WestConnex Rozelle Interchange

Operational Environmental Management Plan

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Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
A	25/05/2021	JHCPB JV	JHCPB ESA Manager	Draft for internal review
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0	30/03/2023	JHCPB JV	JHCPB ESA Manager	Updates to address review comments. For issue
1	9/8/2023	JHCPB JV	JHCPB ESA Manager	Updates to address DPE review comments.

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Glossary of terms

Term/acronym	Definition
AQCCC	Air Quality Community Consultative Committee
Asset	M4-M5 Link Rozelle Interchange Motorway; An interchange at Lilyfield and Rozelle, including a connection to the proposed future Western Harbour Tunnel and Beaches Link project
Blue Book	Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2006)
CEA	O&M Contractor's Community Engagement Advisor
CoA	Minister's Conditions of Approval
Construction Contractor	John Holland CPB Contractors joint venture; a consortium comprising John Holland and CPB Contractors, which was engaged to design and construct the Rozelle Interchange project
CSSI	Critical State Significant Infrastructure
CTP	Compliance Tracking Program
DPE	NSW Department of Planning & Environment
DPE Water	NSW Department of Planning Environment - Water
EIS	Environmental impact statement
EM	Environment Manager
EMP	Environmental Management Plan
EMS	Environmental Management System
Environmental aspect	Element of an organisation's activities, products or services that can interact with the environment
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPL	Environment protection licence
EWMS	Environmental Work Method Statement – a component of the environmental management system that addresses environmental management issues relevant to a specific site and/or activity
FRNSW	Fire & Rescue New South Wales
IRP	Incident response procedures (IRPs)
MOC	Motorway Operations Centre
NRAR	Natural Resource Access Regulator (previously Department of Primary Industries – Water)
NSW	New South Wales
O&M	Operation and Management
O&M Contractor	The contractor(s) engaged by Transurban to deliver the operations and/or maintenance contract for the Rozelle Interchange project
OAQMP	Operational Air Quality Management Plan
OEH	NSW Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
OGMP	Operational Groundwater Management Plan
OGWMP	Operational Groundwater Monitoring Program
OSWQPMP	Operational Surface Water Quality Plan & Monitoring Program
POEO Act	*Protection of the Environment Operations Act 1997*

Term/acronym	Definition
Project Company	Transurban
QSE	Quality, safety and environment
REMM	Revised environmental management measure (from the Submissions and Preferred Infrastructure Report)
Roads and Maritime, RMS	Roads and Maritime Services
SDS	Safety Data Sheets
Secretary, the	Secretary of the NSW Department of Planning, Industry & Environment
Site, the	M4-M5 Link Rozelle Interchange Motorway; An interchange at Lilyfield and Rozelle, including a connection to the proposed future Western Harbour Tunnel and Beaches Link project
SOP	Standard Operating Procedure
TfNSW	Transport for New South Wales, the Proponent for the Rozelle Interchange project
WCX	WestConnex

1 Introduction

This document forms the operation environmental management plan (OEMP) for the M4-M5 Link Rozelle Interchange (CSSI 7485, 'the Asset'). It has been prepared in accordance with:

- the *Guideline for the Preparation of Environmental Management Plans*, Department of Infrastructure, Planning and Natural Resources, 2004 (DIPNR, 2004) (refer Annexure A for compliance table);
- Environmental Management System Guidelines 3rd Edition (EMS Guidelines, NSW Government, 2013), which helps prepare and implement systematic practices to manage environmental performance and conformance;
- ISO 14001:2016 environmental management standards (Standards International, 2016), which provide a defined system for managing operations to minimise their environmental impacts, ensure legal compliance, and allow for continual improvement over time;
- relevant conditions of approval (CoA) relating to the operation of the WestConnex M4-M5 Link Rozelle Interchange project ('the approved project'), refer to Section 4.1.1.

This OEMP will be made available on the WestConnex website (https://www.westconnex.com.au/) and provided to the public upon request.

1.1 Purpose

This OEMP identifies risks and legal obligations associated with the Asset's day-to-day operations by:

- identifying best environmental management practices for operating the Asset in the future;
- setting-out relevant operational environmental management commitments, safeguards and management measures;
- describing relevant legal and regulatory provisions;
- managing environmental risk.

The OEMP also:

- satisfies and executes relevant operational environmental obligations in the CoA (refer to Section 4.1.1) and revised environmental management measures (REMM) identified in the WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report (2018) (refer to Section 4.1.2);
- allows environmental performance to be easily reported, audited and monitored;
- allows management plans, standard operating procedures (SOPs) and environmental work method statements (EWMSs) to be developed and implemented.

1.2 Objectives

The OEMP's objectives are to:

- provide a reference document that defines and interprets operational environmental commitments;
- identify legislative and regulatory compliance requirements;
- satisfy the operational CoA and REMMs relevant to operation of the Asset (as detailed in Section 4.1):
- provide training and awareness to allow all personnel to undertake activities in an environmentally responsible manner;
- identify and appropriately manage risks in order to prevent, or minimise, environmental harm;
- provide management measures, processes and procedures to minimise road user disturbance and local community impacts during the operation of the Asset;

- monitor the Asset's operational environmental impacts in accordance with this document;
- document the environmental monitoring requirements needed to maintain the environment in relation to the operation of the Asset;
- develop, implement and maintain effective management systems and plans to control and manage activities associated with the operation of the Asset that may have an adverse environmental impact;
- demonstrate environmental protection, pollution prevention control and continual improvement;
- maintain consistency with current ISO 14001 environmental management standards.

1.3 OEMP structure

The structure of the OEMP, displayed in Figure 1-1, consists of a main document with issue-specific management strategies and three issue-specific sub-plans for key environmental concerns. The OEMP is the overarching document detailing governance and a structured approach to the management of environmental issues during operation and maintenance of the Asset.

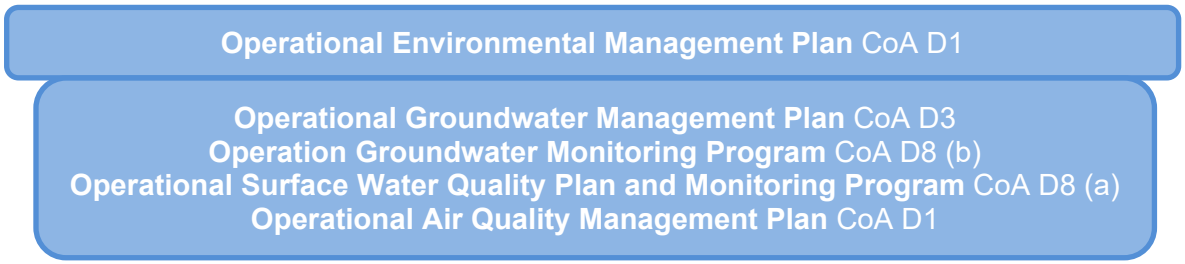


Figure 1-1: OEMP structure

1.4 Management, update, and approval

This OEMP must remain a flexible document that provides continual feedback and improvement. Updates to this plan may be required to reflect:

- improvements, observations and non-conformances;
- improvements in mitigation, management and monitoring measures;
- changes in:
  - project implementation and operation;
  - environment resulting in new or amended risks;
  - maintenance methods;
  - organisational structure, roles and responsibilities;
  - legislation, regulation, policy and guidance;
- after the occurrence of an emergency situation or test;
- where requested or required by DPE or any other relevant authority.

This OEMP must be submitted to the Planning Secretary no later than one month prior to the commencement of operation.

Updates to the plan in response to regular review of the OEMP (refer to Section 10.1) may be approved internally if they are considered minor. Minor changes would typically include those that:

- are editorial in nature (e.g. staff and agency/authority name changes);
- do not increase the magnitude of impacts on the environment when considered individually or cumulatively;

- are in response to audit findings or periodic reviews; or
- do not comprise the ability of the project to meet approval or legislative requirements.

Where necessary, the OEMP will be provided to relevant stakeholders for review and comment if required, and forwarded to the Secretary of DPE for approval.

1.5 OEMP consultation

The OEMP must be prepared in consultation with relevant agencies in accordance with CoA D3 and D8. The stakeholders identified in Table 1-1 were consulted during the preparation of this plan as required by Infrastructure Approval SSI 7485.

Table 1-1: OEMP consultation

	CoA	DPE Water	EPA	Sydney Water	LGAs	OEH (EESG)	AQCCC
Operation Environmental Management Plan	D1						
Operational Air Quality Management Plan	D1						■
Operational Groundwater Management Plan	D3(a)	■		■			
Operational Water Quality Plan & Monitoring Program	D8(a)	■	■	■	■	■	
Operational Groundwater Monitoring Program	D8(b)	■	■	■	■		

DPE Water: Department of Planning, Industry and Environment - Water; EPA: Environment Protection Authority; LGAs: Local Government Areas including Inner West Council, City of Canada Bay Council and City of Sydney Council; OEH: Office of Environment and Heritage

1.6 Asset Interface

The M4-M5 Link Stage 2 Rozelle Interchange forms part of the WestConnex road network, an integrated motorway. Transurban, the Project Company, will coordinate operations across the WestConnex network utilising integrated data and information systems to manage the asset. The Project Company will engage an O&M Contractor to operate and maintain the asset in an integrated manner.

2 Asset description

2.1 Location

Figure 2-1 shows the location and key features of the Asset.

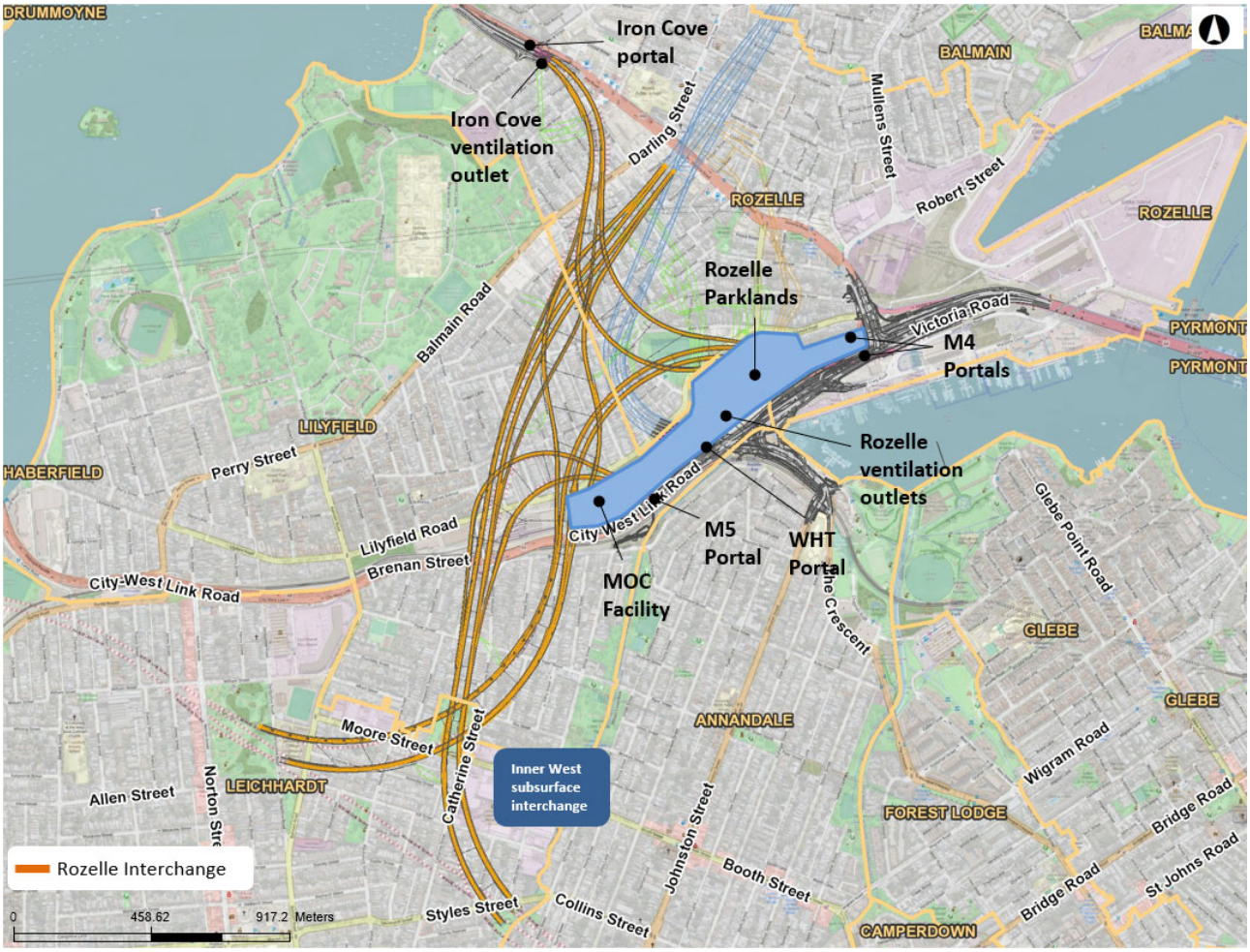


Figure 2-1: Key features of the Asset as upgraded under the approved project

2.2 Asset components

The Asset comprises the new interchange at Rozelle. A summary of the Asset components is included in Table 2-1. The key facilities are further described in the following sub-sections.

Table 2-1: Key Asset components

Asset	Location
Interchanges (including on and off ramp tunnels)	• City West Link M5 portals • City West Link Western Harbour Tunnel portals • M4-Anzac dive portals • Iron Cove link dive portals • M4-M5 Link Eastbound on-ramp • M4-M5 Link Eastbound off-ramp • M4-M5 Link Westbound on-ramp

Asset	Location
	• M4-M5 Link Westbound off-ramp
Road upgrades	• Victoria Road • City West Link • Johnston St, Annandale • The Crescent, Annandale
Motorway Operation Complex	Two motorway operations complexes: ▪ Rozelle west (MOC2 or Rozelle Interchange Facilities Area), and ▪ Iron Cove Link (MOC4 or Iron Cove Ventilation Facility).
Mainline Tunnel	Mainline connections between the New M4 and New M5 motorways and the proposed future Western Harbour Tunnel and Beaches Link (via the M4-M5 Link mainline tunnels)
Tunnel ventilation system	• The Rozelle ventilation facility with vertical garden panels on parts of the ventilation outlets • The Iron Cove Link ventilation facility with vertical garden panels on parts of the ventilation outlet
Tunnel support systems and services	• Electricity substations • Fire pump rooms and tanks • Water treatment facilities and pump station • Low point sump for detention of stormwater, groundwater inflows and/or spills in the tunnel • Fire and life safety systems including emergency evacuation infrastructure
Off-road shared use path	• Pedestrian and Cycle paths throughout the Rozelle Parkland • Pedestrian and Cycle paths adjacent to Victoria Road, Rozelle • Pedestrian and Cycle path bridge connecting Rozelle Bay light rail station to the Rozelle Parkland with land scaped garden beds • Pedestrian and Cycle path bridge connecting Brennan St Lilyfield to the Rozelle Parkland
Parkland	• Public parkland bounded by City West Link, Victoria Rd, Lilyfield Rd and MOC2 • Amenities building • Play equipment • Fitness equipment • Wetlands
Intelligent transport systems	• Tolling equipment • Gantries • Equipment shelters • Substations • Cameras • Cabling and conduits • Traffic control systems
Environmental and amenity controls	• Planting and landscape treatments • Water quality basins • Internal noise attenuation within Iron Cove high voltage regulator building • Axial fan noise attenuators in ventilation tunnels
Stormwater drainage	• Longitudinal drains (pits and pipes) • Cross drains (culverts)
Road furniture	• Lighting • Signage • Furniture

Asset	Location
Utilities	• Power • Communications • Cables and conduits

2.3 Motorway Operational Ancillary Infrastructure

The M4-M5 Link Rozelle Interchange includes the following operational ancillary infrastructure:

- Operational management control systems and incident and emergency response infrastructure
- Tunnel ventilation systems and facilities
- Drainage and water treatment facilities
- Utilities
- Roadside furniture and lighting.

Most operational ancillary infrastructure is established in one main Motorway Operations Centre (MOC) and other operational facilities. The O&M Contractor will operate and maintain the MOC.

2.3.1 Motorway Operations Centre

The Motorway Operations Centre (MOC) (referred to as MOC2 in the EIS documentation) is located on the western side of the Rozelle Parklands. The O&M Contractor will operate and maintain the MOC and Maintenance Facility.

Figure 2-2 Motorway Operations Centre

The operational features of the Motorway Operations Centre and Maintenance Facility are included in Table 2-2.

Table 2-2: Motorway Operations Centre infrastructure and equipment

Aspect	Infrastructure / equipment
Infrastructure and equipment	• Fire Pump Room • Fire Water Tank • Substation • Communications Building • RIC Office/workshop/garage • WHT office/store • WHT Bulk Supply Substation • RIC Water Treatment Plant • Bulk Store
Access	• Access road off Lilyfield Road and via Sydney Light Rail depot. • 24 hours per day • O&M Contractor vehicles.

2.3.2 Rozelle ventilation facility and outlets

The Rozelle ventilation facility is located within the Rozelle Parklands, adjacent to City West Link at Rozelle. There are other operational assets situated within underground caverns, located beneath the Rozelle Parklands. The O&M Contractor will operate and maintain the ventilation facility.

The operational features of the Rozelle ventilation facility are included in Table 2-3.

Table 2-3: Rozelle ventilation facility infrastructure and equipment

Aspect	Infrastructure / equipment
Equipment	• Ventilation exhaust outlets • Fresh air supply intakes • Electrical substations • Ventilation fans
Access	• Vehicle access to the facility is via a maintenance bay or through the tunnel • 24 hours per day • O&M Contractor vehicles

Figure 2-3 Rozelle ventilation facility

2.3.3 Iron Cove operational and ventilation facilities

The Iron Cove ventilation and operational facility is located on Victoria Rd, Rozelle. The O&M Contractor will operate and maintain the Iron Cove ventilation facility.

The operational features of the Iron Cove ventilation facility is included in Table 2-4.

Table 2-4: Parramatta Road ventilation facility infrastructure and equipment

Aspect	Infrastructure / equipment
Equipment	• Ventilation exhaust outlet • Switch room • High Voltage regulators • Alternative Operational Motorway Control System • Service and maintenance bay
Access	• General surface vehicle access is provided via Toelle Street, Rozelle • 24 hours per day • O&M Contractor vehicles

Figure 2-4: Iron Cove operational and ventilation facility

3 Operation and maintenance activities

3.1 Operation and maintenance activities summary

Table 3-1 includes a list of indicative activities to be undertaken during operation and maintenance of the Asset. This list is provided for reference to aid in understanding the environmental risks and mitigations associated with operation and maintenance of the Asset. The Asset Operations and Maintenance Manual contains an exhaustive list of activities and details for implementation. The Asset Operations and Maintenance Manual should be referred to by the O&M Contractor as the definitive manual for operating and maintaining the Asset.

