ops WTP will treat the groundwater and wastewater collected within the tunnel's two low point sumps (LPS), prior to discharge into the Campbell Road drainage network and ultimately into Alexandra Canal. For further information on groundwater inflow rates; anticipated quality and explanation of how the contaminated water from within the tunnel is transferred to the Ops WTP please refer to the Operational Groundwater Management Plan OGMP (M4M5-LSBJ-PRW-GEN-OP01-PLN-0003).

The Ops WTP discharge criteria must comply with the ANZECC (2000) 95 per cent species protection level and a 99 per cent protection level for contaminants that bioaccumulate unless other discharge criteria is agreed upon in consultation with relevant stakeholders. Discharge criteria for iron and manganese during operation must comply with the ANZECC (2000) recreation water quality criteria. The Asset will operate under an Environmental Protection Licence (EPL), please refer to the EPL discharge criteria for the Ops WTP.

To achieve the required discharge criteria, major components of the Ops WTP include the balance tank; dissolved air flotation unit; greensand media filtration; break point chlorination tank; activated carbon filters and an ion exchange feed tank and vessel and a screw press (refer to Figure 4 below).

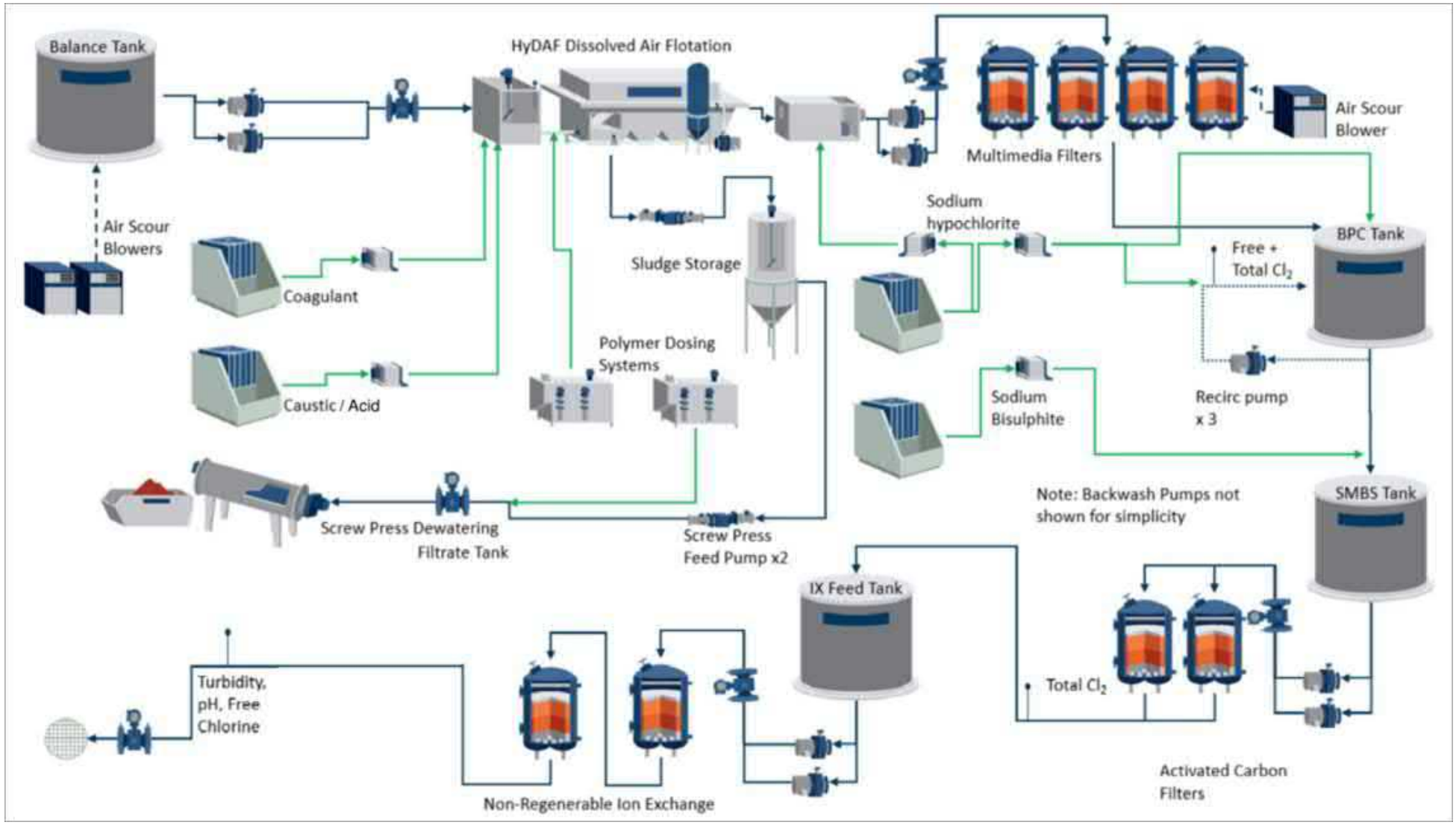


Figure 4: Ops WTP Process Flow Diagram

Under normal operation the maximum discharge rate from the Ops WTP into the Campbell Road surface drainage is 24L/s, however in general will be less. The discharge rate has been checked against the safety criteria for flow rates in channels (0.4) and confirmed that during a wet weather event (1 in 100-year ARI) the flow rate does not have to change. The Ops WTP can continue to discharge at 24L/s without causing an overload of water downstream.

In the event of incoming high flows, the Ops WTP may be bypassed and discharged to the stormwater network if the water quality meets the EPL criteria. Sensors installed in the system will monitor and communicate the water quality to the operator. The Ops WTP design also includes an emergency overflow / bypass in the event of a failure of the Op-WTP and when the sumps and balance tanks are at capacity, preventing potential impacts on tunnel operations.

REMMs OSW18 specifies that energy dissipation or scour protection be added if required to existing drainage outlets to prevent sediment disturbance and resuspension in receiving waters. Where the Campbell Road channel is assumed to receive a continuous baseflow of 24L/s from the Ops WTP, it was identified there was a risk of the channel softening at the discharge invert. To mitigate this risk, the invert of the existing channel has been lined with a narrow concrete channel to the downstream receiving pit. The lining provides uninterrupted flow path and helps prevent channel softening, whilst defining the channel invert during maintenance. Generally rock scour is not needed but has been installed as best practice.

6.4 Management of Tunnel Spills and Leaks, Tunnel Washing and Firefighting Water

As highlighted above in section 6.3 all water inflows to the tunnel will be mixed within the tunnel drainage system and captured at one of the two LPS. It is a mixture of groundwater ingress, tunnel wash-down, firefighting suppressant, tanker spills and stormwater runoff. Each LPS is separated into two compartments, the minor flows (MF) sump and the high flows (HF) sump connected by an under/over weir. The MF sump will continuously collect and pump MF (predominantly groundwater ingress). In the event of larger flows the water will first enter into the MF sump, and then will rise until it overtops into the HF sump through the under/over weir. The under/over weir system will trap hydrocarbons (including those from a major spill) in the MF sump. As a result, the hydrocarbon detection system and the foam suppression system are only required for this sump. The foam suppression system will trigger on detection of hydrocarbons in the sump to reduce combustion risks.

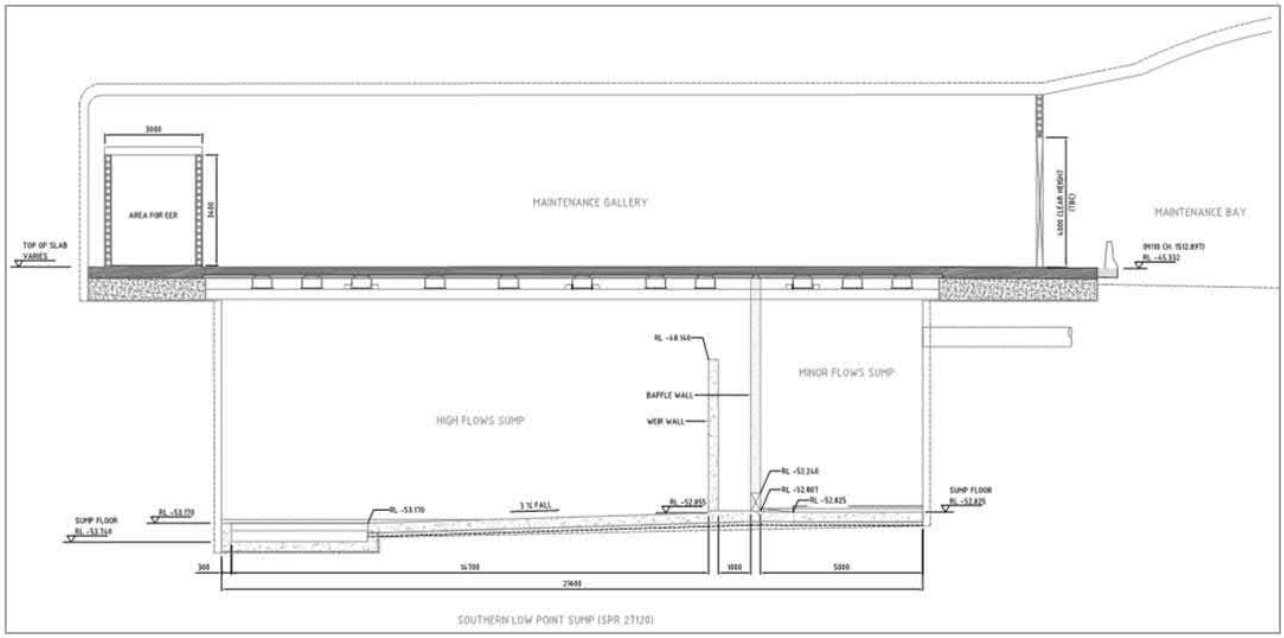


Figure 5: The Under/Over Weir System of the LPS

The MF sumps are sized to cater concurrently for the groundwater inflow, a 1-yar ARI rainfall event and a 50m^3 tanker spillage without overflowing into the HF sump.