Table 3-1: Indicative operational and maintenance services

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
Operations services	Rozelle Interchange		All things necessary for the use, operation and control of the Motorway including:			
	Motorway	Refer below and to Section 2.2	Traffic management including monitoring the operation of traffic signalling devices from the Motorway Operations Centre (MOC)		Daily	24 hours / 7 days
	Tunnel		Operation and periodic testing of tunnel ventilation equipment and facilities to maintain acceptable air quality within and outside of tunnel		Daily	24 hours / 7 days
	Motorway		Equipment and systems management including monitoring the operation of tolling systems and tunnel ventilation system		Daily	24 hours / 7 days
	Motorway		Incident management including attending and clearing all breakdowns and other vehicle incidents (including spills) on the M4 Motorway		As required	24 hours / 7 days
	MOC		Storage of liquids and chemicals at the Motorway Operation Centre and the water treatment plant.		Daily	24 hours / 7 days

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
Maintenance services	Rozelle Ventilation facility	At all times a minimum of two people shall attend site. During maintenance activities up to 10 people shall attend the site.	Maintenance of ventilation plant, facilities and monitoring equipment: (e.g. fans, ventilation facilities, monitors) including: • Testing of the tunnel ventilation system • Inspect fan assemblies and airways into fans • Diagnosis for out of balance vibration and bearing condition • Measure and record operating current and voltage, and motor winding insulation resistance • Inspect protective coatings and tightness of bolts • Inspect impeller for abrasion, corrosion or dirt deposits • Check the fan, impeller, motor for corrosion and damage • Inspect ventilation facility for structural integrity and soundness of fixtures and fittings	Maintenance activities are generally carried out in situ with no machinery requirements. Over the life of the asset major refurbishment may be required and heavy lifting machinery will be required to facilitate the removal of equipment and access at ventilation facilities. Maintenance is generally completed with minimal impact to the community, with the activities conducted within the facilities.	Weekly inspections and monthly routine tasks	Major activities generally occur during quarterly nightly closures; minor activities generally occur during day hours, providing Motorway operations are unaffected and it is safe to do so.
			Maintain external areas including: • Removing rubbish • Maintain visual appearance	Routine activities with repairs involving machinery as required	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Maintaining landscaped areas including vegetation trimming, grass mowing and replanting using equipment such as tractor slashers, ride on mowers, hand mowers, brush cutters, blower/vacs, small skids steer, augers, water carts, etc.	Routine activities with access to adjacent areas	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Cleaning out drains	Routine inspection; cleaning activities may require machinery, with appropriate controls and notification measures in place	Maintenance as required following annual inspection	Generally during daylight hours as required

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
			Graffiti removal from the facility using non-hazardous materials and a pressure cleaner after application of removal agent (graffiti treatment may also include re-painting)	Will be completed as identified after inspections or reported through any of the communication mediums. Activities may involve high pressure water machinery. These shall normally be conducted during day time shifts and appropriate control and notification measures in place.	Maintenance as required following weekly inspection	Generally during daylight hours as required
			Remove unauthorised posters from assets by appropriate means such that the strata from which the items are removed are not damaged and, where possible, minimal damage to the poster occurs. Record details of the poster, sign, location and, where practical, name and address the owner. Once removed, unauthorised posters (including supporting structures) must be stored for one month before disposing.		Maintenance as required following weekly inspection	Generally during daylight hours as required
			Maintenance of vertical garden panels on ventilation outlets.	Area beneath maintenance activities will be barricaded. Vegetation will be disposed to a facility that can accept green waste, preferably for recycling.	Generally quarterly	Generally during daylight hours as required
	Iron Cove Ventilation facility	At all times a minimum of two people shall attend site. During maintenance activities up to 10 people shall attend the site.	Maintenance of ventilation plant, facilities and monitoring equipment: (e.g. fans, ventilation facilities, monitors) including: • Testing of the tunnel ventilation system • Inspect fan assemblies and airways into fans • Diagnose for out of balance vibration and bearing condition • Measure and record operating current and voltage, and motor winding insulation resistance • Inspect protective coatings and tightness of bolts • Inspect impeller for abrasion, corrosion or dirt deposits	Maintenance activities are generally carried out in situ with no machinery requirements. Over the life of the asset major refurbishment maybe required and heavy lifting machinery will be required to facilitate the removal of equipment and access at ventilation facilities. Maintenance is generally completed with minimal impact to the community, with the activities	Weekly inspections and monthly routine tasks	Major activities generally occur during quarterly nightly closures; minor activities generally occur during day hours, providing Motorway operations are unaffected and it is safe to do so.

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
			• Check the fan, impeller, motor for corrosion and damage • Inspect ventilation facility for structural integrity and soundness of fixtures and fittings	conducted within the facilities.		
			Maintain external areas including: • Removing rubbish • Maintain visual appearance	Routine activities with repairs involving machinery as required	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Maintaining landscaped areas including vegetation trimming, grass mowing and replanting using equipment such as tractor slashers, ride on mowers, hand mowers, brush cutters, blower/vacs, small skids steer, augers, water carts, etc.	Routine activities with access to adjacent areas	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Cleaning out drains	Routine inspection; cleaning activities may require machinery, with appropriate controls and notification measures in place	Maintenance as required following annual inspection	Generally during daylight hours as required
			Graffiti removal from the facility using non-hazardous materials and a pressure cleaner after application of removal agent (graffiti treatment may also include re-painting)	Will be completed as identified after inspections or reported through any of the communication mediums. Activities may involve high pressure water machinery. These shall normally be conducted during day time shifts and appropriate control and notification measures in place.	Maintenance as required following weekly inspection	Generally during daylight hours as required
			Remove unauthorised posters from assets by appropriate means such that the strata from which the items are removed are not damaged and, where possible, minimal damage to the poster occurs. Record details of the poster, sign, location and, where practical, name and address the owner. Once removed, unauthorised posters (including supporting structures) must be stored for one month before disposing.		Maintenance as required following weekly inspection	Generally during daylight hours as required

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
			Maintenance of vertical garden panels on ventilation outlets.	Area beneath maintenance activities will be barricaded. Vegetation will be disposed to a facility that can accept green waste, preferably for recycling.	Generally quarterly	Generally during daylight hours or at night if road occupancy licences will not be issued for daytime.
	Motorway Operations Centre and maintenance facility (MOC), Water treatment plant	At all times a minimum of two people shall attend site. During maintenance activities up to four people shall attend the site.	Building maintenance	Routine activities and general facilities maintenance.	Weekly	Generally during daylight hours as required
			Maintaining landscaped areas including vegetation trimming, grass mowing and replanting using equipment such as tractor slashers, ride on mowers, hand mowers, brush cutters, blower/vacs, small skids steer, augers, water carts, etc.	Routine activities and general maintenance of facility landscaping.	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Cleaning out drains	Routine inspection; cleaning activities may require machinery, with appropriate controls and notification measures in place	Maintenance as required following annual inspection	Generally during daylight hours as required
			Graffiti removal from the facility using non-hazardous materials and a pressure cleaner after application of removal agent (graffiti treatment may also include re-painting)	As identified after inspections or reported through any of the communication mediums. Activities may involve high pressure water machinery and noise. These shall normally be conducted during day time shifts and appropriate control and notification measures in place.	Maintenance as required following weekly inspection	Generally during daylight hours as required
			Remove unauthorised posters from assets by appropriate means such that the strata from which the items are removed are not damaged and, where possible, minimal damage to the poster occurs. Record details of the poster, sign, location and, where practical, name and address the owner. Once removed, unauthorised posters (including supporting structures) must be stored for one month before disposing.		Maintenance as required following weekly inspection	Generally during daylight hours as required

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
			Maintenance of ventilation plant, facilities and monitoring equipment: (e.g. fans, ventilation facilities, monitors) including: • Testing of the tunnel ventilation system • Inspect fan assemblies and airways into fans • Diagnose for out of balance vibration and bearing condition • Measure and record operating current and voltage and motor winding insulation resistance Inspect protective coatings and tightness of bolts • Inspect impeller for abrasion, corrosion or dirt deposits • Check the fan, impeller, motor for corrosion and damage • Inspect ventilation facility for structural integrity and soundness of fixtures and fittings	Maintenance activities are generally carried out in situ with no machinery requirements. Over the life of the asset major refurbishment maybe required and heavy lifting machinery will be required to facilitate the removal of equipment and access at ventilation facilities. Maintenance is generally completed with minimal impact to the community, with activities conducted within the facilities.	Weekly inspections and monthly routine tasks	Major activities generally occur during quarterly nightly closures; minor activities generally occur during day hours, providing Motorway operations are unaffected and it is safe to do so.
			Maintain external areas including: • Removing rubbish • Maintain visual appearance	Routine activities with repairs involving machinery as required	Weekly inspections and monthly routine tasks	Generally during daylight hours as required
			Water treatment (through Water Treatment Plant)	Routine activity with dedicated machinery	Weekly	Generally during daylight hours as required
			Delivery of chemicals to the WTP involving one chemical tanker	Routine activity with dedicated machinery	Weekly	Generally during daylight hours as required
			Removal of sludge produced as a by-product of the treatment process utilising one skip bin truck	Routine activity with dedicated machinery	Weekly	Generally during daylight hours as required

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
	All external landscaped areas and parkland	At all times a minimum of two people shall attend site. During maintenance activities up to four people shall attend the site.	Maintaining landscaped areas, wetlands, playgrounds and fitness equipment including vegetation trimming, grass mowing, replanting using equipment such as tractor slashers, ride on mowers, hand mowers, brush cutters, blower/vacs, small skids steer, augers, water carts, hand tools and small excavators, trucks etc.	Routine activities with access to adjacent areas. Vegetation will be disposed to a facility that can accept green waste, preferably for recycling.	Weekly for general landscape maintenance, wetlands maintained following inspection outcomes	Generally during daylight hours as required
			Amenities cleaning and maintenance.	Routine activity with cleaning equipment.	Generally daily	Generally during daylight hours as required
	Motorway (includes all areas within the operational boundary of the project)	At all times a minimum of two people shall attend site. During maintenance activities up to four people shall attend the site.	Removing material deposited by motorists, such as non-biodegradable litter and food wastes from the Motorway verges using road sweeping equipment and maintenance crew members	As identified, sweeping conducted weekly	Maintenance as required following daily inspection	Generally during daylight hours as required
			Cleaning up any spills from motor vehicles using spill kits containing material to absorb spills, then shovelled/swept up and material disposed at approved waste facilities	As required as part of clean up after incidents	Maintenance as required following daily inspection	As required and safe to do so
			Graffiti removal from road furnishings, retaining walls, bridges, etc. using non-hazardous materials and a pressure cleaner after application of removal agent (graffiti treatment may also include re-painting). Remove graffiti and clean the surface according to any requirements for anti-graffiti coatings. Remove unauthorised posters from assets by appropriate means such that the strata from which the items are removed are not damaged and, where possible, minimal damage to the poster occurs. Record details of the poster, sign, location and, where practical, name and address the owner.	Will be completed as identified after inspections or reported through any of the communication mediums. Activities may involve high pressure water machinery. These shall normally be conducted during day time shifts and appropriate control and notification measures in place.	Maintenance as required following daily inspection	As required and safe to do so

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
			Once removed, unauthorised posters (including supporting structures) must be stored for one month before disposing.			
			Stormwater system maintenance and repair including: • Cleaning out drains (including detention and sedimentation basins) • Inspect Pits for structural integrity and flow obstructions (Note: flame trap pits fill with water) • Inspect pipes for structural integrity and flow obstructions • Inspect sub-surface drains	Routine inspection with CCTV equipment requiring access to inlet pits. Cleaning activities may require heavy machinery, these shall generally be conducted during day time shifts, with appropriate controls and notification measures in place.	Annually and as required	Night closures and during 24 hour operations as safe to do so.
			Pavement maintenance and repair including: • Undertake inspection of assets following heavy rains and storms • Undertake asset inspection which is prompted by a public complaint • Undertake detailed Inspection • Test carriageway and ramps in minimum 100m lengths for roughness	Periodic repairs of degraded pavement will be conducted by onsite teams with minimal machinery. Significant pavement works as result of reaching end of effective life will require significant machinery and be	Maintenance as required following daily inspections	During permitted night closures

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
				undertaken as a major project.		
			Maintenance of road furnishings (including noise barriers). Visual inspection for accident damage, vandalism or graffiti.	Routine activities with repairs involving machinery as required	Monthly	Night closures and during 24 hour operations as safe to do so.
			Maintenance of roadside and medians (including fences, retaining walls and landscaping) including removal of graffiti with issues identified through inspections of the structural integrity and stability and public complaint. Inspections will also include ensuring retaining walls are not sloping or falling.	Routine activities with repairs involving machinery as required	Monthly	Night closures and during 24 hour operations as safe to do so.
			Maintenance of mechanical and electrical systems (lighting, hydraulics, instrumentation) including replacement of light globes	Routine activities with repairs involving machine as required	Monthly	Night closures and during 24 hour operations as safe to do so.
			Line marking inspections, both scheduled (alternating day and night) and prompted by public complaints. Maintenance as required by the inspection. Maintenance and repair of intelligent transport systems (traffic lights, traffic signs, safety cameras)	Routine activities with repairs involving machine as required	Quarterly	During permitted night closures.

Services	Facility/Location	Number of Personnel (Indicative)	Activities	Considerations	Frequency	Access Hours
	Bridges	At all times a minimum of two people shall attend site. During maintenance activities up to four people shall attend the site.	Bridge maintenance including repairs after collisions and removal of graffiti, will be prompted following the following inspections: • Level 1 Inspections (all bridges) – basic and relatively cursory inspection performed as part of the general network asset management • Level 2 inspections (concrete and steel bridges) – condition assessment by accredited inspector (if all structural elements are Condition 1 at the last inspection interval can be extended up to 5 years) • Level 3 Inspections – Structural Safety Assessment by Structural Engineer based on reported deterioration of individual elements within the bridge • Level 4 Inspections – Load Capacity Assessment	Routine general inspection activities requiring specialist access machinery. Significant works or repairs will require dedicated machinery and undertaken as a major project.	Maintenance as required following annual inspection	During permitted night closures.
	Tunnel	At all times a minimum of two people shall attend site. During maintenance activities up to ten people shall attend the site.	Tunnel washing	Routine activity with dedicated machinery under closed or controlled conditions	Quarterly	During permitted night closures.
			Tunnel operation systems including ventilation, fire and life safety, etc.	During scheduled closures operation and testing of systems in accordance with maintenance standards.	Quarterly	Night closures and during 24 hour operations as safe to do so.

3.2 Staging and scheduling of operation and maintenance activities

The operation of each stage of the M4-M5 Link project is the operation of the identified elements for that stage, excluding the proposed future Western Harbour Tunnel and Beaches Link elements. Further details are contained within the latest Staging Report. The Asset will be continuously operated and maintained 24-hours per day, 7-days a week, 365 days a year.

Programmed maintenance works will be undertaken where possible, during daylight hours (including off-motorway works, e.g. landscaping, litter removal, graffiti removal, gantry access etc.). However due to the strategic importance of the motorway, certain motorway, maintenance works will be required to occur during:

- hours of low traffic volumes to ensure maintenance works limits impacts on peak traffic flow
- scheduled maintenance shutdowns
- To accommodate parkland activities.

The O&M Contractor will notify the public and other stakeholders before working at night or out of hours, using the methods described in Section 7.3.1. Urgent unplanned repair work will be undertaken in accordance with the Project Company's Community Involvement Plan (refer to Section 7.3.1).

3.3 Responsible parties for the OEMP

The key responsible parties for the OEMP are:

- Transport for NSW (TfNSW);
- Project Company;
- O&M Contractor.

Table 3-2: Roles and functions for key O&M responsible parties

Organisation	Roles and function
Transport for NSW: proponent	• Act on behalf of the Government as the client and commissioning agency • Manage concession arrangements on behalf of the NSW Government • Is the proponent for the planning approval • Acquired the property needed to build and operate WestConnex • Maintain responsibility for tolling policy (with Transport for NSW) • Provide advice and leadership on environmental policy and regulation
Project Company: delivery	• Project manage delivery of WestConnex • Assist with communication and stakeholder activities including Ministerial liaison during operation • Contractor management, performance monitoring and auditing.

Organisation	Roles and function
O&M Contractor: operation	Operation Services: • Procure and manage contracts for the operation and maintenance of WestConnex and any impacts that could result from this • Traffic management including monitoring the operation of traffic signalling devices from the Motorway Operations Centre (MOC) • Equipment and systems management including monitoring the operation of tolling systems • Incident management, including attending and clearing all breakdowns and other vehicle incidents (including spills) on the Rozelle Interchange. Maintenance Services: • Routine and non-routine preventative maintenance activities required to maintain the safe and continuous operation of the Rozelle Interchange • Corrective maintenance (activities required to repair an unexpected failure of, or defect or damage to the Asset, to restore it to full operational condition) • Condition monitoring and reporting (to provide objective assessment of the condition of the Asset) • Spare parts management (custody, use and management of spare parts).
Construction Contractor	• Operational noise monitoring of the onload tap changer at the high voltage regulator at Iron Cove within 3 months of operation in accordance with E94A. • Operational noise monitoring within 12 months of the commencement of operations in accordance with CoA E95.

3.4 Roles and responsibilities

This section describes the key environmental management roles and responsibilities that will operate for the Asset's lifetime. Figure 3-1 shows the organisational structure.

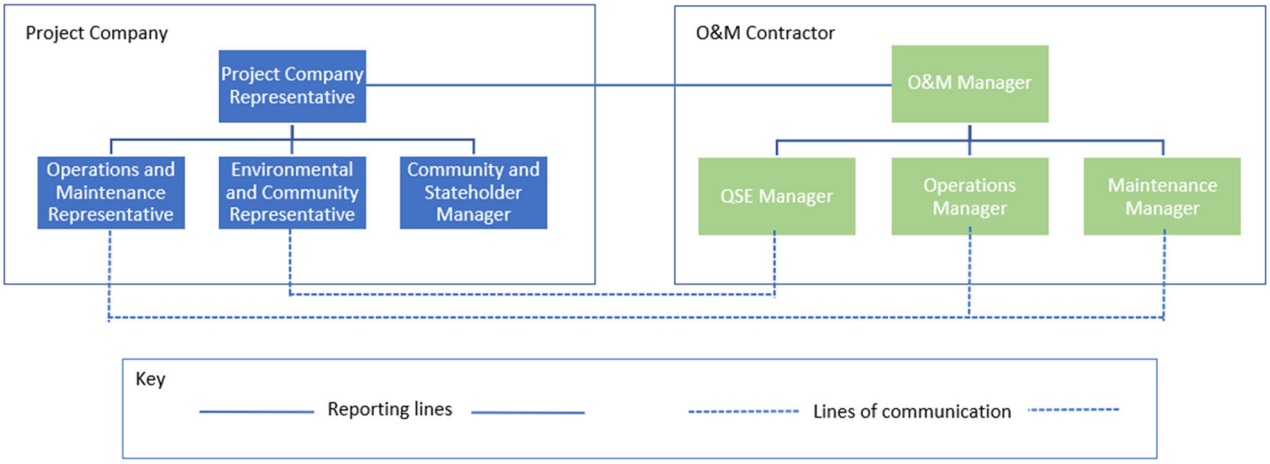


Figure 3-1: OEMP management structure

The environmental responsibilities of key O&M personnel are included in Table 3-3.