If the water being transferred from the LPS are found to be heavily polluted and unable to be treated by the Ops WTP, the water will be removed by a tanker truck for disposal. A camlock is provided at the balance tank to prevent the accidental transfer of polluted water from the Balance Tank to the dissolved air flotation unit. Sensors have also been installed within the Asset's low point sump that monitor the water quality within and communicate the information to the I&M Operator.

6.5 Management of fuel and chemical spills within the Campbell Road MOC 5

Spill containment has been provided in the WTP around the chemical delivery area (CDA) in the form of a bunded bay. The bay provides access for a rigid delivery vehicle to pick up / deliver to the chemical stores and will contain approximately 9000L of spill. This is in accordance with the Sydney Water Guidelines Chemical Dosing Unit Standard Specification (ACP0002 29.102018). All chemical dosing lines onsite have double containment and leak detection. A stop valve has been provided downstream of the CDA to contain spills prior to entering the main line drainage. Any spill captured in the bunded area will be treated onsite or removed for off-site disposal.

In addition to the bunded CDA, a water quality tank has been incorporated into the design of the Ops WTP to capture the first flush runoff from within the Ops WTP and immediately adjacent surrounds (ARI 1-year, 36m3). The water held in this first flush tank is pumped into the WTP at approximately 5/ls for treatment prior to release.

As stated in section 5.1.1 a spill kit containing spill response materials will be stationed within an easily accessible and visible location in the event of a hydrocarbon spill. A second spill kit specific for hazardous chemicals will be located within CDA thus allowing the WTP operator to respond safely to a chemical spill and dispose of the contaminated/hazardous material in accordance with Annexure A . The procedure on how to respond to both a hydrocarbon and hazardous chemical spill is outlined within section Annexure A.

6.6 Management Measures

Steps that will be implemented to plan, manage, monitor and/or review environmental impacts are identified in Table 6-1.

Table 6-1: Environmental Controls

Surface Water Management Controls	Responsibility
Incident and Emergency Response: Road Traffic Incidents	
Follow the Emergency Response Plan (CoA E142 (or relevant associated documents as described in Section 8.2 of the OEMP) during emergency situations associated with the operation of the Asset (including fires, explosions and vehicle collisions). The Emergency Response Plan includes management measures to address the potential environmental impacts of an emergency situation, including measures for containment of contaminated fire-fighting water, fuel spills and gaseous combustion products.	I&M Contractor and Project Company
Shut down the stormwater system and stormwater / deluge pump in the tunnel LPS and stop discharging offsite as soon as it is safe and feasible to do so.	I&M Contractor and Project Company
I&M personnel will work with emergency authorities (when authorities have attended the incident) to clean-up spills and prevent them migrating to the stormwater drainage or reaching surface or groundwater. • The key steps will include: • The use of spill kit material once the area is made safe • Contain the spill within the pavement area if possible	I&M Contractor and Project Company

Surface Water Management Controls	Responsibility
• Install containment measures comprising sandbags and booms to prevent migration to the stormwater drainage • Contain spill in spill containment chamber of tunnel sump and/or cap outfall points to prevent offsite discharge of polluted water if required and feasible • Remove any polluted water using a licensed company • Skim oil sheens from the surface of collected water or water quality basins if required.	
Notify NSW EPA and relevant authorities in accordance with OEMP Section 8.2.4 and Annexure F (RMS Environmental Incident Classification and Reporting Procedure).	I&M Contractor and Project Company
Refer to Incident Response Flow Chart in Annexure A.	I&M Contractor and Project Company
In the event that post-event water quality monitoring identified any exceedances, implement the response action process in the section 4.2.2.2 of Annexure B.	I&M Contractor and Project Company
All I&M personnel are to be trained on how to response to both a small and large spill within the tunnel. Simulated emergency spill scenarios will be carried out on an annual basis and refresher training provided to all personnel.	I&M Contractor and Project Company
Spill prevention: general provisions	
Ensure all I&M personnel are trained in spill management, including the use of materials and their deployment.	I&M Contractor
Retain all necessary personal protective equipment (PPE) onsite.	I&M Contractor
Stocktake and check the use-by date of all spill containment kit and PPE once every quarter.	I&M Contractor
Prohibit the transport of dangerous goods and hazardous substances through all tunnels associated with the Asset	I&M Contractor
Spill prevention: material and chemical storage	
The use of any chemicals or fuels that could result in a spill will be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds.	I&M Contractor
Safety Data Sheets (SDS) for dangerous goods and hazardous substances will be stored on site prior to their arrival.	I&M Contractor
Retain SDS's onsite. Also ensure they are available via a 24-hour contact number.	I&M Contractor
Maintain access to spill kits onsite ensuring they are included at each storage area and at areas of the worksite where handling and use of dangerous goods occur, and in all I&M personnel site vehicles and within the maintenance workshop and WTP.	I&M Contractor
Protect all stormwater and surface drains before starting any site activities requiring the use of chemicals or fuels.	I&M Contractor
Ensure that all chemicals, fuels, dangerous goods and other potentially polluting materials are stored within nominated storage areas. This extends to storing all such materials on hardstand within an area that is bunded to 110 per cent of the volume of the largest single stored materials ie. the WTP CDA. Dangerous goods, as defined by the Australian Dangerous Good Code, must also be stored and handled in accordance with relevant Australian Standards and the Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (EPA, 1997). Ensure that all drainage within chemical and fuel storage areas is self-contained to prevent any offsite migration ie. the first flush tank at the WTP.	I&M Contractor
Spill prevention: refuelling	
Ensure that as much as possible chemical and fuel transfer activities take place within a bunded and contained area.	I&M Contractor
Ensure that a person will be in attendance when vehicle refuelling takes place and that spill kit provisions are available at designated locations or within response vehicle.	I&M Contractor

Surface Water Management Controls	Responsibility
Spill prevention: vehicle and equipment servicing	
Use spill containment controls when vehicles are serviced.	I&M Contractor
As part of the daily plant and vehicle inspection checklist, leaks will be inspected for. If a leak is identified, the plant or vehicle is to be tagged out of service and organised to be fixed.	I&M Contractor
Spill prevention: vehicle washing	
Ensure that no vehicles will be washed to allow runoff to the stormwater system.	I&M Contractor
Spill management as part of the I&M Operations	
Following a minor or major spill: • Identify the type and volumes of spilled material where possible • Refer to SDS for PPE requirements • Assess containment needs • If containment is required use earth mounds and/or absorbent socks/spill kit • Use the relevant clean-up procedure in SDS • Dispose of material using a licensed contractor, and keep records of disposal onsite • Complete an incident reporting form and submit in accordance with Annexure D of the OEMP.	I&M Contractor
Manage major fuel or chemical spills through the incident response procedure (refer to Section 8 and Annexure D of the OEMP).	I&M Contractor
Clean up all spillages immediately, providing there is no risk to human health, to prevent its spread offsite or into the stormwater system, surface waters or groundwater sources.	I&M Contractor
Contract qualified and licensed personnel to manage and classify hazardous or special wastes in accordance with the requirements of the NSW Environmentally Hazardous Chemicals Act 1985 and the EPA Waste Classification Guidelines (NSW EPA, 2014).	I&M Contractor
All I&M personnel are to be trained on emergency spill response, and refresher training provided on an annual basis.	I&M Contractor
Erosion and sedimentation control, including post-construction monitoring of vegetation	
General provisions: applicable to relevant activities	
Erect and maintain effective sediment control barriers down gradient of all areas where soil disturbance will be undertaken.	I&M Contractor
Construct diversion banks upslope of activities where sediment loss may occur to manage surface water runoff away from the exposed areas, where appropriate.	I&M Contractor
Test and classify generated spoil and sediment in accordance with the NSW Assessment Classification and Management of Liquid and Non-Liquid Waste Guidelines (NSW DEC, 2004) and/or the NSW Waste Classification Guidelines (NSW EPA, 2014) before its disposal offsite.	I&M Contractor
Excavate and transport soil offsite for disposal at a licensed facility that is (suspected to be) contaminated as a result of fuel, oil, or chemical spills.	I&M Contractor
Sweep road surfaces as required to prevent the build-up of sediment and kept clear of debris including; vehicle waste, solid waste, sediment, sand, soil, clay or stones.	I&M Contractor
Road sweepings and collected sediment to be classified in accordance with the NSW Assessment, Classification and Management of Liquid and Non-Liquid Waste Guidelines (NSW DEC, 2004) and/or the NSW Waste Classification Guidelines (NSW EPA, 2014) before its disposal offsite.	I&M Contractor
Stabilise exposed areas and earthworks as soon as practicable.	I&M Contractor
Where necessary, protect stormwater drainage to prevent the discharge of sediment by using gravel bags, sand filters or other geotextile fabrics.	I&M Contractor

Surface Water Management Controls	Responsibility
Routinely replace sediment control devices and remove the old devices offsite for storage, waste classification and disposal. Remove sediment from control devices following a major rainfall event and/or when required.	
Batter Slopes and Embarkment Management	
Undertake visual inspections of the batter slopes and embankments especially after a rainfall event, and implement management actions if there is evidence of loose or unstable rock.	I&M Contractor
Stockpile Management	
Install erosion and sediment control measures at stockpile areas based on the provisions included in the Management of Urban Stormwater: Soils and Construction (Landcom, 2004). Install and manage all stockpiles in accordance with Stockpile Site Management Guidelines (Roads and Maritime, 2008).	I&M Contractor
Vegetation Establishment	
Inspect the areas of landscaping and vegetation cover which formed part of the WestConnex M4-M5 Link Tunnel Project to prevent soil erosion, once every month for the first year of operation. If there is evidence of erosion, consider additional remedial actions. Continue inspections after one-year in locations where there is evidence of erosion in the first year until a point in time where the area is established	I&M Contractor
Stormwater drainage system maintenance and repair, including water quality infrastructure, water sensitive urban design measures and outfall points	
General provisions: applicable to relevant activities	
Keep and maintain an Asset drawing of the stormwater system, its respective catchments, collection points, and discharge points.	I&M Contractor
Prepare, maintain, update and review a schedule of all operation and maintenance activities that involve work that could impact on stormwater drainage. This will principally include sediment-generating activities and activities involving the use of chemicals, fuels and other potentially polluting materials.	I&M Contractor
Routine and regular maintenance of the stormwater system including water quality features and water sensitive urban design	
Visually inspect drainage basins at least once a week for signs of debris, poor maintenance, weeds and plant replacement, chemical and oil sheens, notable odours, or other signs of pollution. Monitor, treat and discharge retained water as required. Herbicide and pesticide use should be avoided for weed and plant removal to reduce water pollution. The weekly visual inspection should also include identification of any potential mosquito or other pest larvae such as toads within 9.SWB.02 basin. A qualified and licensed pest controller is required to be engaged to prevent the growth of these pests as required.	I&M Contractor
Ensure that an inspection takes place immediately following an incident, spill or adverse heavy rainfall.	I&M Contractor
Remove sediment from control devices following a major rainfall event and/or when the device is 60 per cent full. Collect, test, classify and dispose of the sediment in accordance with the NSW Waste Classification Guidelines (NSW EPA, 2014).	I&M Contractor
If required, obtain consent from Sydney Water to discharge the collected water to the trunk sewer main.	I&M Contractor

Flood Protection and Maintenance	
Ensure the road drainage infrastructure is inspected quarterly, or more frequently if there is a period of prolonged heavy rainfall or accidental discharge, to ensure it operates within its design specifications to achieve the required flood immunity protection.	I&M Contractor

7 Monitoring, Notification and Reporting

Notification and reporting during operation of the Asset will be undertaken in accordance with Section 8 and 9 of the OEMP. Specific requirements relevant to the OSWQP and the OSWQMP are identified below.

7.1 Surface water quality monitoring

Surface water quality (SWQ) monitoring will be undertaken for duration of operation. This will enable the I&M Contractor to assess the performance of the Asset and identify potential impacts and the required management responses.

Operational monitoring requirements are detailed in the OSWQMP in Annexure B including the various monitoring locations, performance criteria and the triggers for management responses.

7.2 Reporting

As per CoA D17 the results from the Operational Monitoring Programs must be submitted to the Secretary, and the relevant regulatory authorities, for information in the form of the Operational Monitoring Report at the frequency identified in the Operational Monitoring Program. The reporting schedule is outlined in Annexure B and is summarised below in Table 7-1.

Table 7-1: SWQ Monitoring Program reporting schedule

Report Timing	Report requirements	Recipient
Operational Surface Water Quality Monitoring Reports (Six-monthly)	Raw SWQ data from the Ops WTP to be collected and tabulated. Performance criteria exceedances are to be highlighted and what response measures were activated/implemented to further investigate and address these exceedances. Report to confirm implementation and performance of required operational water control measures monitored through monthly visual inspections, including 9.SWB.02 Biofiltration swale, discharge points and chemical storage areas.	DPE, DPE Water (formerly DPI Water), DPE Environment & Heritage (formerly OEH), Sydney Water and relevant councils

8 Auditing and review

8.1 Continuous Improvement

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

The continuous improvement process will be designed to:

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

8.2 OSWQP update and amendment

The processes described in Sections 9 and 10 of the OEMP may result in the need to update this OSWQP and its associated monitoring program. Plan updates will occur on an as needed basis.

Document updates to the plan in response to regular reviews (refer to Section 10.1 of the OEMP) may be approved internally if they are considered minor. Where necessary, the OSWQP will be provided to relevant stakeholders for review and comment if required and provided to the Secretary for approval.

A copy of updated plans will be made public ally available on the WestConnex project website (https://www.westconnex.com.au/) and provided to the relevant stakeholders on request.

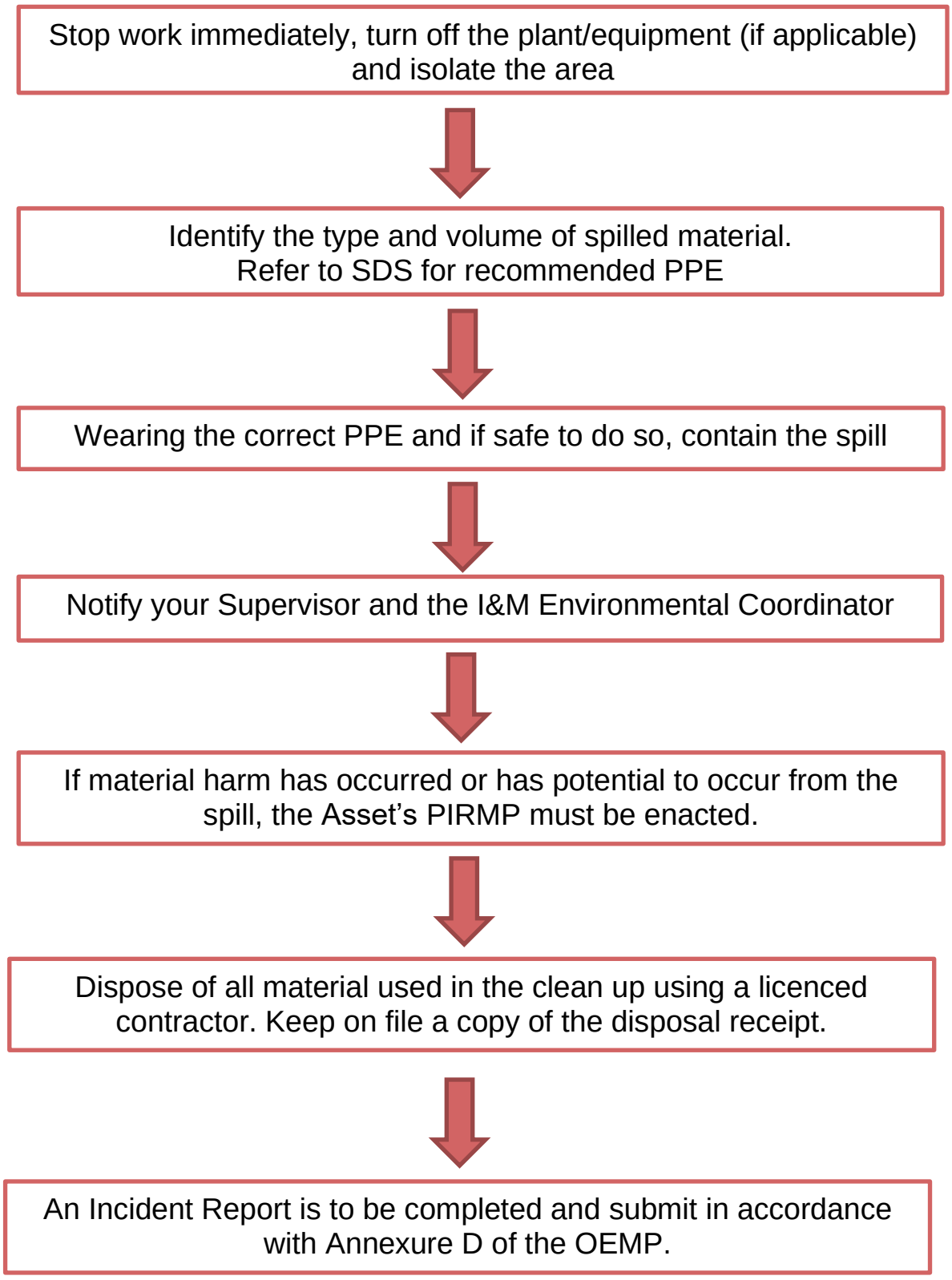
8.3 Auditing

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

Audit requirements are detailed in Section 9.3 of the OEMP.