Table 3-3: Management responsibilities

Organisation and job title	Names and responsibilities
O&M Manager	• Ensure all O&M activities comply with relevant regulatory, Roads and Maritime and Project Company requirements • Ensure the requirements of the OEMP are fully implemented, and, that environmental requirements are not secondary to other O&M requirements • Implement the O&M contractor's environmental policy • Liaise with Project Company and other Government authorities as required • Provide adequate resources (personnel, financial and technological) to ensure effective development, implementation, and maintenance of the O&M Contractor's EMS • Ensure that all maintenance personnel receive appropriate induction training, including details of the environmental and community requirements • Ensure that complaints are investigated, and issues raised resolved in accordance with the Project Company's Community Involvement Plan • Direct work to stop immediately if there is likely to be an unacceptable environmental impact • Report back to the Project Company's Project Director • Confirm the need for any specific permissions and licences before work starts • Report, as required to Project Company
O&M Operations Manager	• Plan operations and incident response services to avoids or minimises environmental impacts • Ensure the requirements of the OEMP are fully implemented • Ensure O&M Contractor personnel manage operations in accordance with statutory approval requirements • Ensure environmental management procedures and protection measures are implemented • Ensure all O&M Contractor personnel attend an induction before starting work • Liaise with Project Company and other Government authorities as required • Direct work to stop immediately if there is likely to be an unacceptable environmental impact • Report, as required to the Project Company • Ensure adequate resources are provided to effectively respond to incidents on the motorway • Ensure that regular training is provided to all personnel participating in incident response
O&M Maintenance Manager	• Plan maintenance services in a manner that avoids or minimises impact to environment • Ensure the requirements of this OEMP are fully implemented • Ensure O&M Contractor personnel manage maintenance works in accordance with statutory and approval requirements • Ensure environmental management procedures and protection measures are implemented • Ensure all O&M Contractor personnel attend an induction prior to commencing works • Liaise with Project Company and other government authorities as required • Direct work to stop immediately if there is likely to be an unacceptable environmental impact • Report, as required to Project Company • Providing maintenance staff for incident response and manage rectification of damage following incidents
O&M Quality, Safety & Environment (QSE) Manager	• Manage environmental aspects of the O&M services • Report to O&M Manager and Project Company on the performance and implementation of the EMS and other environmental documentation • Ensure environmental risks are identified and appropriate mitigation is implemented • Identify where environmental measures are not meeting the set targets and where improvement can be achieved

Organisation and job title	Names and responsibilities
	• Ensure environmental protocols are in place and managed • Ensure environmental compliance • Liaise with Project Company and approval authorities • Direct work to stop immediately if there is likely to be an unacceptable environmental impact or to prevent an environmental non-conformance and advise the O&M Manager, O&M Operations Manager and O&M Maintenance Manager • Assist the Project Company Community & Stakeholder Manager resolve environment-related complaints • Report to the Project Company as required • Responsible for all environmental records and information relating to this OEMP
Project Company Community & Stakeholder Manager	• Ensure all community consultation activities and notifications are carried out in accordance with the CoA • Report environmental issues raised by stakeholders or members of the community to the QSE Manager • Communicate environment-related O&M Services, performance, mitigation measures and issues to stakeholders and the community • Liaise with the 24-hour complaints hotline as required
All O&M Contractor personnel	• Participate in the O&M services induction program • Implement activities in accordance with this OEMP • Work under the requirements of this OEMP, SOPs, EWSMSs • Minimise the potential for environmental impacts • Feedback to the O&M Operations Manager and O&M Contractor's QSE Manager on the effectiveness and practicality of maintenance methods and environmental controls • Immediately report environmental incidents to the supervisor, or as soon as practicable if reasonable steps can be adopted to control the incident • Undertake remedial action as required to ensure environmental controls are maintained in good working order • Stop work immediately if there is likely to be an unacceptable environmental impact
Project Company Representative	• Receive a copy of this OEMP • Review documentation provided by the O&M Contractor, where required • Liaise with relevant stakeholders • Attend site inspections and relevant project meetings as required • Monitor O&M Contractor's environmental performance and compliance • Review and determine Consistency Assessments and Review of Environmental Factors, as required

4 Environmental obligations

4.1 Statutory obligations

This section describes the statutory and other obligations covering the operational Asset.

4.1.1 Conditions of approval

Conditions of approval relevant to the operational environmental management of the Asset are included in Table 4-1. Those CoAs that are specific to the Operational Groundwater Management Plan, Operational Surface Water Quality Management Plan, and Operational Air Quality Plan are identified in those relevant sub-plans.

Table 4-1: Relevant operational conditions of approval

CoA	Relevant requirement	Reference
A1	The CSSI must be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the WestConnex M4-M5 Link Environmental Impact Statement – Volumes 1A-C and 2A-J (dated August 2017) (the EIS) as amended by: (a) the WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report (dated January 2018) (the SPIR); (b) the WestConnex M4-M5 Link Mainline Tunnel Modification Report (dated September 2018) (Modification 1 Report) as amended by the WestConnex M4-M5 Link Mainline Tunnel Modification Response to Submissions (dated November 2018) (Modification 1 RtS); (c) the WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report (dated November 2019) as amended by the WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Response to Submissions Report (dated March 2020); and (d) the WestConnex M4-M5 Link Rozelle Interchange Glebe Island Construction Ancillary Facility Modification Report (dated June 2020). (e) the WestConnex M4-M5 Link Rozelle Interchange The Crescent overpass and active transport links Modification report (dated August 2019) (Modification 2 Report) as amended by the (i) WestConnex M45-M5 Link Rozelle Interchange Modification The Crescent overpass and active transport links Design amendment report (dated April 2020) (Modification 2 Amendment Report), (ii)	This OEMP and subs plans have been developed in accordance with the requirements of CoA A1(a-f).

CoA	Relevant requirement	Reference
	WestConnex M45- M5 Link Rozelle Interchange Modification The Crescent overpass and active transport links Response to Submissions Report (dated April 2020) (Modification 2 RtS), and (iii) WestConnex M45-M5 Link Rozelle Interchange Modification The Crescent overpass and active transport links Response to Submissions on the Design amendment report (dated June 2020) (Modification 2 Amendment RtS); and the WestConnex M4-M5 Link Rozelle Interchange Modification Request Letter (dated October 2020).	
A9	Without limitation, all strategies, plans, programs, reviews, audits, report recommendations, protocols and the like required by the terms of this approval must be implemented by the Proponent in accordance with all requirements issued by the Secretary from time to time in respect of them.	The requirements of the Project approval have been incorporated into this OEMP.
A11	The Proponent is responsible for any breaches of the conditions of this approval resulting from the actions of all persons that it invites onto any site, including contractors, sub-contractors and visitors.	Compliance, training and awareness detailed in Section 6 for the operation of the Asset, including the compulsory site induction, will provide opportunities to inform O&M personnel of the requirements under the conditions of approval relevant to the operation of the Asset.
A12	The CSSI may be constructed and operated in stages. Where staged construction or operation is proposed, a Staging Report (for either or both construction and operation as the case requires) must be prepared, then endorsed by the ER and then submitted to the Secretary for information. The Staging Report must be submitted to the Secretary no later than one (1) month prior to the commencement of construction of the first of the proposed stages of construction (or if only staged operation is proposed, one (1) month prior to the commencement of operation of the first of the proposed stages of operation).	The operation of the M4-M5 Link Project will be staged. Refer to Section 3.2 of this OEMP.
A16	Where changes are proposed to the staging of construction or operation, a revised Staging Report must be prepared and submitted to the Secretary for information no later than one (1) month prior to the proposed change in the staging.	Where changes to the staging of operation are proposed, the Staging Report will be revised and submitted to the Secretary at least one (1) month prior to the proposed change. Refer to Section 9.7.
A27	A Compliance Tracking Program to monitor compliance with the terms of this approval must be prepared, taking into consideration any staging of the CSSI that is proposed in a Staging Report submitted in accordance with Conditions A12 and A13 of this approval.	The Compliance Tracking & Environmental Audit Program (CTEAP) was prepared to satisfy this condition. The CTEAP is discussed in Section 9.6.

CoA	Relevant requirement	Reference
A29	The Compliance Tracking Program in the form required under Condition A28 of this approval must be implemented for the duration of works and for a minimum of one (1) year following commencement of operation, or for a longer period as determined by the Secretary based on the outcomes of independent environmental audits, Environmental Representative Monthly Reports and regular compliance reviews submitted through Compliance Reports. If staged operation is proposed, or operation is commenced of part of the CSSI, the Compliance Tracking Program must be implemented for the relevant period for each stage or part of the CSSI.	The Compliance Tracking and Environmental Audit Program (CTEAP) was prepared to satisfy this condition. The CTEAP is discussed in Section 9.6.
A34	A Pre-Operation Compliance Report must be prepared and submitted to the Secretary for information no later than one (1) month prior to the commencement of operation. The Pre-Operation Compliance Report must include: (a) details of how the terms of this approval that must be addressed before the commencement of operation have been complied with; and (b) the commencement date for operation.	A Pre-Operation Compliance will be prepared and submitted to the Secretary for information no later than one (1) month prior to the commencement of operation. The report will include: a) details of how the terms of this approval that must be addressed before the commencement of operation have been complied with; and b) the commence date for operation.
A35	Operation must not commence until the Pre-Operation Compliance Report has been submitted for information to the Secretary.	Operation will not commence until the Pre-Operation Compliance Report has been submitted to the Secretary for information.
A36	An Environmental Audit Program for annual independent environmental auditing against the terms of this approval must be prepared in accordance with AS/NZS ISO 19011:2014 - Guidelines for Auditing Management Systems and submitted to the Secretary for information no later than one (1) month prior to the commencement of construction.	The Compliance Tracking and Environmental Audit Program (CTEAP) was prepared to satisfy this condition. The CTEAP is discussed in Section 9.6.
A37	The Environmental Audit Program, as submitted to the Secretary, must be implemented and complied with for the duration of construction and operation.	The Compliance Tracking and Environmental Audit Program (CTEAP) was prepared to satisfy this condition. The CTEAP is discussed in Section 9.6.
A38	All independent environmental audits of the CSSI must be conducted by a suitably qualified, experienced and independent team of experts in auditing and be documented in an Environmental Audit Report which: (a) assesses the environmental performance of the CSSI, and its effects on the surrounding environment; (b) assesses whether the project is complying with the terms of this approval; and c) recommends measures or actions to improve the environmental performance of the CSSI.	This is addressed in the CTEAP. Refer to Section 9.6.
A39	The Proponent must submit a copy of the Environmental Audit Report to the Secretary for information, with a response to any recommendations contained in the audit report within six (6) weeks of completing the audit.	This is addressed in the CTEAP. Refer to Section 9.6.

CoA	Relevant requirement	Reference
A40	The Secretary must be notified as soon as possible and in any event within 24 hours of any incident.	Incident management, including notification of the Secretary, is summarised in Section 8.2.
A41	Notification of an incident under Condition A40 of this approval must include the time and date of the incident, details of the incident and must identify any consequent non-compliance with this approval.	Incident management, including notification of the Secretary, is summarised in Section 8.2.
A42	All written requirements of the Secretary or relevant public authority, which may be given at any point in time, to address the cause or impact of an incident must be complied with, within any timeframe specified by the Secretary or relevant public authority.	The requirements of the Secretary or relevant public authority, to address the cause of impact of any incident associated with the operation and maintenance of the Asset will be met as described in Section 8.2.
A43	If statutory notification is given to the EPA as required under the POEO Act in relation to the CSSI, such notification must also be provided to the Secretary within 24 hours after the notification was given to the EPA.	Incident management, including notification of the Secretary, is summarised in Section 8.2.
B5	The Communication Strategy, as approved by the Secretary, must be implemented for the duration of the works and for 12 months following the completion of construction.	A Communication Strategy has been prepared to address the requirements of condition B1. The plan was approved by DPE and will be implemented for 12 months following the completion of Construction. Following the completion of Construction, requirements to be fulfilled in the Communications Strategy by JHCPB will be undertaken by the Project Company or TfNSW as relevant. Further details about communication during the operational phase of the project can be found in Section 7.
B8	A Complaints Management System must be prepared prior to the commencement of any works in respect of the CSSI and be implemented and maintained for the duration of construction and for a minimum for 12 months following completion of construction of the CSSI.	The Project Company established the complaints management system to comply with this condition during the preparation of the Environmental Impact Statement for the Project, fulfilling the requirements of this condition. This same consultation manager system is being utilised during operation of the Asset to ensure consistency in reporting of enquiries and complaints. Complaints and enquiries are discussed in Section 7.3.2.
B9	The Complaints Management System must include a Complaints Register to be maintained recording information on all complaints received about the CSSI during the carrying out of any works associated with the CSSI and for a minimum of 12 months following the completion of construction of the CSSI. The Complaints Register must record the: (a) number of complaints received; (b) number of people affected in relation to a complaint; and (a) (c) nature of the complaint and means by which the complaint was addressed and whether resolution was reached, with or without mediation.	Complaints and enquiries are discussed in Section 7.3.2.

CoA	Relevant requirement	Reference
B17	A website providing information in relation to the CSSI must be established before commencement of works and maintained for the duration of works, and for a minimum of 24 months following the completion of construction of the CSSI. The following up-to-date information (excluding confidential, private and commercial information) must be published prior to works commencing and maintained on the website or dedicated pages: (a) information on the current implementation status of the CSSI; (b) a copy of the documents listed in Condition A1 of this approval, and any documentation relating to any modifications made to the CSSI or the terms of this approval; (c) a copy of this approval in its original form, a current consolidated copy of this approval (that is, including any approved modifications to its terms), and copies of any approval granted by the Minister to a modification of the terms of this approval; and (d) a copy of each licence or permit required and obtained in relation to the CSSI. Where a condition(s) of this approval requires a document(s) be prepared prior to a work or construction or operational activity being undertaken, a current copy of the relevant document(s) must also be published on the website before the work / activity is undertaken.	The website for the Project was established during the preparation of the Environmental Impact Statement, and will remain in place for 12 months following completion of the project. The website is: www.westconnex.com.au Further detail of documentation for the Rozelle Interchange Project can be found at: https://www.westconnex.com.au/roads-projects/m4-m5-link-rozelle-interchange/ Information to be included on the resources page includes: (a) Updates and notifications, (b) M4-M5 Link SSI application, M4-M5 Link EIS and M4-M5 Link Submissions Report, (c) Instrument of approval and modifications, (d) N/A (e) Other documents prepared to satisfy a condition of this approval. This includes a copy of this OEMP and relevant sub-plans.
D1	An Operational Environmental Management Plan (OEMP) must be prepared in accordance with the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004) to detail how the performance outcomes, commitments and mitigation measures made and identified in the documents listed in Condition A1 will be implemented and achieved during operation. This condition (Condition D1) does not apply if Condition D2 of this approval applies.	This OEMP and sub-plans have been prepared in accordance with the *Guideline for the Preparation of Environment Management Plans* (DIPNR, 2004) as identified in Section 1. This plan details how performance outcomes, commitments and mitigation measures made and identified in the documents listed in Condition A1 will be implemented and achieved during operation.
D2	An OEMP is not required for the CSSI if the Proponent has an Environmental Management System (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.	An OEMP is required, and this plan has been prepared in accordance with Condition D1.

CoA	Relevant requirement	Reference
D3	Where an OEMP is required, the Proponent must include the following OEMP Sub-plans in the OEMP: (a) Groundwater Management	A Groundwater Management sub-plan has been prepared and is contained within Annexure G.
D4	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 authorities as identified in Condition D3.	The OEMP sub-plan include the information set out in Condition D2 (a), (b) and (c). This plan was developed in consultation with DPI Water and Sydney Water. Refer to Annexure G of this OEMP for further details.
D5	The OEMP Sub-plans must be submitted to the Secretary as part of the OEMP.	The OEMP sub-plans are appended to this plan and will be submitted to the Secretary as part of the OEMP.
D6	The OEMP or EMS or equivalent as agreed with the Secretary, must be submitted to the Secretary for information no later than one (1) month prior the commencement of operation.	This OEMP will be submitted to the Secretary for information no later than one (1) month prior to the commencement of operation.
D7	The OEMP or EMS or equivalent as agreed with the Secretary, as submitted to the Secretary and amended from time to time, must be implemented for the duration of operation and the OEMP or EMS must be made publicly available prior to the commencement of operation.	This OEMP will be implemented for the duration of operation.
D8	The following Operational Monitoring Programs must be prepared in consultation with the relevant authorities identified for each Operational Monitoring Program to compare actual operational performance against predicted performance. (a) Surface Water Quality Plan & Monitoring Program (b) Groundwater Monitoring Program	A Surface Water Quality Plan & Monitoring Program has been prepared in consultation with the relevant authorities and councils and is contained in Annexure G of this OEMP. A Groundwater Monitoring Program been prepared in consultation with the relevant authorities and councils and is contained in Annexure F of this OEMP
D9	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.	Refer to Annexure F for the operational monitoring programs and how this condition is addressed.
D10	The Operational Surface Water Quality Plan and Monitoring Program must address wetland and mosquito management.	The Operational Surface Water Quality Plan and Monitoring Program addresses wetland and mosquito management. Refer to Annexure F of this OEMP.

CoA	Relevant requirement	Reference
D11	The Operational Groundwater Monitoring Program must include: (a) daily measurement of the amount of water discharged from all water treatment plants; (b) water quality testing results of the water discharged from all water treatment plants; (c) monitoring of groundwater pore pressures in the Hawkesbury Sandstone aquifers adjacent to the tunnel alignment, in consultation with DPI Water; (d) monitoring of groundwater electrical conductivity in key locations between saline water bodies and the tunnel as identified by the project groundwater model including: (i) in the Haberfield / Lilyfield area to the south of Iron Cove, (ii) in the Rozelle area to the north of Rozelle Bay, (iii) in the Annandale area to the west of Rozelle Bay, (iv) in the Rozelle area to the south east of Iron Cove, and (v) in the St Peters area to the north west of Alexandra Canal, with a minimum of two (2) groundwater monitoring wells provided in each key location in consultation with DPI Water; (e) measures to record or otherwise estimate and report groundwater inflows into the tunnels; (f) a method for providing the data collected in (a) and (b) to Sydney Water every three (3) months to demonstrate the project's compliance with the discharge criteria and, if applicable, the Proponent's trade waste licence; (g) a process for annually forwarding data on the monthly volume of groundwater discharged from each water treatment plant to DPI Water for a minimum period of five (5) years, consistent with Condition D12; and (h) the installation of a minimum of two (2) groundwater open hole monitoring wells in the north Rozelle / Lilyfield area to the west of the ventilation tunnel at Iron Cove to monitor groundwater quality and groundwater levels, in consultation with DPI Water.	Refer to Annexure F of this OEMP which contains the Groundwater Monitoring Program.
D12	Groundwater monitoring must continue for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, the Proponent must undertake a review of future monitoring requirements in consultation with DPI Water. The review must determine if additional monitoring is required, and the time period for continued monitoring. The Proponent must notify the Secretary within two (2) weeks of the review as to the outcomes of the review and any requirements for future monitoring.	Groundwater monitoring will commence upon operation of the mainline tunnels and will continue for at least five years following completion of construction of the Rozelle Interchange. At least one (1) month prior to the end of the five-year monitoring period, the Proponent will: • Undertake a review of the future monitoring requirements, in consultation with DPI Water • Determine whether additional monitoring is required and subsequent time period for continued monitoring • Notify the Secretary within two (2) weeks of the review and detail any outcomes and requirements for future monitoring.