Annexure A Spill Response Flow Chart

General I&M Operations



Annexure B Operational Surface Water Quality Monitoring Program

WestConnex M4-M5 Link Mainline Tunnels

Operational Surface Water Quality Monitoring Program

Project:	M4-M5 Link Tunnels – Design and Construct
Contract Number:	TBC
Revision Date:	May 2022

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
00	21 April 2022	ASBJV	WCX, TfNSW + External Stakeholders	Provision to DPE following external consultation
01	13 May 2022	ASBJV	DPE	Update in response to DPE RFI

WestConnex

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Glossary of terms

Term/acronym	Definition
the Asset	WestConnex M4-M5 Link Mainline Tunnels
CoA	Conditions of Approval
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPL	Environment Protection Licence
I&M	Incident and Maintenance
MOC	Motorway Operations Complex
OEMP	Operational Environmental Management Plan
OGMP	Operational Groundwater Management Plan
OSWQMP	Operational Surface Water Quality Monitoring Program
OSWQP	Operational Surface Water Quality Plan
Ops WTP	Operational Water Treatment Plant
PREW	Parramatta Road East and West
REMM	Revised Environmental Management Measures
RMS	Roads and Maritime Services
the Asset	M4-M5 Link Mainline Tunnels
TfNSW	Transport for New South Wales
WCX	WestConnex

1 Introduction

1.1 Context

This Operational Surface Water Quality Monitoring Program (OSWQMP) has been prepared for the incident and maintenance (I&M) phase of the WestConnex M4-M5 Link Mainline Tunnels (the Asset). The document describes how the I&M Contractor will monitor the extent and nature of the potential impacts to SWQ, as well as the required response and management procedure in the event that the performance criteria is exceeded.

This OSWQMP will be implemented to monitor effectiveness of the mitigation measures implemented as part of the I&M phase of the Asset, as described within the main body of the Operational Surface Water Quality Management Plan (OSWQP). The Program has been developed in accordance with the Ministers Conditions of Approval (CoA), the Revised Environmental Management Measures (REMM); the WestConnex M4-M5 Link Mainline Tunnel Modification reports, and applicable legislation. It is based on baseline data and studies from the Asset's Environmental Impact Statement (EIS) (AECOM 2017); monitoring data recorded during the construction phase of the Asset as well as individual case studies which have received approval during construction phase.

This OSWQMP forms part of the SWQP and ultimately the Operational Environmental Management Plan (OEMP) and should be read in conjunction.

1.2 Objectives

The objective of the OSWQMP is to clearly outline the following information:

- Details of baseline data;
- Details of all monitoring of the project to be undertaken;
- The parameters of the project to be monitored;
- The frequency of monitoring to be undertaken;
- The location of monitoring;
- The reporting of monitoring and analysis results against relevant criteria;
- Details of the methods that will be employed to analyse the monitoring data;
- Procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and
- Any consultation to be undertaken in relation to the monitoring programs.

1.3 Implementation

Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to commencement of operation of the Asset.

Operation will not commence until the Secretary has approved all of the required Operational Monitoring Programs relevant to that activity and all the relevant baseline data has been collected.

The Operational Monitoring Programs, as approved by the Secretary, must be implemented for the duration identified in the relevant Operational Monitoring Program or specified by the Secretary, whichever is the greater.

1.4 Consultation

This OSWQMP as part of the OSWQP was provided to the EPA; DPE Water; DPE Environment & Heritage (formerly OEH); Sydney Water; Inner West City Council and the City of Sydney Council in accordance with CoA D8, for review and comment.

A document titled 'Consultation for the M4-M5 Link Tunnels OEMP and sub-plans' has been prepared separately to this plan to provide detail relating to the consultation received and where feedback has been covered or addressed in this plan. Subsequent feedback will be documented and used to inform revisions and updates of this plan (refer Section 7.3 of the OEMP).

All community complaints, issues and notifications (this includes those relating to surface water quality) will be managed in accordance with section 7.3 of the OEMP.

2 Environmental obligations

Refer to section 3 of the OSWQP for those CoA; Revised Environmental Management Measures (REMMs); Guidelines and Standards, and RMS G38 requirements which are applicable to the SWQ Monitoring Program.

3 Baseline Surface Water Monitoring

A baseline surface water monitoring program was implemented in July 2016 and continued through to June 2018 to inform the Asset's EIS. The program was based on a desktop assessment which involved a review of the information obtained from geotechnical investigation and assessments carried out as part of the EIS; information and surface water quality monitoring data from the M4 East EIS and the New M5 EIS relevant to the Asset catchment area; and data relevant to the existing surface water conditions from the following sources: Inner West Council; City of Sydney Council; WestConnex (WCX) Transurban; Sydney Water and Transport for New South Wales (TfNSW), formerly known as Roads and Maritime Services (RMS).

The baseline surface water quality (SWQ) monitoring locations were located upstream and downstream of the Asset alignment, as well of the construction ancillary facilities (refer to Table 3-1 and Figure 1). These monitoring locations were chosen to provide general characterisation of the local waterways, and to include SWQ monitoring locations already established for the M4 and the M8 (formerly known as the New M5) Projects.

Table 3-1: Baseline Surface Water Monitoring Locations

Monitoring Location ID	Address	Ancillary Facility	Waterway
SW10	South side of Huntley Street, Alexandria	Campbell Road	Sheas Creek (upstream)
SW15	Euston Road, Alexandria	Campbell Road	Sheas Creek (Alexandra Canal) (downstream)

3.1 EIS Baseline Surface Water Quality

At each of the monitoring location the following baseline surface water quality analytes were measured on a monthly basis:

- Physio-chemical (field) parameters (pH, temperature, electrical conductivity (EC), oxidation / reduction potential, dissolved oxygen, and turbidity)
- Benzene, toluene, ethylbenzene, xylene, and naphthalene (BTEXN)
- Dissolved metals (arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc)
- Nutrients (nitrite as N, nitrate as N, reactive phosphorus and ammonia)
- Total recoverable hydrocarbons (TRHs) and Total petroleum hydrocarbons (TPHs)

A summary of the monthly baseline SWQ data can be found in Annexure A. The Asset's EIS provided an interpretation of these results which is summarised below in Table 3-2.

Table 3-2: Baseline Surface Water Result Summary

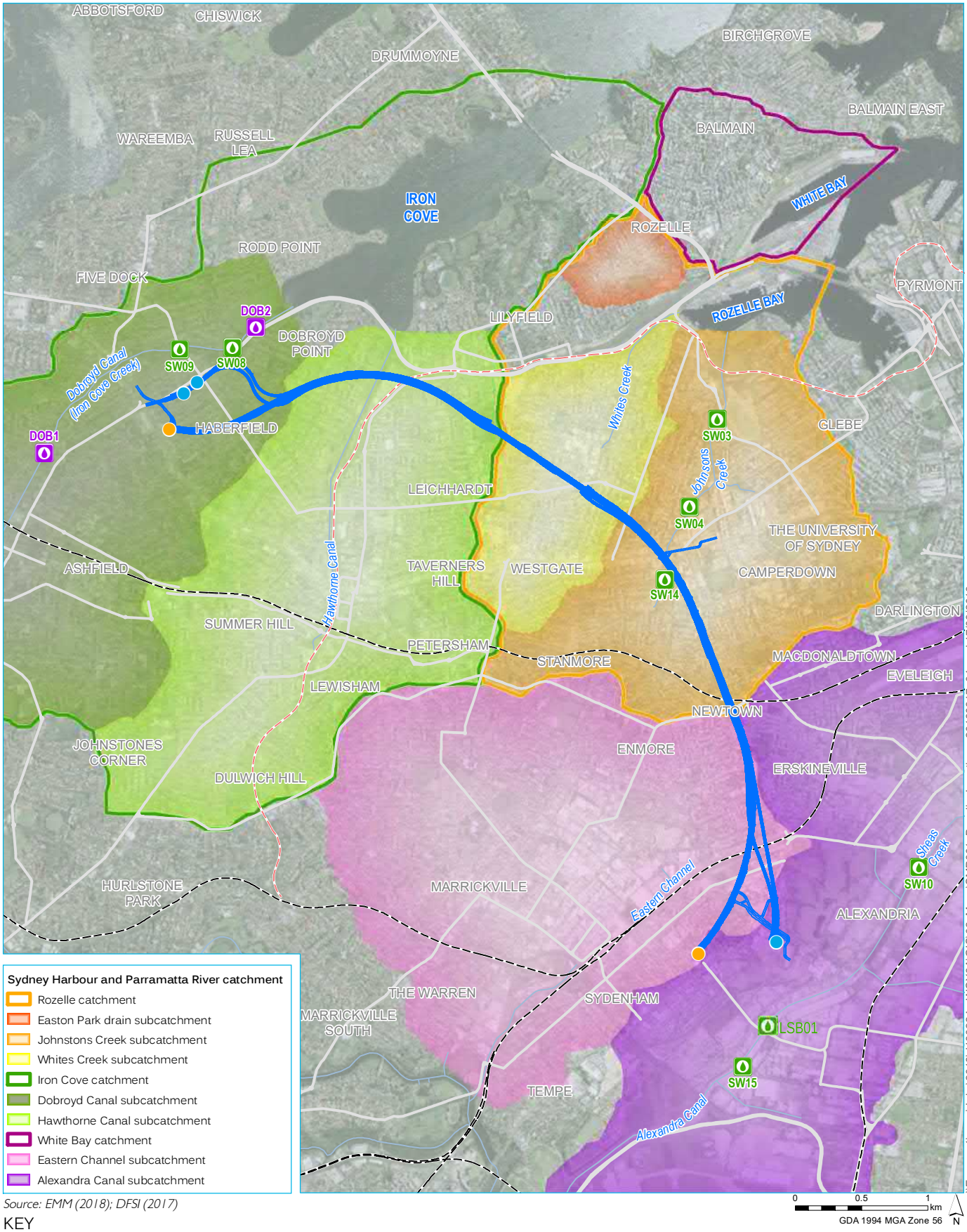
Waterway	Baseline Data Obtained	Description of SWQ
Alexandra Canal	SW10 and SW15	Elevated pH, concentrations of metals (copper, lead, chromium, nickel, manganese and zinc) and nutrients (nitrogen, nitrate and phosphorus) and turbidity The pH was also outside guideline levels on occasions.

[1] ANZECC (2000a)

3.2 Construction Phase SWQ Monitoring Data

In addition to the true baseline data collected prior to any potential impact having occurred, SWQ monitoring data was collected during the construction phase of the Asset to monitor potential construction phase water quality impacts (Annexure B).

During construction, an alternate downstream monitoring location (LSB01) was selected due to issues around safe and public access to the baseline downstream location (SW15). This alternate sampling location also reduced the distance between the control and impact sites resulting in fewer stormwater outlets and potential non-Project pollution sources within the sampling zone. As detailed in Section 4.2, surface watering monitoring will continue during operation at LSB01.



Source: EMM (2018); DFSI (2017)

KEY

Surface water monitoring points

- M4-M5 Link Tunnels
- M4 East

Existing features

- Light rail
- Rail line
- Arterial road
- Watercourse / drainage line

Project features

- Tunnel connection
- Tunnel portal
- Proposed M4 - M5 Link Mainline Tunnel alignment

Figure 3-1: EIS baseline and construction-phase monitoring locations

4 Operational Surface Water Quality monitoring

4.1 Potential Surface Water Impact and Controls

As discussed in section 5.3 of the OSWQP, during the I&M phase of the Asset the local SWQ may be impacted from the following risks:

- Exposure and erosion of soils causing pollution of receiving waters and sedimentation;
- Contamination of waterways associated with the mobilisation of pollutants in stormwater runoff;
- Reduction of water quality and degradation of natural habitats in sensitive receiving environments from uncontrolled discharge of untreated tunnel wastewater;
- Spills of hazardous chemicals and used within the Operation Water Treatment Plant (Ops WTP)

Controls measures which have been implemented to minimise the above risks have been discussed in detail in section 5 of the OSWQP and are summarised below in Table 4-1.

Table 4-1: Potential Impact and Control Measure Summary

Potential risks & impacts on the SWQ	Control Measures as per Section 6 of the SWQP
Exposure and erosion of soils causing pollution of receiving waters and sedimentation.	• 9.SWB.02 Biofiltration Swale emergency spillway has been constructed out of rip-rap protection. Scour protection also provided further downstream. • Landscaped areas will be stabilised with topsoil; mulch; ground covers; grasses and shrubs.
Contamination of waterways associated with the mobilisation of pollutants in stormwater runoff.	• Stormwater runoff from the Campbell Road Motorway Operations Complex (Campbell Road MOC 5) and from the M8 On and Off ramps will be pumped to the 9.SWB.02 Biofiltration Swale which contains an oil baffle wall.
Reduction of water quality and degradation of natural habitats in sensitive receiving environments from uncontrolled discharge of untreated tunnel wastewater.	• All groundwater ingress and tunnel wastewater collected within the two tunnel low point sumps (LPS) will be transferred to the Ops WTP.
Spills of hazardous chemicals and used within the Ops WTP.	• All chemicals for the Ops WTP will delivered and stored within a bunded bay which can contain approx. 9000L of chemical spillage. • All dosing lines have double containment and leak detection. • Stop valve downstream of the chemical delivery area.

The associated management measures that will be implemented by the I&M Operator to also reduce the risk of the above impacts, are outlined within Table 5-2 of the OSWQP.

4.2 Surface Water Quality Monitoring

4.2.1 Monitoring strategy

Table 4-1 identifies the risks and impacts to local surface water quality from the operation of the Asset and describes the control measures that will be implemented to manage the risks. Rather than monitoring the quality of downstream surface water that are subject to a broad range of impact sources, the M4-M5 Link surface water quality monitoring program has been developed to monitor the management measures developed to managed the risk presented by the asset itself.

Table 4-2: Surface Water Quality Monitoring

Potential impacts on the SWQ	Control Measures as per Section 6 of the SWQP	Monitoring type and frequency	Location	Duration
Exposure and erosion of soils causing pollution of receiving waters and sedimentation.	Basin 9.SWB.02 Biofiltration Swale emergency spillway has been constructed with rip-rap protection measures.	Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale stability.	-33.914012449055654, 151.18182027596671	3 years
	The Operational Water Treatment Plant discharges to Swale 7B.SW04, that has a 1m wide SO concrete lined base.	Monthly visual inspection of Swale 7B.SW04 (southern edge of Campbell Rd) stability and operational performance.	-33.91415686773497, 151.18203471398135	3 years
	Landscaped areas stabilised with topsoil; mulch; ground covers; grasses and shrubs.	Monthly visual inspection of all landscaped areas within the asset boundary to assess stability.	Various	3 years
Contamination of waterways associated with the mobilisation of pollutants in stormwater runoff.	Stormwater runoff from the Campbell Road Motorway Operations Complex (Campbell Road MOC 5) and from the M8 On and Off ramps will be pumped to Basin 9.SWB.02 Biofiltration Swale which contains an oil baffle wall.	Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale oil baffle performance.	-33.91524297625522, 151.18384613680107	3 years
Reduction of water quality and degradation of natural habitats in sensitive receiving environments from uncontrolled discharge of untreated tunnel wastewater.	All groundwater ingress and tunnel wastewater collected within the two tunnel low point sumps (LPS) will be transferred to the Ops WTP and treated in accordance with the Environment Protection Licence.	Monthly monitoring adopting the EPA approved methods of the Operational Water Treatment Plant outlet for compliance with Environment Protection Licence discharge limits.	-33.914405002 151.181050995	Duration of EPL