CoA	Relevant requirement	Reference
D13	The Operational Monitoring Programs must be developed in consultation with relevant authorities as identified in Condition D8 of this approval.	The Operational Monitoring Programs were developed in consultation with relevant authorities as identified in Condition D8. Annexure F of this OEMP contain the outcomes of consultation.
D14	The Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation.	The Operational Monitoring Programs will be submitted to the Secretary for approval at least one (1) month prior to operation.
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.	Operation will not commence until the Operational Monitoring Programs contained in Annexure F of this OEMP are approved. All relevant and required baseline data will be collected prior to operation.
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.	The Operational Monitoring Programs, as detailed in Annexure F of this OEMP, will be implemented for the duration identified in each monitoring program or specified by the Secretary, whichever is the greater.
D17	The results of the Operational Monitoring Programs must be submitted to the Secretary, and relevant regulatory authorities, for information in the form of an Operational Monitoring Report at the frequency identified in the relevant Operational Monitoring Program.	An Operational Monitoring Report will be prepared and submitted to the Secretary and relevant regulatory authorities for information. The report will contain the results of any Operational monitoring conducted as required under each Operational Monitoring Program. Annexure F of this OEMP set forth the frequency of this reporting.
D18	Where a relevant OEMP Sub-plan exists, the relevant Operational Monitoring Program may be incorporated into that OEMP Sub-plan.	The Operational Groundwater Monitoring Program has been appended to the Operational Groundwater Management Plan, both of which are contained in Annexure F of this OEMP.
E1	In addition to the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1, all reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during the construction and operation of the CSSI.	Noted. Measures to minimise impacts on air quality impacts during operation are summarise in Section 5.4.

CoA	Relevant requirement	Reference
E2	(a) be comprised of – i. two representatives from the Proponent and tunnel operator, ii. one representative from each of the relevant councils, whose attendance is only required when considering matters relevant to their respective local government area, iii. three representatives from each local community adjacent to each ventilation facility whose attendance is only required when considering matters relevant to their respective local area, and whose appointment has been approved by an expression of interest process conducted by the Proponent in consultation with the Secretary, and iv. a Chair who is an independent from the design and construction of the CSSI put forward by the Proponent and approved by the Secretary; (b) meet at least four (4) times a year, or as otherwise agreed by the Chair and the Secretary; (c) review and provide advice on the location of the air quality monitoring stations required under Condition E24, operation environmental management plans and other operation stage documents, compliance tracking reporting, audit reports, or complaints as they relate to air quality; and (d) provide advice on the dissemination of monitoring results and other information on air quality issues. The AQCCC may comprise the same members of the AQCCC established under CSSI approvals for the WestConnex M4 East and New M5 projects (SSI 6307 and SSI 6788) in relation to the ventilation outlets located in Haberfield and St Peters. The AQCCC must operate for up to two (2) years after commencement of operation, or as otherwise approved or directed by the Secretary, in consultation with the Chair.	Refer to Section 7.5 and Annexure F
E7	Conditions E2A, E3, E4, E5, and E6 do not apply in an emergency, as defined in the OEMP required by Condition D1.	Refer to Section 8.2.1
E8	The Proponent must, as soon as reasonably practicable, notify the Secretary and the EPA of any discharge during an emergency.	Refer to Annexure H

CoA	Relevant requirement	Reference
E9	The tunnel ventilation systems must be designed, constructed and operated so as to only release emissions from ventilation outlets and not from the portals or the tunnel support facilities as identified in the documents listed in Condition A1, except for emergency smoke management purposes in the event of a fire in a tunnel or periodic testing of the system as defined in the OEMP required by Condition D1.	Refer to Section 8.2.1 and Annexure H
E23	Air quality monitoring data is to be made available in as close to real time as possible, under the website reporting requirements of Condition E28.	Refer to Annexure I Operational Air Quality Management Plan Table 2-3. Air quality monitoring data will be made available in as close to real time as possible, under the website reporting requirements of Condition E28.
E28	Results of hourly updated real-time monitoring and relevant meteorological data must be provided on a website in an easy to interpret format. This data must be preliminary until a quality assurance check has been undertaken by a person or organisation, who is accredited by NATA for this purpose.	Refer to Annexure I Operational Air Quality Management Plan Table 2-3 which references the relevant section of the Plan detailing that Information regarding the air quality monitoring required during operation of the Asset will be made available on the WestConnex website. Information will include hourly updated real-time ambient monitoring.
E64	The Proponent must prepare an Operational Road Network Performance Review, within 12 months and five (5) years after the commencement of operation of the full CSSI (of the mainline tunnels and Rozelle Interchange). The Review must address road network performance and review the performance of the CSSI on the adjoining road network. The Review must confirm the adequacy of the mitigation measures identified in the Road Network Performance Plan required under Condition E63. The Review must be undertaken in consultation with Transport for NSW and relevant council(s) and be completed within six (6) months of the review timeframes. The Review must be provided to the Secretary within 60 days of its completion. Further mitigation measures, if required, must be included in the Review. The Proponent is responsible for the implementation of the identified measures. Note: Identified mitigation measures may need to be further assessed under the Environmental Planning and Assessment Act, 1979. Works will need to meet relevant design standards and to subject to independent road safety audits.	A Road Network Performance Review will be prepared to satisfy this condition at both 12 months and 5 years after the commencement of operation of the Asset as identified in Section 9.4. The review will be undertaken in consultation with Transport for NSW and relevant councils within 6 months of the review timeframes. The review will be submitted to the Secretary within 60 days of its completion. Any applicable mitigation measures identified in the Road Network Performance Review Plan will be implemented by the Asset.

CoA	Relevant requirement	Reference
E67	All noise and vibration assessment, management and mitigation required by this approval must consider the cumulative noise impacts of approved CSSI and SSI projects. This includes using ambient and background levels which do not include other WestConnex M4 East and New M5 (SSI 6307 and SSI 6788) projects. This condition applies to all works and operation.	The operational noise assessments contained in the Operational Noise and Vibration Review (ONVR) considered cumulative impacts of the other WestConnex stages and will be verified within 12 months from the commencement of operation. Refer to Section 9.2. Cumulative impacts will also be considered in noise assessments undertaken for I&M activities during operation. Refer to Section 5.5.2
E92	The Proponent must prepare an Operational Noise and Vibration Review (ONVR) to confirm noise and vibration control measures that would be implemented for the operation of the CSSI. The ONVR must be prepared in consultation with the Department, relevant council(s), other relevant stakeholders and the community and must: (a) confirm the appropriate operational noise and vibration objectives and levels for adjoining development, including existing sensitive receivers; (b) confirm the operational noise predictions based on the final design. Confirmation must be based on an appropriately calibrated noise model (which has incorporated noise monitoring, and concurrent traffic counting, where necessary for calibration purposes). The assessment must specifically include verification of noise levels at all fixed facilities, based on noise monitoring undertaken at appropriately identified noise catchment areas surrounding the facilities; (c) confirm the operational noise and vibration impacts at adjoining development based on the final design of the CSSI, including operational daytime LAeq,15 hour and night-time LAe, 9 hour traffic noise contours; (d) review the suitability of the operational noise mitigation measures identified in the documents listed in Condition A1 and, where necessary, investigate, identify and implement additional noise and vibration mitigation measures required to achieve the noise criteria outlined in the NSW Road Noise Policy (DECCW, 2011) and NSW Industrial Noise Policy (EPA, 2000), including the timing of implementation; (e) include a consultation strategy to seek feedback from directly affected landowners on the noise and vibration mitigation measures; and (f) procedures for the management of operational noise and vibration complaints. The ONVR is to be verified by a suitably qualified and experienced noise and vibration expert. The ONVR is to be undertaken at the Proponent's expense and submitted to the Secretary for approval prior to the implementation of mitigation measures. The Proponent must implement the identified noise and vibration control measures and make the ONVR publicly available.	An Operational Noise and Vibration Review has been prepared and submitted to the Secretary for approval. The plan is available on the project website document library https://www.westconnex.com.au/document-library/.

CoA	Relevant requirement	Reference
E94A	Within three months of commencement of operation of the high voltage regulators at Iron Cove, the Proponent must undertake noise monitoring to compare the actual noise level emitted by the regulators to the noise performance at sensitive receivers as predicted in the document WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report (dated November 2019) and project-specific noise level as determined in accordance with the NSW Industrial Noise Policy (EPA, 2000). Monitoring must capture the onload tap changer noise and peak loading. A report detailing the noise monitoring results must be provided to the Secretary for information within one month of undertaking the monitoring. If the noise level at the nearest sensitive receiver exceeds either the predicted noise level or project-specific noise level, then the Proponent must implement noise reduction measures within six months of when the noise monitoring was undertaken.	Within three months of commencement of operation of the high voltage regulators at Iron Cove, noise monitoring will be undertaken to compare the actual noise level emitted by the regulators to the noise performance at sensitive receivers as predicted in the document WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report(dated November 2019) and project-specific noise level as determined in accordance with the NSW Industrial Noise Policy (EPA, 2000). Monitoring will be designed to attempt to capture the onload tap change noise and peak loading.

CoA	Relevant requirement	Reference
E95	Within 12 months of the commencement of operation of the CSSI, the Proponent must undertake monitoring of operational noise to compare actual noise performance of the CSSI against the noise performance predicted in the review of noise mitigation measures required by Condition E92. The Proponent must prepare an Operational Noise Compliance Report to document this monitoring. The Report must include, but not necessarily be limited to: (a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E92; (b) a review of the operational noise levels in terms of criteria and noise goals established in the NSW Road Noise Policy 2011; (c) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which CSSI noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers; (d) details of any complaints and enquiries received in relation to operational noise generated by the CSSI between the date of commencement of operation and the date the report was prepared; (e) any required recalibrations of the noise model taking into consideration factors such as noise monitoring and actual traffic numbers and proportions; (f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of mitigation measures; and (g) identification of additional measures to those identified in the review of noise mitigation measures required by Condition E92, that would be implemented with the objective of meeting the criteria outlined in the NSW Road Noise Policy (EPA, 2011) and Industrial Noise Policy (EPA, 2000), when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary and the EPA. The Operational Noise Report must be submitted to the Secretary and the EPA within 60 days of completing the operational noise monitoring and made publicly available.	In accordance with MCoA E95, within 12 months of the commencement of operation of the CSSI, the Proponent must undertake monitoring of operational noise to compare actual noise performance of the CSSI against the noise performance predicted in the review of noise mitigation measures required by MCoA E92. An Operational Noise Compliance Report is to be prepared presenting the findings. There requirements are addressed in Section 5.5.4 of this Plan. Refer to Section 17.1 of the ONVR for further information.

CoA	Relevant requirement	Reference
E122	The Proponent must construct and operate the CSSI with the objective of minimising light spillage to residential properties. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces. Notwithstanding, the Proponent must provide mitigation measures to manage any residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners	The DPE approved Urban Design and Landscape Plan details measures to minimise light spillage impacts to residential properties.
E123	The Proponent must construct and operate the CSSI with the objective of avoiding adverse or distracting lighting configuration, spillage or intensity to aircraft operations. All lighting associated with the construction and operation of the CSSI must adhere to the Lighting in the Vicinity of Aerodromes: Advice to Lighting Designer (CASA, 1999) and National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports (DIRD, 2012). Notwithstanding, the Proponent must provide mitigation measures to manage any residual night lighting impacts to protect aircraft operations, in consultation with CASA and DIRD.	Lighting has been designed to adhere to the Lighting in the Vicinity of Aerodromes: Advice to Lighting Designer (CASA, 1999) and National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports (DIRD, 2012). Consultation with CASA and DIRD was also completed during the detailed design process. Refer to the UDLP. Refer to Section 5.15 of this Plan.
E137	The Urban Design and Landscape Plan(s), as approved by the Secretary, must be implemented during construction, as required, and operation.	The approved UDLP has been implemented in construction and will continue to be implemented in operations. Refer to Section 5.14 of this Plan.
E139	The ongoing maintenance and operation costs of urban design, open space, landscaping and recreational items and works implemented as part of this approval will remain the Proponent's responsibility until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority. Prior to the transfer of assets, the Proponent will maintain items and works to at least the design standards established in the Urban Design and Landscape Plan, and its sub-plans, required by Condition E133.	Noted.

CoA	Relevant requirement	Reference
E142	Prior to operation, the Proponent must prepare an Emergency Response Plan, in consultation with FRNSW and NSW Police Force. The Emergency Response Plan must include, but not be limited to: a) protocols and procedures to be followed during emergency situations associated with the operation of the project (including fires, explosions and, for the purposes of this condition, vehicle collisions). The protocols and procedures are to take into account the needs of people with a disability or who may experience access problems in emergency situations; b) details of traffic management measures to be implemented during emergencies, where appropriate, to minimise the potential for escalation of the emergency; c) design and management measures for containment of contaminated fire-fighting water, fuel spills and gaseous combustion products; d) details of a training and testing program to ensure that – i. all operational staff familiar with the Emergency Response Plan, and ii. coordination with FRNSW and NSW Police is regularly exercised; and e) provision for a simulated emergency response exercise, including the Proponent, FRNSW and NSW Police, to be conducted in accordance with the approved Emergence Response Plan on at least one occasion prior to the opening of the tunnel to traffic. The time for the exercise is to be agreed by the participants.	The Emergency Response Plan has been prepared to satisfy this condition. The plan and simulated emergency response scenario is discussed in Section 8.2.3.
E144	The Proponent must undertake annual Hazard Reviews of the project for the first five (5) years of operation. The Hazard Review must detail all hazardous incidents that have occurred during the preceding period, identify safety measures required to rectify those incidents, and address any ongoing issues. The first Hazard Review must be undertaken for the first three (3) months of operation after the opening of the project to traffic. Subsequent Hazard Reviews must be undertaken for the following nine (9) months and thereafter at 12 monthly intervals. FRNSW may also direct the Proponent to undertake a Hazard Review following any major incident in the tunnel.	Annual Hazard Reviews will be undertaken for the Asset in accordance with this condition. Refer to Section 9.4.

CoA	Relevant requirement	Reference
E145	A Hazard Review Report, outlining the results of the Hazard Review, and any proposed additional safety measure(s) to be implemented in response to the findings of the Hazard Review, must be submitted to FRNSW no later than one (1) month after the review period. The Proponent must respond in writing to any recommendation made by FRNSW in relation to the findings of a Hazard Review, within such time as may be agreed to by FRNSW.	Annual Hazard Reviews will be undertaken for the Asset in accordance with this condition. Refer to Section 9.4.
E149	A detailed maintenance-testing program outlining the methods of testing the fire and life safety systems and schedule for implementation must be developed in consultation with FRNSW prior to opening of the project to traffic. The Proponent must respond in writing to any recommendations made by FRNSW.	A detailed maintenance testing program has been prepared to satisfy this condition and is being managed separate to this OEMP. These documents will be provided to FRNSW and comments will be responded to in writing. Evidence of this will be included in the Pre-Operations Compliance Report.
E150	Maintenance testing of fire and life safety systems must be undertaken at least annually, or any other interval as required by the design engineer and in consultation of FRNSW. Results of maintenance testing must be made available to FRNSW for review, and the Proponent must respond in writing to any recommendations from FRNSW to ensure the reliability of the fire and life safety systems.	Annual maintenance testing of the fire and life safety systems will be undertaken in accordance with this condition. Refer to Section 9.4 of this OEMP and the O&M Manual for more detail.

CoA	Relevant requirement	Reference
E153	The Proponent must prepare a Flood Review Report(s) after the first defined flood event for any of the following flood magnitudes – the 5 year ARI event, 20 year ARI event, 100 year ARI event and probable maximum flood – to assess the actual flood impact against that predicted in the documents referred to in Condition A1. The Flood Review Report(s) must be prepared within three (3) months of each flood event. The report(s) must prepared by an appropriately qualified person(s) and include: (a) identification of the properties and infrastructure affected by flooding during the reportable event; (b) a comparison of the actual extent, level, velocity and duration of the flooding event against the impacts predicted in the documents referred to in Condition A1 and the requirements specified in Condition E151; and (c) where the actual extent and level of flooding exceed the predicted level and / or the requirements specified in Condition E151, with the consequent effect of adversely impacting on property(s), structures and infrastructure, identification of the measures to be implemented to reduce future impacts of flooding related to the CSSI works, including the timing and responsibilities for implementation. Flood mitigation measures must be developed in consultation with the affected property / structure / infrastructure owners and the relevant council(s). A copy of the Flood Review Report(s) must be submitted to the Secretary and relevant council(s) within one (1) months of finalising the report(s).	Operational reviews and checks are discussed in Section 9.4 and reporting requirements in Section 9.7. Details of the flood review report are identified in Section 5.16 of this Plan.
E177	The CSSI must be designed to retain as many trees as possible. Where trees are to be removed, the Proponent must provide a net increase in the number of replacement trees. Replacement trees must be planted within, and on public land up to 500 metres from the CSSI boundary. Replacement tree plantings can be undertaken beyond 500 metres on public land within the local government areas to which the CSSI approval applies if no more plantings are practicable within and up to 500 metres from the CSSI boundary. The location of the trees must be determined in consultation with the relevant authority(s)	The Project was designed to retain as many trees as possible. A record of all trees removed has been catalogued and an overall net increase in replacement trees will be achieved. Further details are contained within the Tree Replacement Report required under Condition E179.
E178	Replacement trees are to have a minimum pot size of 75 litres except where the plantings are consistent with the pot sizes specified in a relevant authority's plans / programs / strategies for vegetation management, street planting, or open space landscaping, or as agreed by the relevant authority(s).	Replacement trees are consistent with the relevant authority's *RMS Landscape Design Guidelines Report 2018*. Refer to the Project's Tree Replacement Report for additional information.

CoA	Relevant requirement	Reference
E179	The Proponent must submit to the Secretary a report which details the type, size, number and location of replacement trees. The report must demonstrate how any replacement plantings with a pot size less than 75 litres are consistent with the requirements of Condition E178. The report must be submitted to the Secretary one (1) month prior to operation.	A Tree Replacement Report has been prepared and submitted to the Secretary at least one (1) month prior to operation.
E198	The Proponent must prepare a **Water Reuse Strategy** which sets out options for the reuse of collected stormwater and groundwater during construction and operation of the CSSI. The Water Reuse Strategy must include, but not be limited to: (a) evaluation of reuse options; (b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required; and (c) a time frame for the implementation of the preferred reuse option(s). The Water Reuse Strategy must consider public health risks from water recycling and must be managed to avoid misuse of recycled water as potable water. The Water Reuse Strategy must be undertaken following best practice and advice from sought from relevant agencies as required. Justification must be provided in the event that it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be submitted to the Secretary for approval prior to commencement of tunnelling works. Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction and operational phases of the CSSI. Where a separate Strategy is prepared for the operation of the CSSI, this must be submitted to the Secretary for approval at least six (6) months prior to the commencement of operation of the CSSI.	An Operational Water Reuse Strategy meeting the requirements of condition E198 has been prepared and submitted to the Secretary for approval at least six (6) months prior to the commencement of operation of the CSSI.
E200	The Sustainability Strategy must be submitted to the Secretary for information prior to the commencement of works and must be implemented throughout construction and operation.	The Sustainability Strategy has been submitted to the secretary prior to the commencement of works and will continue to be implemented during operations. Revisions to the Sustainability Strategy may be provided to the Secretary for information from time to time.

CoA	Relevant requirement	Reference
E202	Waste generated during delivery of the CSSI is to be dealt with in accordance with the following priorities: (a) waste generation is to be avoided and where avoidance is not reasonably practicable, waste generation is to be reduced; (b) where avoiding or reducing waste is not possible, waste is to be re-used, recycled, or recovered; and (c) where re-using, recycling or recovering waste is not possible, waste is to be treated or disposed of at a waste management facility or premise lawfully permitted to accept the materials or in accordance with a Resource Recovery Exemption or Order issued under the Protection of the Environment Operations (Waste) Regulation 2014, or to any other place that can lawfully accept such waste.	The waste management hierarchy will be implemented during operation and maintenance activities for the Asset. Wastes will be reduced or avoided in the first instance, followed by reuse and/or recycling of waste materials. Refer to 'waste management hierarchy' in Section 5.12.
E203	Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence or waste exemption under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.	No wastes will be received at the Site, except as permitted by a licence, if required. Refer to 'general' in Section 5.12.
E204	All waste generated during construction and operation must be classified in accordance with the EPA's Waste Classification Guidelines, with appropriate records and disposal dockets retained for audit purposes.	All wastes generated on the site will be classified in accordance with the Waste Classification Guidelines (EPA, 2014) or any superseding documents. Refer to 'classification' in Section 5.12.