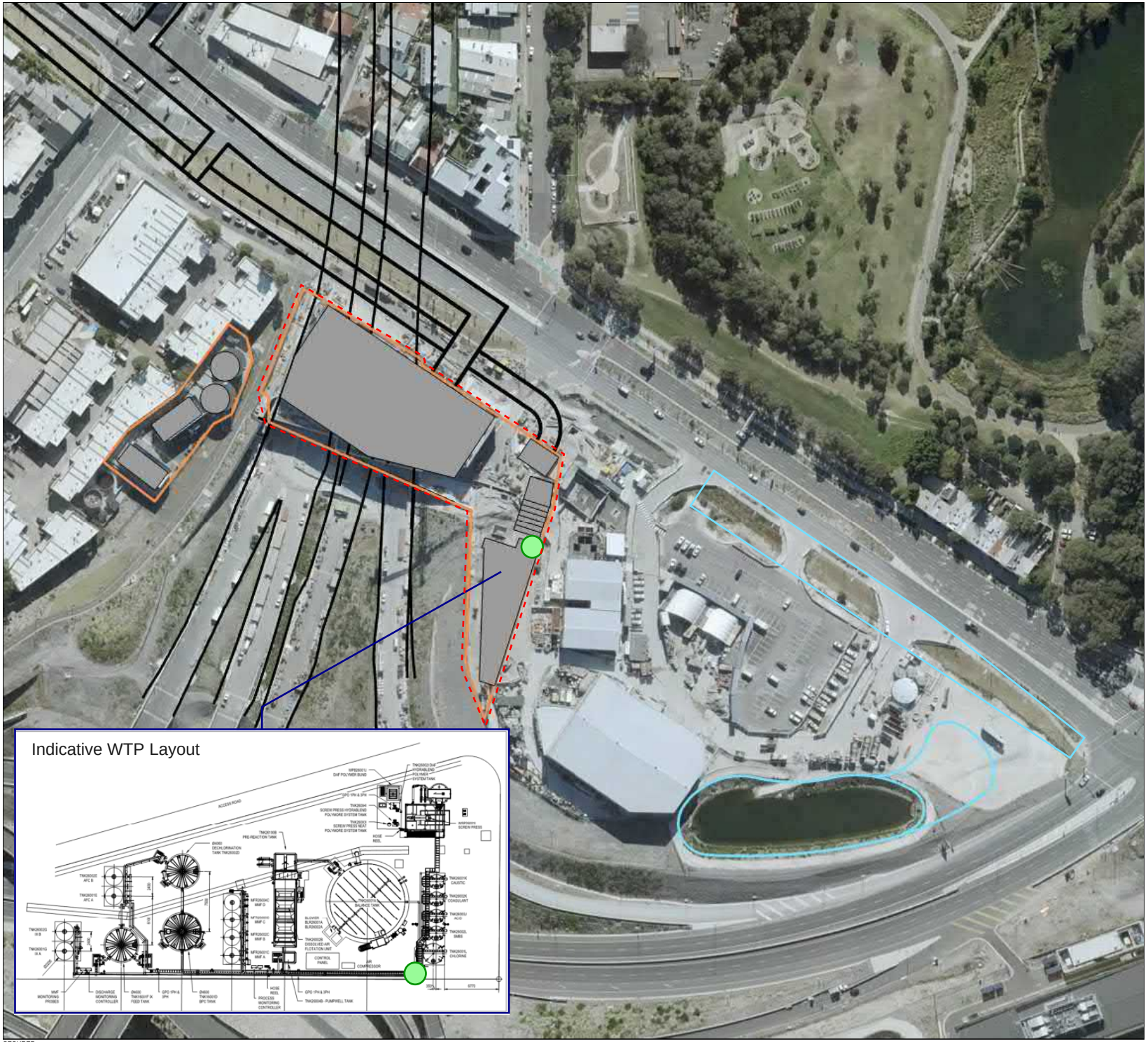
Potential impacts on the SWQ	Control Measures as per Section 6 of the SWQP	Monitoring type and frequency	Location	Duration
Spills of hazardous chemicals used within the Operational Water Treatment Plant.	All chemicals for the Ops WTP will delivered and stored within a bunded bay which can contain approx. 9000L of chemical spillage. All dosing lines have double containment and leak detection. Stop valve downstream of the chemical delivery area.	Monthly monitoring of chemical and fuel storage control measure compliance	-33.91421028923871, 151.18118713598753	Duration of WTP operation

WestConnex M4-M5 Link Mainline Tunnels

Figure 4-1: Operational monitoring locations

Legend

- Tunnel Alignment
- WTP Discharge Sampling Location
- Ancillary Facility Boundary
- Operational Ancillary Infrastructure
- 9.SWB.02 Swale Inspection Areas
- Landscaping and Chemical Storage Inspection Area



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4.2.1.1 Monitoring Parameters

Table 4-3: Surface Water Monitoring Parameters

Potential impacts on the SWQ	Monitoring type and frequency	Parameters
Exposure and erosion of soils causing pollution of receiving waters and sedimentation.	Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale stability. Monthly visual inspection of Swale 7B.SW04 (southern edge of Campbell Rd) stability and operational performance. Monthly visual inspection of all landscaped areas within the asset boundary to assess stability.	Exposed soils, instability or accumulated debris Presence of exposed soils along Swale 7 or instability Stability of landscaped areas
Contamination of waterways associated with the mobilisation of pollutants in stormwater runoff.	Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale oil baffle performance.	Performance of swale oil baffle
Reduction of water quality and degradation of natural habitats in sensitive receiving environments from uncontrolled discharge of untreated tunnel wastewater.	Monthly monitoring adopting the EPA approved methods of the Operational Water Treatment Plant outlet for compliance with Environment Protection Licence (EPL) discharge limits.	As defined by the Asset EPL.
Spills of hazardous chemicals used within the Operational Water Treatment Plant.	Monthly monitoring of chemical and fuel storage control measure compliance	Presence of spill containment measures, damage or visual signs of spills.

5 Monitoring Methodology

5.1 Personal Protective Equipment

When out in the field the staff will wear the following to avoid sunburn and infection:

- Sunscreen
- Sunglasses (UV protection grade)
- Wide brim hat
- Long sleeve shirt and pants
- Waterproof and disposable gloves

5.2 Visual Inspections

Weekly and monthly visual inspections of Basin 9, Swale 7, Water Treatment Plant storage areas and landscaped areas will be undertaken in accordance with Table 5.1 below.

Table 5-1: Visual inspection methodology

Monitoring area	Methodology
Basin 9.SWB.02 Biofiltration Swale stability.	Inspection of the basin outlet will be from Campbell Road. The rock rip-rap from the basin spill-over to the adjoining channel will be inspected, with a focus on the main flow channel path and compliance with the Code of Maintenance Standard and the Operational Maintenance Manual. If more than two concurrent inspections identify debris or instability, the frequency of monitoring and the swale design will be revisited, with maintenance of the swale to be scheduled as required. Refer to OSWQMP Table 6-1 for Management measures.
Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale oil baffle performance.	The swale oil baffle will be visually inspected from within the operational motorway area, with a focus on ensuring stability and compliance with the Code of Maintenance Standard and the Operational Maintenance Manual. If more than two concurrent inspections identify baffle performance matter, the frequency of monitoring and the baffle design will be revisited, with maintenance of the baffle to be scheduled as required. Refer to OSWQMP Table 6-1 for Management measures. The Swale 7 inspection will be undertaken from the footpath on the southern edge of Campbell Road. The entire length of the swale will be walked and inspected for compliance with the Code of Maintenance Standard and the Operational Maintenance Manual. If more than two concurrent inspections identify swale stability matters, the frequency of monitoring and the swale design will be revisited, with maintenance of the swale to be scheduled as required. Refer to OSWQMP Table 6-1 for Management measures.
Swale 7B.SW04 (southern edge of Campbell Rd)	The inspection of the Operational Water Treatment Plant chemical storage areas will be undertaken from within the motorway access area. The perimeter of the bund will be walked, evidence of spills identified and observations of any bund damage identified. If more than two concurrent inspections identify non-compliances with the chemical storage area, the frequency of monitoring and the operational training manual communication will be revisited.
Monthly monitoring of Operational Water Treatment Plant chemical storage control measure compliance	Areas within and adjoining St Peters Interchange and Habberfield landscaped by the M4-M5 Link project will be visually inspected from publicly accessible areas and operational motorway areas, with a focus on perimeter zone compliance with the Code of Maintenance Standard and the Operational Maintenance Manual. If more than two concurrent inspections identify landscape instability matters, the frequency of monitoring and the design of identified landscape areas will be revisited, with landscape maintenance to be scheduled as required. Refer to OSWQMP Table 6-1 for Management measures.

Monitoring area	Methodology
Landscaped areas within the asset boundary Basin 9.SWB.02 Biofiltration Swale and Swale 7B.SW04 (southern edge of Campbell Rd)	As outlined in OSWQMP Section 6.2 and Table 6-1, weekly visual inspections of potential mosquito breeding habitat will include identification of any potential mosquito or other pest larvae. A qualified and licensed pest controller is required to be engaged to prevent the growth of these pests if identified.

5.3 Water Treatment Plant Sample Collection

Grab samples will be collected manually from the WTP and sent to a National Association of Testing Authorities (NATA) accredited laboratory for analysis. The volume of the sample will be adequate to measure the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s).

5.4 Recording of monitoring results

All monitoring and sampling will be documented and transferred to a central electronic database under the responsibility of the I&M Contractor.