4.1.2 Mitigation and management commitments

Table 4-2 summarises the safeguards and mitigation measures included in the M4-M5 Link Submissions and Preferred Infrastructure Report that relate to operation of the Asset.

Table 4-2: Operational revised environmental management measures

No.	Relevant requirement	Responsibility	OEMP reference
OpTT1	A review of operational network performance will be undertaken 12 months and five years from the opening of the project to confirm the operational impacts of the project on surrounding arterial roads and major intersections in proximity to the Wattle Street interchange, Rozelle interchange and St Peters interchange. The assessment will be based on updated traffic surveys at the time and the methodology used will be comparable with that used in this assessment. The results of the review will be considered in future operational network performance planning carried out by Roads and Maritime.	Transport for NSW	The Road Network Performance Review required by CoA E64 will satisfy this REMM.
OpTT2	To manage potential performance constraints at the Wattle Street interchange, Roads and Maritime will investigate the implementation of the following in consultation with local councils: • Queuing and capacity monitoring and management on the Frederick Street/Milton Street corridor • Managing lane use and utilisation to improve the operation of the corridor.	Transport for NSW	This REMM relates to Stage 1 of the Project, as described in the latest Condition A12 Staging Report.
OpTT3	Roads and Maritime will develop a strategy to ensure appropriate network integration in the areas surrounding the Rozelle interchange. The strategy will include a review of: • Capacity improvement measures • The interface with road based public transport on the Western Distributor and Victoria Road in consultation with Transport for NSW • Project staging options • Demand management measures.	Transport for NSW	The Road Network Performance Review required by CoA E64 will satisfy this REMM.

No.	Relevant requirement	Responsibility	OEMP reference
AQ27	An in-tunnel air quality monitoring system will be included in the detailed design. The system will monitor oxides of nitrogen, nitrogen dioxide, carbon monoxide and visibility (as a minimum) throughout the tunnel. Monitoring of each pollutant will be undertaken throughout the tunnel. The locations of monitoring equipment will generally be at the beginning and end of each ventilation section. This will include, for example, monitors at each entry ramp, exit ramp, merge point and ventilation exhaust and supply point. The location of monitors will be governed by the need to meet the in-tunnel air quality criteria for all possible journeys through the tunnel system, especially for nitrogen dioxide. This will require sufficient, appropriately placed monitors to calculate a journey average.	Transport for NSW	The requirements of CoA E20 satisfy this REMM. Refer to Section 5.11.
AQ29	Ambient air quality monitoring will be carried out in the vicinity of the ventilation outlets installed as part of the project. Monitoring will occur at key representative locations, identified in consultation with an independent air quality specialist and an Air Quality Community Consultative Committee (AQCCC), to allow direct comparison of measured ambient air quality with dispersion model predictions. The monitoring will commence at least 12 months prior to and continue for at least two years following the commencement of operation. Monitoring results and a comparison of monitoring results against dispersion model predictions and relevant ambient air quality criteria will be made publicly available.	Transport for NSW	The requirements of CoA E24 satisfy this REMM. Refer to Section 5.11.
NV14	Within 12 months of the commencement of the operation of the project, actual operational noise performance will be compared to predicted operational noise performance. The need for any additional management measures to address any identified operational performance issues and meet relevant operational noise criteria will be assessed and implemented where reasonable and feasible.	Transport for NSW	The Operational Noise and Vibration Review (Section 17) required by CoA E92 contains a procedure to satisfy this REMM.

<table>
<tr><th>No.</th><th>Relevant requirement</th><th>Responsibility</th><th>OEMP reference</th></tr>
<tr><td>PL6</td><td>Ground settlement will be managed to comply with the following criteria where possible:
<table>
<tr><th>Beneath structure/facility</th><th>Maximum settlement</th><th>Maximum angular distortion</th><th>Limiting tensile strain (per cent)*</th></tr>
<tr><td>Buildings – Low or non-sensitive properties
(ie less than or equal to two levels and carparks)</td><td>30 mm</td><td>1 in 350</td><td>0.1</td></tr>
<tr><td>Buildings – High or sensitive
properties
(ie greater than or equal to 3 levels and carparks)</td><td>20 mm</td><td>1 in 500</td><td>0.1</td></tr>
<tr><td>Roads and parking areas</td><td>40 mm</td><td>1 in 250</td><td>N/A</td></tr>
<tr><td>Parks</td><td>50 mm</td><td>1 in 250</td><td>N/A</td></tr>
</table>
* As defined in Burland et al. ‘Building response to tunnelling – Case Studies from construction of the Jubilee Line Extension’, London, Thomas Telfor (2001)</td><td>Transport for NSW</td><td>Refer to the Operational Water Management Plan contained in Annexure F.</td></tr>
<tr><td>PL9</td><td>Settlement monitoring will be carried out for the period in accordance with the program starting prior to commencement of tunnel construction through to until all settlement has stabilised following completion of tunnel construction. The results of settlement monitoring will be compared to predicted settlement. The implementation and adequacy of the Settlement Monitoring Program will be monitored by the Independent Property Impact Assessment Panel</td><td>Transport for NSW</td><td>Refer to the Operational Water Management Plan contained in Annexure F.</td></tr>
</table>

No.	Relevant requirement	Responsibility	OEMP reference
OSE8	A Social Infrastructure Plan will be prepared that details: • Measures that will be delivered as part of the project to improve community connectivity in areas affected by the project, including pedestrian and cyclist access • Community and social facilities, for example open space, that will be delivered or enhanced as part of the project • Community initiatives and programs that will receive support as part of the project, including the manner in which support will be provided. The Social Infrastructure Plan will be prepared by a suitably qualified and experienced person in consultation with the community and relevant councils and implemented as part of the project.	TfNSW	A Social Infrastructure Plan has been prepared based on consultation with the community and Inner West Council with many of the measures implemented during construction such as; • Improved connectivity with shared user bridges across arterial roads, • Extensive new and enhanced shared user paths, • New parklands providing passive and active recreation spaces • New playgrounds, • New bicycle loops for bicycle parking, • Local procurement and local business support, • Charity support. During operations initiatives including; • Additional enhanced cycle paths to improve community connectivity, • New sporting fields and courts, • New community sports amenities, will continue to be implemented.
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 treatments will be supported by MUSIC modelling and water sensitive urban design principles.	O&M Contractor	Refer to Annexure F – Operational Water Management Plan.

No.	Relevant requirement	Responsibility	OEMP reference
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.	O&M Contractor	Maintenance requirements for all stormwater treatment systems and devices will be identified and included in relevant operational maintenance schedules/ systems. Refer to Annexure F
OSW14	Spill containment will be provided on the motorway. Spill management and emergency response procedures will be documented in the Operation Environmental Management Plan (OEMP) and/or Emergency Response Plan.	O&M Contractor	Spill containment is provided for in the motorway. Refer to Section 8.2 for an Incident Response Plan.
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.	Project Company	The constructed wetland at the Rozelle Interchange has been designed to incorporate Water Sensitive Urban Design Principles. The approved Urban Design and Landscape Plan includes demonstrated integration of these principles, as required by CoA E134 (v).
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. Opportunities to incorporate nutrient treatment within the plant at Darley Road will be investigated during detailed design. Discharge criteria will be developed 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.	O&M Contractor	Water discharged into the receiving environment will be of a suitable quality based on the ANZECC Guideline, relevant NSW WQOs and limits set forth in this REMM. Refer to Annexure F – Operational Groundwater Management Plan.
OpCM01	Procedures to address spills, leaks and tunnel washing will be developed as part of an OEMP and implemented during operation of the project.	O&M Contractor	Spill containment is provided for in the motorway. Refer to Section 8.2 for an Incident Response Plan. Tunnel washing is detailed in Table 3-1. The Operators procedures to address spills, leaks and tunnel washing for M4-M5 Link Stage 1 will be used for M4-M4 Link Stage 2 and are contained within the Operation and Maintenance Manual. The CSSI has an integrated operations system.

No.	Relevant requirement	Responsibility	OEMP reference
FD17	A Flood Review Report will be prepared after the first defined flood event affecting the project works for any of the following flood magnitudes – the five year ARI event, 20 year ARI event and 100 year ARI event - to assess the actual flood impact against those predicted in the design reports or as otherwise altered by the FMS. The Flood Review Report(s) must be prepared by an appropriately qualified person(s) and include: • Identification of the properties and infrastructure affected by flooding during the reportable event • A comparison of the actual extent, level, velocity and duration of the flooding event against the impacts predicted in the design reports or as otherwise altered by the FMS • Where the actual extent and level of flooding exceeds the predicted level with the consequent effect of adversely impacting of property(ies), structures and infrastructure, identification of the measures to be implemented to reduce future impacts of flooding related to the M4-M5 Link project including the timing and responsibilities for implementation. Flood mitigation measures will be developed in consultation with the affected property, structure and/or infrastructure owners, OEH and the relevant council(s).	O&M Contractor	A Flood Review Report(s) will be prepared after the first defined flood event for any of the following flood magnitudes: 5, 20 and 100 year ARI event and probable maximum flood, as described in Annexure F.
OB9	The UDLP will include compensatory planting for trees removed by the project. The plan will include: • A tree replacement strategy • Species recommendations for the landscape design to consider, including foraging trees for the Grey-headed Flying-fox Relevant project specific rehabilitation and revegetation measures associated with the M4 East and New M5 projects, where there is an overlap in use of project footprint.	Project Company	An Urban Design and Landscape Plan has been prepared to address the requirements of this REMM. The document was approved by DPE in May 2021.
OB10	Consultation will be undertaken with Sydney Water regarding integration of naturalisation works at Whites Creek, including re-establishment of vegetation where possible following construction activities. Vegetation re-establishment will be undertaken in accordance with Guide 3: Re-establishment of native vegetation of the *Biodiversity Guidelines: Protecting and Management Biodiversity on RTA Projects* (NSW Roads and Traffic Authority 2011).	Project Company	Refer to Section 5.10
OGW8	Groundwater inflow within and groundwater levels in the vicinity of the tunnels will be monitored during construction and compared to model predictions and groundwater performance criteria applied to the project. The groundwater model will be updated based on the results of the monitoring as required and proposed management measures to minimise potential groundwater impacts adjusted accordingly to ensure that groundwater inflow performance criteria are met.	Transport for NSW	Refer to Annexure F – Operational Groundwater Management Plan.

No.	Relevant requirement	Responsibility	OEMP reference
OGW10	The groundwater monitoring program prepared and implemented during construction will be augmented and continued during the operational phase. Groundwater will be monitored during the operations phase for three years or as otherwise required by the project conditions of approval and will include trigger levels for response or remedial action based on monitoring results and relevant performance criteria. At least three monitoring wells and vibrating wire piezometers (VWPs) should be constructed as close as possible to the tunnel centrelines to allow for the comparison of pore pressures and standing water levels. The wells could be constructed about 5-10 metres above the top of the tunnel crown to allow for groundwater drawdown monitoring in the Hawkesbury Sandstone. The program will include procedures for monitoring and reporting of extracted groundwater volumes to DPI-Water annually for the duration of construction and operation, unless otherwise agreed to or directed by the Secretary. The operational groundwater monitoring program will be developed in consultation with the NSW EPA, DPI-Fisheries, DPI-Water and the Inner West and City of Sydney relevant councils and documented in the OEMP or EMS.	O&M Contractor	Refer to Annexure F – Operational Groundwater Management Plan.
OGW11	Where the corrosion assessment that will be carried out prior to construction indicates potential issues, corrosion and other associated impacts of highly aggressive groundwater on the tunnel infrastructure will be monitored during operations. The monitoring program will be documented in the OEMP or EMS. Corroded or otherwise impacted infrastructure will be repaired or replaced as required to maintain operational integrity of the road infrastructure.	Project Company O&M Contractor	Refer to Annexure F – Operational Groundwater Management Plan.
OGW12	In accordance with the *NSW Aquifer Interference Policy* (DPI-Water 2012), measures will be taken to 'make good' the impact on an impacted water supply bore by restoring the water supply to pre-development levels. The measures taken will be dependent upon the location of the impacted bore but could include, for example, deepening the bore, providing a new bore or providing an alternative water supply.	Project Company	Refer to Annexure F – Operational Water Management Plan. Section 5.1.3
GHG1	An Energy Efficiency and Greenhouse Gas Emissions Strategy and Management Plan will be prepared for the project as part of the project's Sustainability Management Plan and will be implemented to assist in achieving 'Design' and 'As Built' ratings of Excellent under the Infrastructure Sustainability Council of Australia infrastructure rating tool.	TfNSW	This REMM was satisfied during the construction phase of the project and is detailed more in the Sustainability Strategy.
OGHG7	The tunnel will be designed with appropriate vertical alignments and grades to allow vehicles to maintain constant speeds and minimise fuel use to reduce potential greenhouse gas emissions.	TfNSW	This REMM was satisfied during the design and construction phase of the project.

No.	Relevant requirement	Responsibility	OEMP reference
OGHG8	Energy efficiency will be considered during the design of mechanical and electrical systems such as the tunnel ventilation system, tunnel lighting, water treatment systems and electronic toll and surveillance systems. Energy efficient systems will be installed where reasonable and practicable.	TfNSW	The Sustainability Strategy details the process by which energy efficiency will be considered in the design of mechanical and electrical system. Outcomes from implementing this process have achieved significant efficiencies through initiatives such as LED lighting of the tunnel, high efficiency ventilation systems and efficient fixtures.
OGHG9	At least six per cent of operational energy (electricity) required for the project will be sourced from an accredited GreenPower energy supplier and/or through renewable energy generated onsite. Opportunities for operational energy offset, in accordance with the Australian Government National Carbon Offset Standard, will be considered during detailed design.	O&M Contractor	A total of 6% of electricity consumption utilised during operation and maintenance of the asset will be 100% renewable either through onsite renewables or purchase of accredited GreenPower. Refer to Section 5.12
OpRW1	The project will be operated in accordance with the relevant aims of the WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015) and a Sustainability Strategy will be developed during detailed design to outline ways to optimise resource efficiency and waste management.	O&M Contractor	The Sustainability Strategy has been developed and submitted to the Secretary prior to construction. The Project Sustainability Strategy will be implemented during operations. The Operator will align decision making with the relevant aims of the WestConnex WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015) detailed in Section 5.17.
OpRW2	Waste will be managed and disposed of in accordance with relevant NSW legislation and government policies and the mitigation measures described in this EIS.	O&M Contractor	Wastes will be managed and disposed of in accordance with relevant State legislation and government policies. Refer to Section 5.12

No.	Relevant requirement	Responsibility	OEMP reference
OpRW3	Opportunities to reuse treated groundwater during project operation will be considered in preference to discharge to receiving waterbodies. This could include irrigation of landscaped areas within the project footprint such as new open spaces at the Rozelle interchange.		The Project has incorporated an additional reverse osmosis treatment option within the operational water treatment plant that makes suitable the treated tunnel water for irrigation of the parkland, the green walls and the land bridge planting. Further details are contained within the Operational Water Reuse Strategy
OpRW4	In order to reduce demand on local water supplies, options will be investigated to provide water for the deluge system from wastewater produced through the tunnel drainage system, where it meets appropriate quality parameters.	JHCPB	This REMM is considered in further detail in the Operational Water Reuse Strategy (WRS). The WRS identified that it was not considered feasible or reasonable to utilise the treated tunnel groundwater for the deluge system. The deluge tanks and system will not withstand the elevated salinity of the groundwater. The additional cost in treatment, energy and maintenance for a more complex water treatment plant, and the distance between the treatment plant and deluge tanks creates a significant engineering and financial barrier to re-using treated groundwater for this purpose.
CC7	Consider the projected increase in the intensity and frequency of extreme rainfall during detailed design, which may lead to exacerbated risk of road incidents. Consider implementation of operational procedures for surface connections to increase safety during extreme rainfall events, such as use of variable speed signs and reduced speed limits.	O&M Contractor	Refer to Emergency Response Plan Section 8.3.2

No.	Relevant requirement	Responsibility	OEMP reference
OpHR1	The fire and safety systems and measures adopted for the project will be equivalent to or exceed the fire safety measures recommended by National Fire Protection Association 502 (American), Permanent International Association of Road Congresses (European), AS4825 (Australian) and Roads and Maritime standards.	O&M Contractor	This requirement has been met during design and construction. Any modifications to fire and safety systems during operations must be equivalent to or exceed the fire safety measures recommended by National Fire Protection Association 502 (American), Permanent International Association of Road Congresses (European), AS4825 (Australian) and Roads and Maritime standards.
OpHR2	Ongoing consultation will be undertaken with emergency services regarding fire and safety systems and associated measures adopted for the project.	O&M Contractor	Ongoing consultation will be undertaken with emergency services regarding fire and safety systems. Refer to Section 9.4.
OpHR3	The transport of dangerous goods and hazardous substances will be prohibited through all tunnels and entry and exit ramps associated with the project.	O&M Contractor	The transport of dangerous goods and hazardous substances are prohibited from all tunnels and entry and exit ramps associated with the project. Relevant legislation for the operation of the Asset is included in Section 4.1.3 and relevant policies, guidelines and principles are identified in Section 4.2.
OpHR4	An Incident Response Plan will be developed as part of the Emergency Response Plan for the project and implemented in the event of an accident or incident.	O&M Contractor	An Incident Response Plan has been prepared for the Asset as described in Section 8.2.3.
OpHR5	The response to incidents within the motorway will be managed in accordance with the memorandum of understanding between Roads and Maritime and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.	O&M Contractor	An Incident Response Plan has been prepared for the Asset as described in Section 8.2.3.
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.	O&M Contractor	Dangerous goods and hazardous materials will be stored in accordance with the relevant standards and legislation, as identified in Annexure F. Relevant legislation for the operation of the Asset is included in Section 4.1.3 and relevant policies, guidelines and principles are identified in Section 4.2.

No.	Relevant requirement	Responsibility	OEMP reference
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.	O&M Contractor	Dangerous goods and hazardous materials will be stored in accordance with the relevant standards and legislation, as identified in Annexure F. Relevant legislation for the operation of the Asset is included in Section 4.1.3 and relevant policies, guidelines and principles are identified in Section 4.2.
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.	O&M Contractor	Dangerous goods and hazardous materials will be stored in accordance with the relevant standards and legislation, as identified in Annexure F. Relevant legislation for the operation of the Asset is included in Section 4.1.3 and relevant policies, guidelines and principles are identified in Section 4.2.
OpHR9	Material Safety Data Sheets for dangerous goods and hazardous substances will be stored on site prior to their arrival.	O&M Contractor	Safety Data Sheets (SDS) for dangerous and hazardous substances will be obtained before materials arrive on site. The SDS and Hazardous Products Register and copies of all SDS documents will be maintained in the site office.