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature and will record the following information:

- Site ID
- Time and date of sampling
- Prevailing weather conditions
- Name of sampler
- Other relevant information and commentary

5.5 Decontamination

Sampling equipment will be cleaned (decontaminated) between each sample. Where a sample site shows evidence of contamination (ie. there is an algal bloom, or the site smells strongly of hydrocarbons or sewage etc) equipment will need to be cleaned thoroughly. In addition, equipment will need to be cleaned periodically to prevent a build-up of dirt.

The following method of decontamination will be followed:

- Rinse equipment in tap water
- Clean with De-Con 90 (a phosphate free detergent), or equivalent;
- Rinse again with tap water;
- Rinse three times with de-ionised water, and
- Allowed to dry

5.6 Quality Assurance and Documentation

Quality assurance and control protocols during sampling and recording of physio-chemical (field) parameters will be undertaken in accordance with ANZECC/ARMCANZ (2000b) to ensure the integrity of the dataset.

As part of sampling, quality assurance and control samples during sampling will be undertaken to ensure the integrity of the dataset. This includes:

- Rinsate blanks (one per sampling event only);
- Bind duplicates (at a rate not less than 20% of total samples);
- Split duplicates (at a rate not less than 20% of total samples.

If samples can not be analysed in the field with the multi-probe meter and are required to be sent off to the laboratory for analysis. The samples are then to be transported to a NATA-accredited laboratory under document chain-of custody protocols.

Field results will be checked for accuracy before leaving the site, and errors or discrepancies will be cross-checked and further investigation will be initiated if required.

Monitoring and calibration records will be maintained in accordance with the appropriate standard.

6 Compliance Management

6.1 Roles, Responsibility and Training

The I&M contractor's organisational structure and overall roles and responsibilities are outlined in section 5.8 of the OEMP. Specific responsibilities for the implementation of SWQ related environmental controls are detailed in the OSWQP section 6.6.

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

Further details regarding staff induction and training are outlined in section 6 Of the OEMP.

6.2 Monitoring and Inspection

Section 6.6 and Table 6-2 of the OSWQP as well as section **Error! Reference source not found.** of this d ocument provide detailed inspection criteria including:

- Monitoring locations
- The parameters to be monitored
- Type and frequency of monitoring
- Monitoring methodology
- Spills and Erosion and sediment control focused monitoring at the Campbell Road MOC and Basin 9.SWB.02 Basin
- Mosquito breeding monitoring at Basin 9.SWB.02

Additional requirements and responsibilities in relation to inspections are documented in section 9.1 of the OEMP.

6.3 Response to unsatisfactory performance

Table 6-1: Response to Monitoring Performance

Monitoring area	Response
Basin 9.SWB.02 Biofiltration Swale stability.	If the basin outlet, in particular the rock rip-rap is identified as unstable or where debris is sited, a maintenance work order will be raised by the I&M contractor within 24 hours for rectification in accordance with the Code of Maintenance Standard and the Operational Maintenance Manual.
Monthly visual inspection of Basin 9.SWB.02 Biofiltration Swale oil baffle performance.	If the basin swale oil baffle is identified as not being in accordance with the As-built design (stability and location) a maintenance work order will be raised by the I&M contractor within 24 hours for rectification in accordance with the Code of Maintenance Standard and the Operational Maintenance Manual.
Swale 7B.SW04 (southern edge of Campbell Rd)	If the visual inspection identifies that the basin swale is either unstable, affected by debris or not in a condition consistent with the As-built design, a maintenance work order will be raised by the I&M contractor within 24 hours for rectification in accordance with the Code of Maintenance Standard and the Operational Maintenance Manual.
Monthly monitoring of Operational Water Treatment Plant chemical	If the monitoring of the Operational Water Treatment Plant chemical storage area identifies a non-compliance, evidence of a spill or damage to the bund a maintenance work order will be raised by the I&M contractor within 24 hours for

Monitoring area	Response
storage control measure compliance	rectification in accordance with the Code of Maintenance Standard and the Operational Maintenance Manual.
Landscaped areas within the asset boundary	If the visual inspection of landscaped areas identifies instability or areas where on site erosion could present a sedimentation risk, a maintenance work order will be raised by the I&M contractor within 24 hours for rectification in accordance with the Code of Maintenance Standard and the Operational Maintenance Manual.
Monthly monitoring of Operational Water Treatment Plant Discharge	Upon receipt of monthly sampling results described in Section 5.3, should any criteria exceed the defined EPL discharge limits, a review of the WTP operations, recent incidents and asset maintenance activities will be undertaken by the I&M contractor. A follow up grab sample will be taken from the WTP upon completion of this review and any required rectification works. Should the same criteria exceed the EPL discharge limit on the follow up sample, this result will be classified as an incident and notification will be made in accordance with section 8.2.4 of the OEMP.

6.4 Auditing

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

Audit requirements are detailed in section 9.3 of the OEMP.

6.5 Reporting

Reporting and data provision requirements relevant to this OSWQMP are outlined in Section 7.1 of the OSWQP.

7 Review and Improvement

Continual improvement is achieved through constant measurement and evaluation, audit and review of the effectiveness of the plan, and adjustment and improvement of the OEMP, project environmental outcomes and I&M Environmental Management System.

This program will be updated as required:

- To take into account changes to the environment or generally accepted environmental management practices, new risks to the environment, any hazardous substances, contamination or changes in legislation;
- Where requested or required by the NSW Department of Planning and Environment or any other Authority;
- Following a review of 12 months of operational phase monitoring data; or
- In response to internal or external audits or quarterly management reviews.

During operation the updated program will be reviewed and approved in accordance with the process in section 10 of the OEMP.

8 References

AECOM, 2017. WestConnex M4-M5 EIS Technical Working Paper: Surface Water and Flooding, August 2017.

ANZECC/ARMCANZ, 2000a. Australian and New Zealand Guidelines for Fresh and Marine Water Quality

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EPA, 2004. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.

Landcom, 2004. Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition)

March 2004 (reprinted 2006) (the “Blue Book”). Volume 1 and Volume 2.

NSW Department of Conservation and Land Management, 1989. Soil Landscapes of the Sydney 1:100,000 Sheet 9130

Annexure A Baseline SWQ monitoring results

Parameter	Units	ANZECC 2000 guideline							Baseline data SW10				
		South-east Australia default triggers			Freshwater		Marine						
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection	count	mean	min	max	80th percentile
Physiochemical parameters													
pH	-	6.5-8.5	7.0-8.5	6.5-8.5	-	-	-	-	26	7.72	5.78	9.79	8.19
Temperature	°C	-	-	-	-	-	-	-	27	19.7	15.5	24.5	22.1
Conductivity	µS/cm	125-2,200	-	-	-	-	-	-	27	684	111	4830	510
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	26	338	249	470	375
Dissolved Oxygen	mg/L	-	-	>6.5	-	-	-	-	27	12.4	5.6	65.2	10.2
Dissolved Oxygen	% sat	85-110	80-110	>80	-	-	-	-	-	-	-	-	-
Turbidity	NTU	6-50	0.5-10	-	-	-	-	-	23	19	1	93	25
Chemical analytes													
Ammonia as N	µg/L	20	15	10	320	900	500	910	-	-	-	-	-
Nitrogen (Total Oxidised)	mg/L	0.04	0.015	10/1	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.35	0.3	-	-	-	-	-	-	-	-	-	-
Phosphorous filterable reactive (P)	mg/L	0.02	0.005	-	-	-	-	-	1	0.025	0.025	0.025	0.025
Reactive Phosphorus as P	mg/L	0.02	0.005	-	-	-	-	-	2	0.005	0.005	0.005	0.005
Phosphorus (Total)	mg/L	0.025	0.03	-	-	-	-	-	2	0.025	0.025	0.025	0.025
Arsenic	mg/L	-	-	0.05	0.001/0.0008	0.024/0.013	ID	ID	3	0.0042	0.0026	0.005	0.005
Cadmium	mg/L	-	-	0.005	0.00006	0.0002	0.0007	0.0055	19	0.0005	0.0005	0.0005	0.0005
Chromium (III+VI)	mg/L	-	-	0.05	ID/0.00001	ID/0.001	0.008/0.00014	0.027/0.0044	7	0.0009714	0.0005	0.0038	0.0038
Copper	mg/L	-	-	1	0.0010	0.0014	0.0003	0.0013	1	0.036	0.036	0.036	0.036
Ferrous Iron	mg/L	-	-	0.3	ID	ID	ID	ID	4	0.025	0.025	0.025	0.025
Iron	mg/L	-	-	0.3	ID	ID	ID	ID	1	2.57	2.57	2.57	2.57
Lead	mg/L	-	-	0.05	0.001	0.0034	0.0022	0.0044	3	0.0087333	0.005	0.0162	0.0162
Manganese	mg/L	-	-	0.1	1.2	1.9	ID	ID	2	0.0575	0.005	0.11	0.11
Mercury	mg/L	-	-	0.001	0.00006	0.0006	0.0001	0.0004	27	7.778E-06	0.000005	0.00008	0.00008
Nickel	mg/L	-	-	0.1	0.008	0.011	0.007	0.07	6	0.0008083	0.00025	0.0036	0.0036
Zinc	mg/L	-	-	5	0.0024	0.008	0.007	0.015	1	0.134	0.134	0.134	0.134

Parameter	Units	ANZECC 2000 guideline							Baseline data SW10				
		South-east Australia default triggers			Freshwater		Marine						
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection	count	mean	min	max	80th percentile
Benzene	µg/L	-	-	10	600	950	500	700	29	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	-	-	-	ID	ID	ID	ID	29	1	1	1	1
Toluene	µg/L	-	-	-	ID	ID	ID	ID	29	1	1	1	1
Xylene (m & p)	µg/L	-	-	-	ID	ID	ID	ID	29	1	1	1	1
Xylene (o)	µg/L	-	-	-	200	350	ID	ID	29	1	1	1	1
Xylene Total	µg/L	-	-	-	-	-	-	-	29	1	1	1	1
Naphthalene	µg/L	-	-	-	2.5	16	50	70	29	2.5	2.5	2.5	2.5
C6-C10	mg/L	-	-	-	-	-	-	-	29	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	-	-	-	-	-	-	-	29	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	-	-	-	-	-	-	-	29	0.05	0.05	0.05	0.05
C10-C16	mg/L	-	-	-	-	-	-	-	29	0.05	0.05	0.05	0.05
C16-C34	mg/L	-	-	-	-	-	-	-	28	0.05	0.05	0.05	0.05
C34-C40	mg/L	-	-	-	-	-	-	-	29	0.05	0.05	0.05	0.05
C10 - C40 (Sum of total)	mg/L	-	-	-	-	-	-	-	26	0.05	0.05	0.05	0.05
C6 - C9	mg/L	-	-	-	-	-	-	-	29	0.01	0.01	0.01	0.01
C10 - C14	mg/L	-	-	-	-	-	-	-	29	0.025	0.025	0.025	0.025
C15 - C28	mg/L	-	-	-	-	-	-	-	29	0.05	0.05	0.05	0.05
C29-C36	mg/L	-	-	-	-	-	-	-	29	0.025	0.025	0.025	0.025
+C10 - C36 (Sum of total)	mg/L	-	-	-	-	-	-	-	29	0.025	0.025	0.025	0.025

Parameter	Units	ANZECC 2000 guideline							Baseline data SW15				
		South-east Australia default triggers			Freshwater		Marine						
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection	count	mean	min	max	80th percentile
Physiochemical parameters													
pH	-	6.5-8.5	7.0-8.5	6.5-8.5	-	-	-	-	27	7.46	5.65	7.97	7.89
Temperature	˚C	-	-	-	-	-	-	-	27	20.14	15.70	25.10	24.17
Conductivity	µS/cm	125-2,200	-	-	-	-	-	-	27	42066.69	402.90	52314.60	49676.20
Oxidation Reduction Potential	mV	-	-	-	-	-	-	-	27	320.17	28.70	590.00	386.24
Dissolved Oxygen	mg/L	-	-	>6.5	-	-	-	-	27	7.40	0.16	66.20	6.57
Dissolved Oxygen	% sat	85-110	80-110	>80	-	-	-	-	-	-	-	-	-
Turbidity	NTU	6-50	0.5-10	-	-	-	-	-	24	4.93	0.00	18.70	9.02
Chemical analytes													
Ammonia as N	µg/L	20	15	10	320	900	500	910	-	-	-	-	-
Kjeldahl Nitrogen Total	mg/L	-	-	-	-	-	-	-	17	0.25	0.25	0.25	0.25
Nitrite (as N)	mg/L	-	-	-	-	-	-	-	19	0.005	0.005	0.005	0.005
Nitrogen (Total Oxidised)	mg/L	0.04	0.015	10/1	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.35	0.3	-	-	-	-	-	18	2541.6667	250	41500	250
Reactive Phosphorus as P	mg/L	0.02	0.005	-	-	-	-	-	2	0.005	0.005	0.005	0.005
Phosphorus (Total)	mg/L	0.025	0.03	-	-	-	-	-	16	0.025	0.025	0.025	0.025
Arsenic	mg/L	-	-	0.05	0.001/0.0008	0.024/0.013	ID	ID	11	0.0047545	0.0023	0.005	0.005
Cadmium	mg/L	-	-	0.005	0.00006	0.0002	0.0007	0.0055	23	0.0005	0.0005	0.0005	0.0005
Chromium (III+VI)	mg/L	-	-	0.05	ID/0.00001	ID/0.001	0.008/0.00014	0.027/0.0044	21	0.0005	0.0005	0.0005	0.0005
Copper	mg/L	-	-	1	0.0010	0.0014	0.0003	0.0013	10	0.0047	0.002	0.005	0.005
Ferrous Iron	mg/L	-	-	0.3	ID	ID	ID	ID	13	0.025	0.025	0.025	0.025
Iron	mg/L	-	-	0.3	ID	ID	ID	ID	9	0.0534444	0.05	0.081	0.05
Lead	mg/L	-	-	0.05	0.001	0.0034	0.0022	0.0044	10	0.00463	0.0013	0.005	0.005
Manganese	mg/L	-	-	0.1	1.2	1.9	ID	ID	8	0.00515	0.005	0.0062	0.005
Mercury	mg/L	-	-	0.001	0.00006	0.0006	0.0001	0.0004	28	0.000005	0.000005	0.000005	0.000005
Nickel	mg/L	-	-	0.1	0.008	0.011	0.007	0.07	14	0.000275	0.00025	0.0006	0.00025
Zinc	mg/L	-	-	5	0.0024	0.008	0.007	0.015	7	0.0244286	0.015	0.026	0.026

Parameter	Units	ANZECC 2000 guideline							Baseline data SW15				
		South-east Australia default triggers			Freshwater		Marine						
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection	count	mean	min	max	80th percentile
Benzene	µg/L	-	-	10	600	950	500	700	31	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	-	-	-	ID	ID	ID	ID	31	1	1	1	1
Toluene	µg/L	-	-	-	ID	ID	ID	ID	30	1	1	1	1
Xylene (m & p)	µg/L	-	-	-	ID	ID	ID	ID	29	1	1	1	1
Xylene (o)	µg/L	-	-	-	200	350	ID	ID	29	1	1	1	1
Xylene Total	µg/L	-	-	-	-	-	-	-	28	1	1	1	1
Naphthalene	µg/L	-	-	-	2.5	16	50	70	31	2.5	2.5	2.5	2.5
C6-C10	mg/L	-	-	-	-	-	-	-	30	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	-	-	-	-	-	-	-	31	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	-	-	-	-	-	-	-	31	0.05	0.05	0.05	0.05
C10-C16	mg/L	-	-	-	-	-	-	-	31	0.05	0.05	0.05	0.05
C16-C34	mg/L	-	-	-	-	-	-	-	31	0.05	0.05	0.05	0.05
C34-C40	mg/L	-	-	-	-	-	-	-	31	0.05	0.05	0.05	0.05
C10 - C40 (Sum of total)	mg/L	-	-	-	-	-	-	-	29	0.05	0.05	0.05	0.05
C6 - C9	mg/L	-	-	-	-	-	-	-	31	0.01	0.01	0.01	0.01
C10 - C14	mg/L	-	-	-	-	-	-	-	30	0.025	0.025	0.025	0.025
C15 - C28	mg/L	-	-	-	-	-	-	-	31	0.05	0.05	0.05	0.05
C29-C36	mg/L	-	-	-	-	-	-	-	31	0.025	0.025	0.025	0.025
+C10 - C36 (Sum of total)	mg/L	-	-	-	-	-	-	-	30	0.025	0.025	0.025	0.025

Annexure B Construction phase SWQ monitoring results

Upstream: SW10								Downstream: SW15/LSB01							
Parameter	Temp (°C)	pH	ORP (mV)	EC (mS/cm)	Turbidity (NTU)	DO (%)	TDS (g/L)	**Parameter**	Temp (°C)	pH	ORP (mV)	EC (mS/cm)	Turbidity (NTU)	DO (%)	TDS (g/L)
Sample Count	45	45	45	45	45	45	45	**Sample Count**	45	45	45	45	45	45	45
Min	12.8	7.2	2.7	0.2	1.2	54.4	0.1	**Min**	11.7	6.8	-81.0	0.9	2.1	16.7	0.5
Mean	19.5	8.1	145.8	0.6	83.9	88.4	0.3	**Mean**	19.2	7.6	125.8	25.3	24.9	65.3	13.6
Median	19.4	8.1	140.0	0.6	5.3	81.7	0.3	**Median**	19.1	7.6	130.0	28.3	9.5	61.6	16.0
Max	28.0	9.4	417.0	1.3	3172.0	195.1	0.7	**Max**	28.4	8.8	417.0	56.9	504.0	178.9	34.2

Annexure C Monitoring Location Guide