No.	Relevant requirement	Responsibility	OEMP reference
OpHR10	The detailed design of the project substations will ensure that the exposure limits for the general public suggested by the Draft Radiation Standard (Australian Radiation Protection and Nuclear Safety Agency 2006) will not be exceeded at the boundary of the substation sites.	O&M Contractor	This REMM has been met in detailed design by; • Relocating most of the substations underground away from the general public. • Of the substations remaining on the surface, design included relatively low operating currents, selection of low emission transformers and low emission balanced three core cables to ensure exposure limits at the boundary are not exceeded. Modification to any substations b the operator must ensure that the exposure limits for the general public suggested by the Draft Radiation Standard (Australian Radiation Protection and Nuclear Safety Agency 2006) will not be exceeded at the boundary of the substation sites.
OpHR11	Should the exhaust plumes at any of the M4-M5 Link ventilation outlets be assessed as a 'controlled activity' under the Airports Act and the Airspace Regulations, then the project will be operated in accordance with any conditions of approval from the Secretary of Department of Infrastructure and Regional Development.	O&M Contractor	The Secretary of Department of Infrastructure and Regional Development approved the controlled activity for the plume rises at Rozelle in November 2017.
OpHR12	Aviation hazard lighting (if required), building lighting and surface road lighting will be designed and operated in accordance with the requirements of CASA and the Sydney Airport Master Plan 2033.	Project Company	The approved Urban Design and Landscape Plan details the measures adopted for compliance with this REMM.

4.1.3 Legislation

The following legislation is relevant to the OEMP and its implementation.

Table 4-3: Relevant key environmental legislation

Legislation	Relevance
General	
Environmental Planning and Assessment Act 1979	Planning and development control
Local Government Act 1993	Pollution control, protection of Aboriginal heritage, and watercourse management
Protection of the Environment Operations Act 1997	Pollution and waste management
Work Health and Safety Act 2011	Worker safety
Noise and vibration	
Protection of the Environment Operations Act 1997	Noise and vibration management
Protection of the Environment (Noise Control) Regulation 2017 (as amended)	
Traffic and transport	
Roads Act 1993	Traffic management and working on public roads
Surface water quality and hydrology	
Protection of the Environment Operations Act 1997	Soil and water management
Soil Conservation Act 1938	Erosion and sediment control
Contaminated Land Management Act 1997	Contaminated land management
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (amended 2013)	Stockpile management Spill management
Water Management Act 2000 *Water Management Amendment Act 2014*	Watercourse protection Water access and use Water use approval Water management work approval Activity approval (other than aquifer interference)
Sydney Water Act 1994	Requirement to obtain consent to discharge waste water to a sewer
Pesticides Act 1999	Safe use and application of pesticides Public notification requirements before applying pesticides
Dangerous Goods (Road and Rail Transport) Act 2008	Safe and licenced transportation of dangerous goods.
Biodiversity	
NSW Biosecurity Act 2015 *Fisheries Management Act 1994* *Biodiversity Conservation Act 2016*	Weed management and control Safe fish passage Protection of threatened (fish) species, populations and communities
Aboriginal heritage	
National Parks and Wildlife Act 1974	Aboriginal heritage protection Management of unexpected finds
Non-Aboriginal heritage	

Legislation	Relevance
Heritage Act 1977	Non-Aboriginal heritage protection Management of unexpected finds
Air quality	
Protection of the Environment Operations Act 1997 *Protection of the Environment (Clean Air) Regulation 2010*	Pollution management Prohibition of burning
Greenhouse gas	
National Greenhouse and Energy Reporting Act 2007	Minimisation of greenhouse gas generation
Waste and resource management	
Protection of the Environment Operations (Waste) Regulation 2014 *Protection of the Environment Operations Act 1997* *Waste Avoidance and Resource Recovery Act 2001*	Waste classification, management, storage, transportation and disposal Waste hierarchy: reduction, in preference to reuse and recycling Littering Reduction of resource consumption Minimisation of transport impacts
Dangerous and hazardous materials	
Work Health and Safety Act 2011 *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW) *Dangerous Goods (Road and Rail Transport) Regulation 2014* (NSW)	Dangerous goods and hazardous materials

4.1.4 Licences, permits and approvals

Permissions and licences that are or may be needed for maintenance activities are described in Table 4-4.

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

Requirement	Comment
Section 138: NSW *Roads Act 1993*: road occupancy	Required when operation of maintenance activities require the occupation of the road carriageway
Environment Protection Licence (EPL) under Schedule 1 of the POEO Act	In general, operation and maintenance of the Asset is not considered to be a scheduled activity identified in the *Protection of the Environment Operations Act 1997* (POEO Act). However, the emission into the air of any air impurity by way of a ventilation stack is considered to be a Scheduled activity under the POEO Act. The treatment of contaminated groundwater is a scheduled activity, however the groundwater is not considered to be contaminated. It does contain concentrations of metals that are considered indicative of natural background metal concentrations in groundwater within the Sydney basin. The Asset requires an EPL for the emission of air by way of a ventilation stack.
Aquifer interference approval may be required in accordance with section 91 of the *Water Management Act 2000*	Section 5.23 (previously 115ZG) of the EP&A Act states that a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000* are not required for SSIs.
Water access licence	Under Schedule 5, Part 1, clause 2 of the *Water Management (General) Regulation 2011*, roads authorities are exempt from the requirement to hold a water access licence for water required for road construction and road maintenance.

Requirement	Comment
Section 199: NSW *Fisheries Management Act 1994*: permission to undertake dredging or reclamation work	Dredging or reclamation works are not proposed to occur. In the event that they are, notification to DPI Fisheries is to occur.
Part 2 of the *Biodiversity Conservation Act 2016*: licence to harm or pick threatened species, populations or ecological communities	There are no threatened species, populations or ecological communities which have been identified on the project.

4.2 Environmental guidelines and principles

The policies, guidelines and principles relevant to the OEMP and its implementation are identified in Table 4-5.

Table 4-5: Environmental policies, guidelines and principles

Policy / Guideline / principles	Relevance
General	
G36: Environmental Protection (Roads and Maritime, 2017)	Environmental protection
EIA-PO5-1 Environmental Assessment Procedure for Routine and Minor Works (Roads and Maritime, 2015).	Management of routine and minor work
• Interim Community Consultation Requirements for Applicants (DEC, 2005) • International Association for Public Participation: Public Participation Spectrum (IAP2, 2014)	Community consultation
Air Quality	
• Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2007) • Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016) • 9TP-SD-107/2.0 Air Quality Management Guideline (Transport for NSW, 2016) • Australain Standard: AS3580.8 Methods for sampling and analysis of ambient air (Standards Australia, 2008) • Australian Standard: AS/NZS3580.9 Methods for sampling and analysis of ambient air (Standards Australia, 2013) • Australian Standard 4323.1 – Stationary source emissions, Method 1: Selection of sampling positions • USEPA Method 1 - Sample and Velocity Traverses for Stationary Sources • USEPA Method 2(f) - determination of stack gas velocity and volumetric flow rate with three-dimensional probes	Management of air quality and dust
Noise and vibration	
• Interim Construction Noise Guidelines (DECC, 2009) • Construction Noise and Vibration Guidelines (Roads and Maritime, 2016) • Assessing vibration: a technical guideline (DEC, 2006)	Maintenance and repair noise management
• Environmental Noise Management Manual (Roads and Maritime, 2001) • Noise Mitigation Guideline (Roads and Maritime, 2015) • Noise Criteria Guideline (Roads and Maritime, 2015) • NSW Road Noise Policy (RNP, DECCW, 2011)	Operational road traffic noise
• Noise Policy for Industry (EPA, 2017)	Operational equipment noise
• Australian Standard: AS1055 Acoustics (Standards Australia, 1997)	Description and measurement of environmental noise

Policy / Guideline / principles	Relevance
Traffic and Transport	
• Guide to Traffic Management (Austroads, 2014) • Guide to Traffic Generating Developments (Roads and Maritime, 2002) • Traffic Control at Work Sites (Roads and Maritime, Version 4, 2010)	Traffic management and working on public roads
• Sydney CBD to Parramatta Strategic Transport Plan (Transport for NSW, 2015)	Public transport management
Climate change and energy use	
• Australian Standard: AS 5334 Climate Change Adaptation for Settlements and Infrastructure (Standards Australia, 2013) • Climate Change Impacts and Risk Management: A Guide for Business and Government (Department of the Environment and Heritage, Australian Greenhouse Office, 2006) • Environmental Sustainability Strategy 2015-2019 (Roads and Maritime, 2016).	Climate change adaptation
Visual amenity and landscaping	
• WestConnex Rozelle Interchange Urban Design and Landscape Plan (2021) • RMS QA Specification M321 Landscape Maintenance (Roads and Maritime, 2008) • Bridge Aesthetic Design Guidelines (Roads and Maritime, 2012) • Noise Wall Design Guideline (Roads and Maritime, 2016) • Urban Design Report and Landscape Character and Visual Impact Assessment (EIA-N04, Roads and Maritime, 2013) • Landscape Guideline (Roads and Maritime, 2008) • Beyond the Pavement (Roads and Maritime, 2014) • G40: Clearing and Grubbing (Roads and Maritime, 2012) • GreenWay Species List: Native plants of the Cooks River to Iron Cove GreenWay	Landscape, urban design and vegetation management
• Australian Standard: AS4282 Control of the obtrusive effects of outdoor lighting (Standards Australia, 1997)	Light spill
Groundwater	
• Australian Groundwater Modelling Guidelines (National Water Commission, 2012) • NSW Aquifer Interference Policy (DPI, 2012)	Groundwater modelling
Surface water quality and hydrology	
• G38: Soil and Water Management (Roads and Maritime, 2015) • Code of Practice for Water Management: Road Development and Management (Roads and Maritime, 1999) • Guidelines for Controlled Activities on Waterfront land (DPI, 2012) • 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) • Sydney Harbour and Parramatta River Water Quality Objectives	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

Policy / Guideline / principles	Relevance
• 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
• Floodplain Risk Management Guideline: Practical Consideration of Climate Change (NSW DECC, 2007) • Guidelines for watercourse crossing on waterfront land (NSW DPI – Water, 2012)	Working in flood plains and over/close to watercourses
• Guidelines for Construction Water Monitoring (Roads and Maritime, undated) • 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) • Guidelines for Construction Water Quality Monitoring (Roads and Maritime, 2003) • The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (Landcom, 2004)	Water quality sampling
• Guidelines for the Assessment and Management of Groundwater Contamination (DEC, 2007) • 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
Biodiversity	
• Biodiversity Guidelines – Protecting and managing biodiversity (Roads and Maritime, 2011) • Environmental Impact Assessment Practice Note: Biodiversity Assessment (EIA-N06, Roads and Maritime, 2016) • Matters of National Environmental Significance: Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (DEWHA, 2009) • Threatened Biodiversity Survey and Assessment: Guidelines for developments and activities (working draft, NSW DEC, 2004) • G40: Clearing and Grubbing (Roads and Maritime, 2016)	Threatened Species Management
• NSW Guidelines for Controlled Activities Watercourse Crossings (DPI, 2012) • Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge, 2003) • Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries, 2004) • Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013)	Safe fish passage
Soils and Geology	
• G38: Soil and Water Management: Soil and Water Management Plan (Roads and Maritime, 2016)	Soil and water management

Policy / Guideline / principles	Relevance
• Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Management Advisory Committee, 1998) • Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998) • Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (Roads and Maritime, 2005) • Waste Classification Guidelines Part 4: Acid Sulfate Soils (EPA. 2014)	Acid Sulfate soils
Aboriginal Heritage	
• Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH, 2011) • Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010) • Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (NSW DECCW, 2010) • Procedure for Aboriginal Heritage Consultation and Investigation (Roads and Maritime, 2011)	Investigating and managing Aboriginal heritage
• Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015)	Management of unexpected finds
Non-Aboriginal Heritage	
• Statements of Heritage Impact (Heritage Office and Department of Urban Affairs and Planning, 2002) • NSW Heritage Manual (Heritage Office and Department of Urban Affairs and Planning, 1996) • Assessing Heritage Significance (Heritage Office, 2001) • Statements of Heritage Impact (Heritage Office and Department of Urban Affairs and Planning, 2002) • How to Prepare Archival Records of Heritage Items, (Heritage Office, 1998)	Investigating and managing non-Aboriginal heritage
• Standard Management Procedure – Unexpected Heritage Items (Roads and Maritime, 2015)	Management of unexpected finds
Greenhouse gas	
• The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition (World Council for Sustainable Business Development and World Resources Institute, 2004) • Greenhouse Gas Assessment Workbook for Road projects (Transport Authorities Greenhouse Group, 2013) • National Greenhouse Accounts Factors (Department of Environment and Energy, 2017)	Minimisation of greenhouse gas generation
Waste and resource management	
• Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management (NSW DEC, 2005) • Environmental Procedure: Management of Wastes on Roads and Maritime Services Land (Roads and Maritime, 2014) • The reclaimed asphalt pavement exemption 2014 (NSW EPA, 2014) • The stormwater exemption 2014 (NSW EPA, 2014) • Waste Classification Guidelines (NSW EPA, 2014) • Excavated Natural Material Exemption 2014 (NSW EPA, 2014) • Excavated Public Road Material Exemption 2014 (NSW EPA, 2014) • Raw Mulch Exemption 2014 (NSW EPA, 2014)	Materials handling and storage, and waste management

Policy / Guideline / principles	Relevance
• Fact Sheet 1: Virgin Excavated Natural Material (Roads and Maritime, 2015) • Fact Sheet 2: Excavated Natural Material (Roads and Maritime, 2015) • Fact Sheet 3: Excavated Public Road Materials (Roads and Maritime, 2015) • Fact Sheet 4: Reclaimed Asphalt Pavements (Roads and Maritime, 2015) • Fact Sheet 5: Asbestos Waste (Roads and Maritime, 2015) • Fact Sheet 6: Waste Sampling (Roads and Maritime, 2015).	Roads and Maritime waste factsheets
• Waste Avoidance and Resource Recovery Strategy (NSW EPA, 2014) • Sustainability Policy: Waste Reduction and Purchasing Policy (WRAPP, NSW OEH, 2011)	Waste hierarchy
• Waste Reduction and Purchasing Plan (Roads and Maritime, 2010	Reduction of resource consumption
Dangerous goods and hazardous materials	
• Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW 2005) • The Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (Environment Protection Authority 1997) • Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission 2008).	Dangerous goods and hazardous materials

5 Implementation

This section describes how the OEMP will be implemented.

5.1 Environmental management system

The O&M Contractor will utilise an Integrated Management System for environmental management. The environmental management system (EMS) has been certified as complying with AS/NZS ISO 14001.

The EMS forms the context for this OEMP, which is summarised in Figure 5-1.

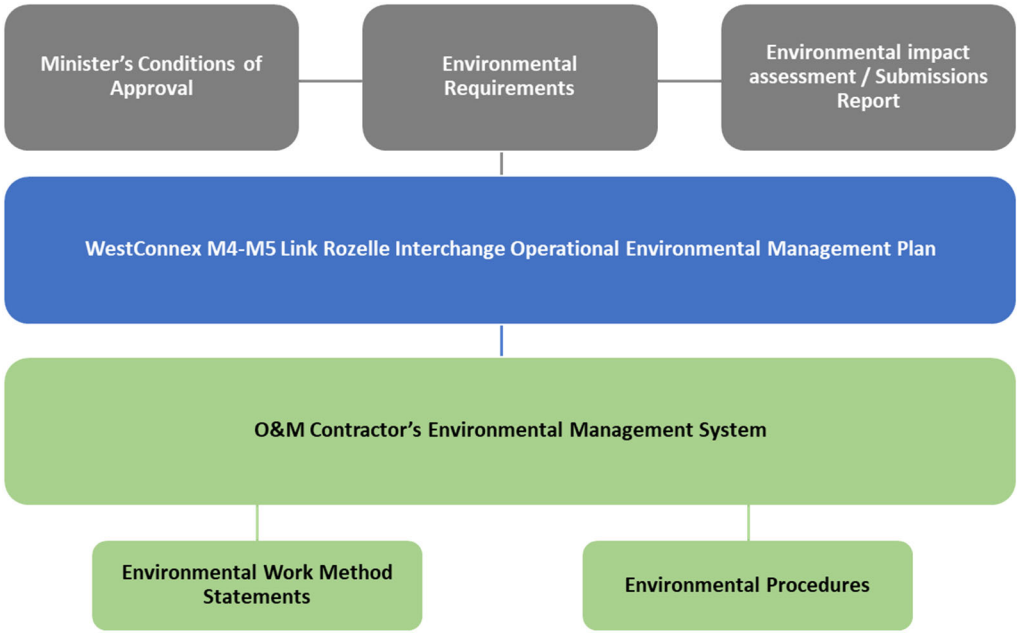


Figure 5-1: OEMP context

5.2 Environment policy

The environmental and sustainability performance of the Asset will be guided by the Project Company's Environment and Sustainability Policies (refer Annexure B). These policies will be displayed on the project website and displayed at relevant offices. The O&M Contractor's environment and sustainability policies will be consistent with the Project Company's policies.

5.3 Operation environmental management plan

This OEMP outlines the environmental management practices and procedures that are to be followed during the operation and maintenance of the Asset. It provides the overall frameworks for the systems and controls to minimise environmental impacts and meet legislative and other requirements.

5.4 Environmental management activities and controls

Site specific operational impacts have been identified and addressed through strategies and sub-plans (refer to Annexure G-H). Each strategy or sub-plan outlines management activities and controls which will be implemented to mitigate potential adverse impacts and assigns responsibility for these control measures.

Where a sub-plan is not required, sections 5.4 to 5.14 provide a summary of the environmental aspects and the mitigation measures which have been identified to manage these aspects.

5.5 Noise and Vibration

This section provides details of the noise and vibration control measures to be implemented to minimise noise impacts to the community during the operational stage of the Project. A detailed analysis of operational noise and vibration is contained within the Operational Noise and Vibration Review (ONVR).

The key noise mitigation measures referred to were determined as part of the detailed design phase for the Project. Vibration impacts from traffic travelling along the various surface roads and tunnels associated with the Project was considered in the Operational Noise and Vibration Review (ONVR).

5.5.1 Project Requirements

The noise mitigation measures outlined below have been designed based on the requirements of:

- NSW 'Road Noise Policy' (RNP, 2011),
- NSW 'Industrial Noise Policy' (INP, 2000),
- Roads and Maritime's 'Noise Criteria Guideline' (NCG, 2015),
- 'Noise Mitigation Guideline' (NMG, 2015),
- Environmental Impact Statement (EIS), and
- Part E of the Minister's Conditions of Approval (MCoA).

5.5.2 Mitigation Measures

Mitigation measures are explored in detail in the Operational Noise and Vibration Review required by CoA E94. More general measures to be implemented to minimise the risk of noise and vibration may include:

- Inform residents of planned maintenance works
- Implement a complaints hotline and handling procedure (refer to Section 7.3.2)
- Undertake regular maintenance of equipment to ensure noise emissions do not increase over time
- Schedule maintenance works during normal construction hours (if possible)
- Schedule parkland maintenance with consideration of parkland users and activities
- Undertake consultation with affected sensitive receivers during maintenance planning
- Undertaken noise monitoring during operation if required
- Analyse complaints and report to Project Trustee with recommendations to minimise impact

Consistent with CoA E67 all noise and vibration assessment, management and mitigation required by the Infrastructure Approval must consider the cumulative noise impacts of approved CSSI and SSI projects. This includes using ambient and background levels which do not include other WestConnex M4 East and New M5 (SSI 6307 and SSI 6788) projects.

5.5.3 Iron Cove High Voltage Regulators

Within three months of commencement of operation of the high voltage regulators at Iron Cove, the Proponent must undertake noise monitoring to compare the actual noise level emitted by the regulators to the noise performance at sensitive receivers as predicted in the document WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report (dated November 2019) and project-specific noise level as determined in accordance with the NSW Industrial Noise Policy (EPA, 2000). Monitoring must capture the onload tap changer noise and peak loading. A report detailing the noise monitoring results must be provided to the Secretary for information within one month of undertaking the monitoring.

If the noise level at the nearest sensitive receiver exceeds either the predicted noise level or project-specific noise level, then the Proponent must implement noise reduction measures within six months of when the noise monitoring was undertaken.

5.5.4 Operational Noise Performance

Within 12 months of the commencement of operation of Rozelle Interchange, monitoring of operational noise to compare actual noise performance of the Project against the noise performance predicted in the review of noise mitigation measures required by Condition E92 will be undertaken.

An Operational Noise Compliance Report will be prepared to document this monitoring. In accordance with CoA E95 the Report will include, but not necessarily be limited to:

(a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E92;

(b) a review of the operational noise levels in terms of criteria and noise goals established in the NSW Road Noise Policy 2011;

(c) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which Project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers;

(d) details of any complaints and enquiries received in relation to operational noise generated by the Project between the date of commencement of operation and the date the report was prepared;

(e) any required recalibrations of the noise model taking into consideration factors such as noise monitoring and actual traffic numbers and proportions;

(f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of mitigation measures; and

(g) identification of additional measures to those identified in the review of noise mitigation measures required by Condition E92, that would be implemented with the objective of meeting the criteria outlined in the NSW Road Noise Policy (EPA, 2011) and Industrial Noise Policy (EPA, 2000), when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary and the EPA.

The Operational Noise Report will be submitted to the Secretary and the EPA within 60 days of completing the operational noise monitoring and made publicly available on the WestConnex website.

5.6 Surface Water

Measures will be implemented to minimise the risk of adverse surface water quality. These measures may include:

- Program regular landscape maintenance activities
- Maintenance of parkland wetlands consistent with controls in the Operational Surface Water Management Plan
- Maintenance of drainage and sump pump in tunnels
- Manage vegetation stockpiles
- All maintenance and incident response vehicles to contain a spill kit
- Provision of 24/7 hotline for motorists to advise of any major dumping
- All refuelling to be undertaken out of the Maintenance site at normal approved filling station
- Promptly report all spills to the QSE Manager

Refer to the Operational Surface Water Management Plan for further mitigation measures and Project requirements.

5.7 Groundwater

Measures will be implemented to minimise the risk of adverse groundwater quality. These measures may include:

- Maintenance of drainage and sump pump in tunnels
- Contain spills in the spill containment chamber of tunnel sump and/or cap outfall points to prevent offsite discharge of polluted water if required and feasible
- Ensure that all groundwater monitoring is undertaken in accordance with the Water Quality Monitoring Program, including if an exceedance is recorded.

Refer to the Operational Water Management Plan for further mitigation measures and Project requirements.

5.8 Erosion and sediment

Erosion and sediment controls will be implemented to minimise the risk of these processes occurring. These measures are covered in detail in the Operational Surface Water Quality Plan and Monitoring Program presented in Annexure F. of this OEMP. Some of the broader measures implemented may include:

- Undertake post-construction monitoring to ensure successful establishment of landscaping and vegetation
- Undertake remedial planting in locations where vegetation cover has not been established
- Use mulch bunds or straw bales as alternatives to sediment fencing where appropriate
- Maintenance of parklands consistent with the Rozelle Interchange Urban Design and Management Plan

5.9 Contamination

Measures will be implemented to minimise the risk of contamination. These measures may include:

- Develop a remedial action plan or acid sulphate soil management plan if contamination or acid sulfate soils are found to pose unacceptable risks
- Engage reputable subcontractor to remove and dispose of sludge
- Undertake storage and transport of liquid and dry chemicals in bunded areas and according to relevant Australian standards
- Keep liquid chemicals and fuels in bunded storage areas or sheds that have capacity to contain spills from leaky containers or from an incident
- Advise all personnel of the following:
  - Location of bunded storage areas, liquid absorbent materials and other spill containment materials and kits
  - Storage of large quantities of fuel for O&M vehicles and plant is not permitted
  - All drums and decanted containers must be labelled and stored within bunded areas whenever not in use

Refer to the Operational Surface Water Quality Plan and Operational Groundwater Plan for further mitigation measures.

5.10 Flora and Fauna

Operation and maintenance of the Asset has the potential to cause impacts to flora and fauna. The Asset will be operated with the objectives of:

- managing the general appearance, tidiness, condition and urban design of the Asset to be consistent with its objectives as described in the documents listed under Condition A1
- monitoring remedial vegetated areas post upgrade to check that they provide the intended screening, aesthetic, ecological, and amenity function
- introducing further remedial measures to support struggling vegetation
- undertaking routine site inspections to ensure that weeds are identified and managed.
- Engaging appropriately qualified personnel to maintain and manage flora and fauna in the parklands

During construction, consultation with Sydney Water was undertaken on the naturalisation works at Whites Creek. The approved Urban Design and Landscape Plan contains additional information on the outcomes of consultation and the adopted design.

Table 5-1 Operational Flora and Fauna Mitigation Measures

Management measures	Responsibility
Vegetation and landscape management	
Develop relevant environmental procedures and EWMSs for vegetation and landscape management including the provisions and actions of the Urban Design and Landscape Plan. These documents will include:	O&M Contractor

Management measures	Responsibility
• training provisions developed in accordance with Section 6 of the OEMP that focus on: – dust and noise management when undertaking work – environmentally sensitive areas (e.g. contamination, acid sulfate soils, heritage values) – erosion and sediment control as per Operational Water Management Plan – waste management and reuse – water and energy conservation as per Operational Surface Water Quality Plan. • exclusion provisions including site set-up, demarcation and provision of no-go areas, including entry and exit points and any vehicular access limitations. Note: this includes exclusion provisions covering weed-infested areas • marking out provisions and clearing limits consistent with G40: Clearing and Grubbing (Roads and Maritime, 2016) • pre-clearance ecological surveys and checks of sensitive areas or written approval from the Project Company Environmental Manager before clearing and management starts • incident management in accordance with the provisions in Section 8.2 of the OEMP • complaints handling and management in accordance with the provisions in Section 7.3.2 of the OEMP • vegetation and tree management (including removal, branch trimming and pruning) • protection of endangered communities and habitat • potential risk of damage to other flora and fauna, including increased spread of invasive seeds (weeds).	
Further vegetation and landscapes restoration	
Inspect the rehabilitated and revegetated areas within the Rozelle Interchange site that provide screening and amenity and prevent erosion once every month for the first year of operation. If there is evidence of poor establishment (e.g. plants under stress and wilting) replace with suitable plant species. Continue inspections after one-year in locations where there is evidence of poor establishment in the first year until a point in time where the area is established.	O&M Contractor
Adopt the immediate above control where land will be cleared in the future when operating, maintaining and repairing the Asset. This will secure the effectiveness of any associated landscaping and vegetation cover introduced to remediate the cleared area.	O&M Contractor
Weed and pest management	
Develop environmental procedures for weed management accounting for the provisions of the NSW *Noxious Weed Act 1993* and the *Pesticides Act 1999* and in accordance with the Biodiversity Guidelines (RTA 2011) and RMS Specification M321. These documents will include: • weed removal practices that include: – weed spread – potential environmental harm to vegetation, threatened species, flora and fauna, and heritage items – weed disposal – notification requirements for Class 1 weeds. • weed control (spraying) practices that cover: – annual program of herbicide application (e.g. targeting invasive spp.) – seed stock and weed removal from topsoil – poor spraying outcomes – impacts to water quality from herbicides (weed killer application). • ongoing weed management practices that cover: – prevention of weed spread and propagation.	O&M Contractor
Regular site inspections will include awareness of pests and vermin on site. Maintenance of a tidy Asset will discourage vermin.	O&M Contractor
Trees gardens, streetscapes, parks and landscape areas under Tree Preservation Orders or with heritage values	
Safeguard trees, gardens, streetscapes, parks and landscape areas that are heritage items or are associated with the heritage significance of heritage items or heritage conservation areas or	O&M Contractor

Management measures	Responsibility
are under Tree Preservation Orders. Examples of safeguards may include tree protection plans and established No Go Areas.	
Asset transfer	
Urban design and landscaping items to be maintained to the design standards established in the Urban Design and Landscape Plan until satisfactory arrangements have been put in place for the transfer of the asset to the relevant authority, as required by CoA E139.	Project Company, O&M Contractor
Monitoring	
Periodic site inspections, as described in Section 9.1 of the OEMP, will also be used to review environmental performance of landscaping. Additional periodic inspections will be undertaken in the event that there is a concern about implementation or performance of landscaping.	O&M Contractor
Auditing and review	
All environmental auditing of the Asset will be undertaken in accordance with Section 9.3 of the OEMP.	Project Company, O&M Contractor
Notification and reporting	
Incidents and emergencies to be managed in accordance with OEMP Section 8.2.	O&M Contractor
Reporting to DPE to be managed in accordance with OEMP Section 9.6	O&M Contractor

The following figures are taken from the Rozelle Interchange Urban Design and Landscape Plan and will be implemented to manage any impacts to flora and fauna.

Figure 5-2 UDLP Maintenance Schedule Part 1 of 4

MAINTENANCE ACTIONS	TASKS	TIME FRAMES / FREQUENCY							
		Weekly	Monthly	Seasonal				As required	As specified below
				Sum	Aut	Win	Spr		
CIVIL STRUCTURES INCLUDING BRIDGES, RETAINING WALLS, PRECAST PANELS AND FIXINGS ALL AREAS									
1. Detailed inspections	Cursory inspection involving visual inspection, photographic documentation and reporting on the condition of major elements, e.g. girders, headstocks, abutments, linings, sour protection, embankment								Every two years
	Detailed inspection involving visual inspection, photographic documentation and reporting on the condition of major elements including measurements of defects, e.g. cracks, settlement								Every two years
	Evidence based inspections and testing which may include testing of materials, surveys and measurements.								Where evidence of deterioration or an anomaly is present.
2. Graffiti	Inspect walls for graffiti and remove as soon as possible.								
FACILITY BUILDINGS									
1. Inspections	Visual inspection for signs of damage including cracking, discolouration, settlement, stability, leakage, rust, defects, and termites),								
2. Cleaning	Cleaning of the building and fittings, including toilets, hand dryers, surfaces, air conditioning								Various
3. Inspect, clean and repair	Inspect, clean and if needed repair damage to external stone paving and flooring and interlock blocks								
	Inspect clean and if needed repair damage to sand trap louvers								
	Clean, inspect and if needed repair damage to external metal panels, canopy panels, joints and supports								
	Sweep roof gutters for dust, sand and debris; check for damage, corrosion, and signs of leakage; clean gutters, downpipes, drains, outlet points and manholes								3 monthly
4. Pest and vermin control	A pest and vermin control program will be developed and implemented with advice from a Pest Control Contractor								As Required
FENCES									
1. Inspections	Inspect all posts, fence panels and fixings for signs of damage, discolouration, tension, rust; if damage is identified, maintain and/or replace to ensure the motorway facilities and the City West Link corridor is not accessible.								3 monthly
2. Maintenance	Lightly oil gate mechanisms and wipe out extra oil								3 monthly

Figure 5-3 UDLP Maintenance Schedule Part 2 of 4

MAINTENANCE ACTIONS	TASKS	TIME FRAMES / FREQUENCY
		Weekly / Monthly / Seasonal (Sum, Aut, Win, Spr) / As required / As specified below
ALL AREAS		
1. Pruning of vegetation for safety	Maintaining driver sightlines	Monthly
	Pruning trees over carriageways, roads, paths and cycleways.	As required
2. Management of non-frangible vegetation	Remove woody "non-frangible" vegetation in setbacks	As specified below: Once a year
3. Noxious weed control	Treat noxious weeds according to control category	Monthly
4. Rubbish removal	Remove all roadside litter and debris.	Weekly; As specified below: And prior to mowing
5. Mowing verge areas (applies to turf species only)	Maintain a 2m wide mown strip to the edge of all road surfaces	As specified below: When growth exceeds 100mm high
	Mow grass to a maximum height of 50mm	
6. Auditing and reporting	Audit and report on maintenance and additional works	As specified below: Monthly
MULCHED MASSED PLANTING AREAS		
1. Watering	Water hydromulched areas as required to germinate seed and maintain healthy growth. Ensure that a distinct level of moisture in the soil is maintained at all times and that plants do not dry out during this period. The frequency of watering may be varied during periods of adequate rainfall.	
	First 8 weeks after planting - 20 litres per plant	Weekly
	Thereafter to 26 weeks after planting – 10 litres per plant At 14 day intervals	As specified below: At 14 day intervals
2. Weeding	Weed planting areas (manual or herbicide) before weed seed set.	Monthly
	Replace landscape planting damaged or killed by herbicide	As required
3. Mulching	Reapply mulch to maintain to a depth of 10cm	As required
4. Removal of dead / dying plant material	Remove dead or dying planting material and replace.	As required
5. Replacement plantings	Replace failed plantings with specified species and densities.	As required
	Water replacement plantings as listed in item 1	As specified below: As listed in item 1
6. Tree guards and stakes	Replace damaged tree guards and stakes during establishment	As required
	Remove tree guards and stakes.	As specified below: 12 months after planting is established as required to maintain healthy condition

Figure 5-4 UDLP Maintenance Schedule Part 3 of 4

MAINTENANCE ACTIONS	TASKS	TIME FRAMES / FREQUENCY
		Weekly / Monthly / Seasonal (Sum, Aut, Win, Spr) / As required / As specified below
7. Horticultural maintenance	Fertilise all plantings at specified rates.	Spr
	Prune all plantings in specified manner:	
	Canopy trees	As required
	Sub-canopy trees / large shrubs	As required
	Low shrubs	As specified below: Annually after flowering
	Climbers	Spr; As specified below: Annually
	Grasses and ground covers	Aut; As specified below: After flowering Every 4 years
TREE PLANTINGS		
1. Watering	Water plants to maintain adequate soil moisture availability during establishment and to prevent plants from drying out:	
	first 8 weeks after planting - 20 litres per plant	Weekly
	thereafter to 26 weeks after planting – 10 litres per plant At 14 day intervals	As specified below: At 14 day intervals
2. Weeding	Weed mulch pads to spot plantings (manual or herbicide) before weed seed set.	
	Replace landscape plants damaged or killed by herbicide.	As required
3. Mulching	Reapply mulch to maintain to a depth of 10cm to an area 1.0m in diameter around each plant	As specified below: Every 2 years
4. Removal of dead / dying plant material	Remove dead or dying planting material and replace.	As required
5. Replacement plantings	Replace failed plantings with specified species and densities.	As required
	Water replacement plantings as listed in item 1	As specified below: As listed in item 1
6. Tree guards and stakes	Replace damaged tree guards and stakes during establishment.	As required
	Remove tree guards and stakes.	As specified below: 12 months after planting
7. Horticultural maintenance	All tree management assessment and reporting activities to be undertaken by Level 5 Arborist or Arboriculturalist. Fertilise all plantings at specified rates.	Spr; As specified below: As required to maintain healthy condition
	Prune all plantings in specified manner:	
	Canopy trees	As required
	Sub-canopy trees / large shrubs	As required

Figure 5-5 UDLP Maintenance Schedule Part 4 of 4

MAINTENANCE ACTIONS	TASKS	TIME FRAMES / FREQUENCY
		Weekly / Monthly / Seasonal (Sum, Aut, Win, Spr) / As required / As specified below
TURFED AREAS		
1. Watering	Water turf to maintain adequate soil moisture availability during establishment and to prevent turf from drying out	
	Water the turf immediately after laying until the underlay is moistened to its full depth. Continue watering every second day for the first fourteen (14) days, then at regular intervals until the turf is established.	Daily
	Thereafter	As required until turf has taken root and is making healthy growth
2. Mowing	Mow grass to a maximum height of 50mm When growth	When growth exceeds 75mm
3. Replace damaged turf	Remove damaged areas of turf and replace with new turf	As required
4. Weed control	Control weeds in turf areas using selective herbicide	Monthly
PLAY AREAS AND EQUIPMENT		
1. Inspections and reporting	Visual inspections to identify developing issues for safety of play equipment including wear and tear of structures, moving parts, ropes cables etc. To be undertaken in accordance with play equipment supplier general maintenance instruction.	Weekly
	Visual inspection and maintenance log	Monthly
	Annual comprehensive inspection and reporting	Annually and/or in accordance with supplier general maintenance instruction.
2. Cleaning	Remove soil, leaves and debris on or around equipment	Weekly
3. Inspect, clean and repair	Inspect, clean and if needed repair damage to playground equipment	As required
	Check for broken, loose or missing parts and repair necessary in accordance with manufacturers recommendations	As required

5.11 Air Quality

The management of air quality impacts in accordance with the Conditions of Approval are identified within the Operational Air Quality Management Sub-Plan (OAQMP) in Annexure H of this OEMP.

5.12 Waste and Resources

Waste and resource management strategy

Purpose / Objectives

Operation and maintenance of the Asset has the potential to cause:

- generation of waste such as green waste from landscaping activities and bitumen and concrete waste from road works to collection road litter and orphan waste
- unnecessary generation of waste products such as over-ordering of materials to excessive packaging materials
- resource consumption.

The objectives of this Waste and Resource Management Strategy are to:

- ensure all waste generated for the Asset is handled and disposed of in an environmentally sound manner
- adopt and promote the waste hierarchy (reduce or avoid waste, reuse waste, recycle waste, recover energy, treat waste, dispose of waste
- ensure measures are identified and implemented to minimise waste, manage waste and conserve energy throughout operation and maintenance of the Asset

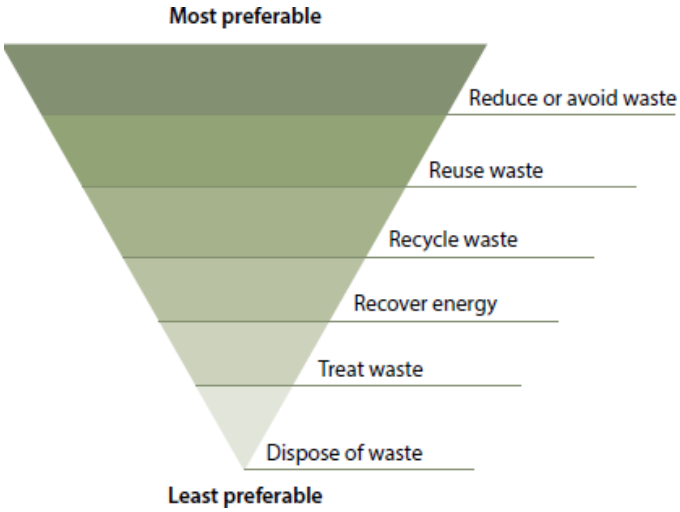
This Waste and Resource Management Strategy has been developed to satisfy Condition E202. For further information regarding the environmental obligations, refer to Section 4.

Approach to waste management

Waste management hierarchy

Waste and resource management strategy

During operation and maintenance of the Asset, waste will be prioritised according to the principles of a resource management hierarchy:



Resource recovery orders and exemptions

The EPA may issue resource recovery orders and resource recovery exemptions under the 2014 Waste Regulation. Resource recovery orders apply to generators and processors of waste. Resource recovery exemptions apply to consumers of the resource. Both contain conditions that must be met to satisfy the order/exemption and may include specifications, requirements on how to re-use or apply the waste, record keeping, reporting and other requirements.

The general orders and exemptions that may be applicable to the project are listed in Table 5-2 below. In addition to these, a specific exemption may be granted where an application is made to the EPA.

Table 5-2 General resource recovery orders and exemptions that may apply to operation and maintenance of the Asset

Order / Exemption	General conditions
Excavated natural material	The chemical concentration or other attributes of the excavated natural material listed in the order must not be exceeded. The excavated natural material can only be applied to land as engineering fill or used in earthworks. ENM handling, processing and testing requirements are outlined in detail in the order.
Excavated public road material	The excavated public road material can only be stored within the road corridor at the site where it is to be applied to land. The excavated public road material can only be applied to land within the road corridor for public road relatedactivities including road construction, maintenance and installation of road infrastructure facilities. This order does not apply to the land application of excavated public road material on any land outside the road corridor. The excavated public road material cannot be applied on private land.
Raw mulch	The raw mulch can only be applied to land for the purposes of filtration or as a soil amendment material or used either singularly or in any combination as input material(s) to a composting process.
Reclaimed asphalt pavement	The reclaimed asphalt pavement can only be: • Applied to land for road related activities including road construction or road maintenance activities, being: a. Use as a road base and sub base, b. Applied as a surface layer on road shoulders and unsealed roads c. Use as engineering fill material. • Used as an alternative raw material in the manufacture of asphalt.

Waste and resource management strategy	
Recovered aggregate	The chemical concentration or other attribute of the recovered aggregate listed in the order must be met. The recovered aggregate can only be applied to land for road making activities, building, landscaping and construction works. This approval does not apply to any of the following applications: • Construction of dams or related water storage infrastructure, • Mine site rehabilitation, • Quarry rehabilitation, • Sand dredge pond rehabilitation, • Back-filling of quarry voids, • Raising or reshaping of land used for agricultural purposes, and • Construction of roads on private land unless: a. the relevant waste is applied to land to the minimum extent necessary for the construction of a road, and b. a development consent for the development has been granted under the relevant Environmental Planning Instrument (EPI), or c. it is to provide access (temporary or permanent) to a development approved by a Council, or d. the works undertaken are either exempt or complying development.
Stormwater	Stormwater can be applied to land by: • Spraying, spreading or depositing on the land, • Ploughing, injecting or mixing into the land, • Filling, raising, reclaiming or contouring the land.

Management measures	Responsibility
General	
No waste generated outside the Site to be received at the Site for storage, treatment, processing, reprocessing, or disposal on the Site, except as expressly permitted by a licence under the *Protection of the Environment Operations Act 1997*, if such a licence is required in relation to that waste (CoA B36).	O&M Contractor
Classification	
Classify all waste (liquid and/or non-liquid) in accordance with the Waste Classification Guidelines (EPA, 2014) or any superseding documents.	O&M Contractor
Waste storage: general provisions	
Store stockpile-collected spoil, topsoil or mulch onsite in allocated areas, and where required, implement dust control and stockpile management measures.	O&M Contractor
Store liquid waste in appropriate containers in bunded areas in the maintenance depot until they can be transported offsite. Ensure the bunded areas have the capacity to carry 110 per cent of the bulk storage or 120 per cent of the volume of the largest contained for smaller packaged storage.	O&M Contractor
Store other recyclable or non-recyclable materials in appropriately covered bins and skips. Store these materials in appropriate locations onsite. Commission a licensed contractor to regularly empty the bins and skips to an approved disposal or recycling facility.	O&M Contractor
Waste transportation	
Trucks to transport waste to appropriately licensed waste facilities or facilities lawfullypermitted to accept such waste.	O&M Contractor
Waste truck loads to be covered and tailgates secured before leaving site.	O&M Contractor
Controlled wastes to be transported under a consignment number and waste data forms tobe completed.	O&M Contractor
Waste disposal	
Once classified, dispose of the waste to a nearby appropriately licensed waste facility or preferentially, allow for its reuse or recycling.	O&M Contractor
Remove all orphan waste (e.g. illegally dumped materials) encountered within the Asset footprint to a licensed contractor.	O&M Contractor

Waste and resource management strategy	
All waste materials removed from the site shall only be directed to a waste facility or premises lawfully permitted to accept the materials. Any off-site reuse of waste must complywith relevant EPA resource recovery orders and exemptions.	O&M Contractor
The relevant licences of waste facilities utilised for the disposal of project waste will be obtained (on a regular basis if necessary) to ensure they are legally able to accept thatwaste.	O&M Contractor
Record the types, volumes and destinations of all waste on a waste register.	O&M Contractor
Obtain and retain a completed and signed notice under section 143(3A) of the POEO Act ("s.143 Notice") prior to transporting wastes to a place that is not owned by TfNSW and is not a licensed waste facility (the "Waste Site"). This includes waste transported for reuse, recycling, disposal or stockpiling.	O&M Contractor
Sustainability initiatives	
An Initiatives and Opportunities Register (or equivalent) will be maintained to identify potential sustainability opportunities and opportunities to reduce carbon emissions and energy use. The register will include assigned responsibilities to investigate or implement nominated initiatives / opportunities.	O&M Contractor
Tunnel lighting system utilises LED light banks, with long-life expectancy and fewer total number of fittings, resulting in decreased operational power demand and associated carbon footprint for lighting compared to fluorescent and high pressure sodium (HPS) light systems.	Note
A total of 6% of electricity consumption utilised during operation and maintenance of the asset will be 100% renewable either through onsite renewables or purchase of accredited GreenPower.	Project Company
The O&M Contractor will consider the Australian Government's Green Vehicle Guide (https://www.greenvehicleguide.gov.au/) for light utility vehicles that will be purchased or leased for the operation and maintenance of the Asset.	O&M Contractor
Campaigns to encourage O&M personnel to switch off lights, air conditioners and other whitegoods and vehicles when not in use and appropriate to do so.	O&M Contractor
Where feasible and reasonable, resources (e.g. mulch for garden beds) will be sourced from local suppliers and/or from within the Sydney region.	O&M Contractor
Resource consumption to be minimised by making informed predictions on the required quantities of resources, such as construction materials.	O&M Contractor
Monitoring	
Periodic site inspections, as described in Section 9 of the OEMP, will also be used to review environmental performance as will periodic inspections in the event that there is a concern about implementation or performance.	O&M Contractor
Monitoring of waste generation, recycling, reuse and disposal will be conducted by tracking of waste sent off-site. Records maintained include waste transfer dockets and the maintenance of the Rozelle Interchange Motorway Waste Register.	O&M Contractor
Operational energy use and greenhouse gas emissions will be monitored and recordedduring operation and maintenance of the Asset.	O&M Contractor
Undertake monthly inspections to ensure all waste documentation is being completed and is correct, and that all waste is being appropriately classified, stored, transported and disposed.	O&M Contractor
Details of greenhouse gas (GHG) emissions, energy production, energy consumption will be monitored and recorded for the activities required under the *National Greenhouse and Energy Reporting Act 2007*. Monitoring records will include: • a list of all sources monitored • the activity data used for calculation of greenhouse gas emissions for each source, categorized by process and fuel or material type • documentary evidence relating to calculations—for example, receipts, invoices and details of payment methods • documentation of the methods used for greenhouse gas emissions and energy estimations • documents justifying selection of the monitoring methods chosen	O&M Contractor

Waste and resource management strategy	
• documentation of the collection process for activity data for a facility and its sources records supporting business decisions and accuracy, especially for high-risk areasrelating to reporting coverage (e.g. facility).	
Auditing and review	
The Initiatives and Opportunities Register (or equivalent) will be reviewed and updated on anannual basis. The review will consider potential sustainability initiatives, and opportunities to reduce carbon emissions and energy use.	O&M Contractor
All environmental auditing of the Asset will be undertaken in accordance with Section 9.3 of the OEMP.	O&M Contractor, Project Company
Notification and reporting	
Sustainability reporting	
Reporting to be undertaken throughout operation of the Asset will include: • Monthly Sustainability Reports to Project Company • Annual Sustainability Reports to Project Company An annual GHG Initiatives Report (as required by CoA B52).	O&M Contractor
National Greenhouse and Energy Reporting	
The NGER scheme, established by the National Greenhouse and Energy Reporting Act 2007 (NGER Act), is a single national framework for reporting and disseminating company information about greenhouse gas (GHG) emissions, energy production, energy consumption and other information specified under NGER legislation. Energy consumption and Scope 1 and Scope 2 emissions associated with operation and maintenance of the Asset (excluding vehicles utilising the Asset) will be monitored and reported throughout operation of the Asset. Records will be managed in accordance with Project Company's ISO: 9001 accredited quality management system.	O&M Contractor

5.13 Traffic and Transport

Traffic management strategy	
Purpose / Objectives	
Operation and maintenance of the asset has the potential to cause: • impacts to the network functionality and operational impacts to the overall Sydney traffic network • impacts to or restrictions upon the movements of heavy vehicles and transportation vehicles (e.g. buses) • impacts upon emergency vehicle access and/or diversion points	
The objectives of this Traffic Management Strategy are to: • manage operation and maintenance activities such that the operational network performance is not impacted • maintain traffic management control infrastructure • operate and maintain site vehicles to reduce their amenity impacts on adjacent residents, road users and othersensitive receivers.	
This Traffic Management Strategy has been developed to satisfy **CoA E26(h)(iii)**. For further information regarding the environmental obligations, refer to Section 2 of the OEMP.	
Management measures	**Responsibility**
The Motorway Control Centre (MCC) Operator] has the authority and responsibility for issues relating to traffic management, including liaison with the Transport Management Centre (TMC) and Sydney Coordination Office (SCO), during operation and maintenance of the Asset.	O&M Contractor
Prior to commencement of works, undertake consultation with Transport Management Centre, the Sydney Coordination Office, and/or relevant Council and where required, obtain Road Occupancy Licence (ROL) under section 138 of the NSW *Roads Act 1993* and fulfil other required legislative requirements.	O&M Contractor
Undertake works in accordance with Road Occupancy Licences (ROLs).	O&M Contractor
Develop a specific Traffic Control Plan (TCP) or Traffic Management Plan (TMP), as required, covering controls relevant to the location and O&M activity taking place. The TCP or TMP will beprepared in accordance with the Traffic Control and Work Site Manual (Roads and Maritime, 2010) and quality assurance specification G10: Control of Traffic (Road and Maritime, 2010).TheTMP will include: • Overview of the proposed construction and/or maintenance activities. • Layout of plant, any required exclusion zones, loading areas and circulation requirements. • Site arrival and pre-notification plans. • Traffic volume estimates including vehicle type, frequency and timing of arrival to anddeparture from site. • Traffic control plans showing access arrangements and the details of signs and devices. • Temporary works drawings to illustrate the proposed staging to be implemented during theconstruction works, specifically to outline the basic construction methodology, identify the need for temporary works; specify any particular traffic management measures / controls required. • Vehicle management and movement plan showing entry and exit points. • Controls to prevent traffic queuing on public roads. • Pedestrian and cyclist management plans including diversions and temporary provisions toguide people through work areas. • Measures to manage other road users including lane closures, diversions, and temporary speed restrictions. Specified work hours, including restrictions on queuing on the motorwayand/or in the local area. • Response plans to any incident or emergency. • Communication and notification plans. • Details of external stakeholder consultations and/or notifications. Any localised changes to existing traffic management arrangements.	O&M Contractor
Notify road users and the local community two weeks prior to implementing traffic managementcontrols for planned maintenance.	O&M Contractor
Brief drivers working onsite about: relevant aspects of this Traffic Management Strategy, the traffic management controls; TCP or TMP requirements; site entry, exit and circulation; and	O&M Contractor

othersafety measures. Toolbox talks may be used to reinforce issues related to specific risks during work packages (e.g. traffic switches, pavement maintenance, tunnel washing).	
Maintain access and operational arrangements, where reasonable and feasible. Provide adequate alternative access and/or operational arrangements as necessary.	O&M Contractor
Ensure safe sight and stopping distances are provided to any work site to allow traffic to safely leave and join the road network.	O&M Contractor
Ensure all surfaces are properly maintained and in good condition post the construction works and the roads wearing course is adequate for traffic requirements.	O&M Contractor
Determine any placards or warning devices to be installed on heavy vehicles used for non-tunnelrelated operational or maintenance activities.	O&M Contractor
O&M vehicles to carry spill kits to manage minor environmental spills.	O&M Contractor
Material delivery / removal trucks with potential dust-generating material will be covered prior toarriving / leaving the asset site.	O&M Contractor
Where feasible, limit O&M heavy vehicles or O&M related traffic movements through residentialstreets.	O&M Contractor
Truck drivers of heavy vehicles (e.g. deliveries) must be informed of the transport and delivery routes and site operation hours prior to arrival at the worksite.	O&M Contractor
On maintenance sites that are closed to public traffic, site traffic to maintain the defined speed limit identified in the relevant Vehicle Movement Plan prepared for the nominated works.	O&M Contractor
Works will be planned to cause the least possible disruption to traffic. All necessary approvals from the relevant Authorities for the temporary traffic arrangements will be obtained as required.	O&M Contractor
A safe and convenient passage will be provided for vehicles and pedestrians to and from side roads and property connecting to the roadway.	O&M Contractor
Ensure works strictly adhere to the standard hours of operation permitted under the Road Occupancy Licence.	O&M Contractor
Monitoring	
Continuously monitor traffic conditions. Intelligent transport systems allow for the partial adjustment of traffic conditions on the motorway such as variable speed limits, ramp metering controls and use of the hard shoulder. These measures help promote and maintain operationaltraffic performance.	O&M Contractor
Conduct inspections of the temporary traffic controls (both short and long term) during the works,focusing on monitoring compliance against the Traffic Control Plan and the associated TMP to identify safety hazards and enable the appropriate implementation of corrective solutions.	O&M Contractor
Auditing and review	
Prepare a Road Network Performance Review Plan in accordance with CoA E36 at both 12 months and 5 years after the commencement of operation of the asset. Submit the plan to the Secretary, Transport for NSW (in relation to impacts on bus services) and to relevant councils within 60 days of this completion, and make the plan publicly available. This review will also satisfy the requirements of REMM OpTT1.	TfNSW / Project Company
Implement any mitigation measures identified in the Road Network Performance Review Plan, and update this Traffic Management Strategy if required.	TfNSW
Any additional mitigation measures that require occupying, modifying or affecting any roads, which are open to the public, will first require approval from TfNSW and the relevant Authority.	O&M Contractor / Project Company
All environmental auditing of the asset will be undertaken in accordance with Section 9.3.	Project Company / O&M Contractor
Notification and reporting	
A road traffic environmental incident includes any unplanned and/or undesired event that results in, or has the potential to result in, environmental impairment, such as fuel spills, toxic chemical spills, problems with air quality or incidents involving water contamination.	
Develop an Incident Response Plan (IRP) and relevant procedures to deal with road trafficincidents. Ensure the IRP/procedures include: • First response measures to ensure motorist and road user safety including road and laneclosures, use of variable message warning signs and contacting the emergency services. • Response measures to manage environmental risks associated with incidents. • Training for O&M contractor personnel in dealing with potential environmental impacts (referto Section 5 of the OEMP). • Regular exercises on the implementation of the procedure and plans.	O&M Contractor

• Traffic management control procedures for a minor, moderate and major road traffic accident, including ongoing traffic management controls, safety provisions, environmentalcontrols, and notification requirements. • Sets out other reporting and escalation processes. • Protocol and authorisations to reinstating normal traffic operations on the motorway. • Protocol for delivering environmental protection, including site clean-up, pollution control andabatement, with appropriate links to the controls in OEMP Annexure L Operational Water Management Plan. • Subsequent reporting processes, including lessons learnt, corrective actions and revisions tothe IRP and associated procedures. Provision for an annual drill in emergency and incident response.	
Refer to the Incident Response Plan (described in Section 8.2.3 of the OEMP) for traffic management measures to be implemented during an emergency, where appropriate, to minimisethe potential for escalation of the emergency (in accordance with CoA E39b).	O&M Contractor
After identifying a major (significant) incident or emergency, contact the relevant external agency as soon as practicable. Refer to Section 8.2.4 of the OEMP for information regarding notificationsand Annexure F of the OEMP for relevant environmental contacts. Roles relating to road traffic environmental incident response and management are identified below.	O&M contractor

Relevant Stakeholder	Role and responsibility
Transport for NSW Transport Management Centre(TMC)	• Where appropriate, making adjustments to network traffic arrangements to facilitate prompt access by emergency services when required to respond to environmental incidents. • Provision of relevant outer cordon traffic and traveller information. • Providing reports to the media including details on the incident situations and response arrangements.
Fire and Rescue NSW	Fire and Rescue NSW is the responsible agency for managing environmental incidents involving: • A major smoke, fire or explosion event • Major flammable liquids • Major natural disasters • A major fuel, chemical or toxic spill event.
NSW Police	NSW Police is the responsible agency for managing all other incidents/emergencies includingon site, control and coordination of traffic and pedestrians during major environmental incidents
NSW Ambulance	NSW Ambulance will attend the incident site when requested, and provide emergency response to injured persons, including initial patient care and specialised transport services.
NSW Environment Protection Authority(NSW EPA)	NSW EPA personnel will become involved when incidents impact on environmental matters,such as fuel spills, toxic chemical spills, problems with air quality or incidents involving water contamination.
Other agencies	Other agencies that may be involved in an environmental incident include: • State Emergency Services (SES) • Department of Planning, Industry and Environment • Local Emergency Management Committee (LEMC).

5.14 Visual Amenity and Landscape

Measures will be implemented to minimise the risk of adverse effects towards visual amenity and landscaping. These measures may include:

- Develop and implement relevant environmental procedures and EWMSs for vegetation and landscape management including the provisions and actions of the urban design and landscape plan
- Inspect the rehabilitated and revegetated areas within the Project site that provide screening and amenity and prevent erosion once every month for the first year of operation. If there is evidence of poor establishment (e.g. plants under stress and wilting) replace with suitable plant species. Continue inspections after one-year in locations where there is evidence of poor establishment in the first year until a point in time where the area is established

- Maintain landscaping in accordance with the UDLP to ensure local native species are used to stabilise the soil and enhance the area
- Implement the maintenance program detailed in the UDLP to ensure the UDLP, as approved by the Secretary, is implemented as required during operation as required by CoA E137
- Implement measures identified in the UDLP to minimise light spill to residential properties.

CoA E212 requires the Proponent must construct and operate the CSSI with the objective of minimising light spillage to residential properties. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and relevant Australian Standards in the series AS/NZ 1158 – Lighting for Roads and Public Spaces. Notwithstanding, the Proponent must provide mitigation measures to manage any residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners.

In the event that additional lighting is to be installed during operations, beyond that assessed in the documents referenced in UDLP, an assessment must be undertaken to ensure compliance with CoA E212 and if required by this assessment mitigation measures provided in accordance with CoA E212.

5.15 Aviation Risk

The Project has been designed and constructed in accordance with Lighting in the Vicinity of Aerodromes: Advice to Lighting Designer (CASA, 1999) and National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports (DIRD, 2012).

In accordance with CoA E123 the Project will be operated with the objective of avoiding adverse or distracting lighting configuration, spillage or intensity to aircraft operations. All lighting associated with the operation of the Project must be maintained consistent with the design requirements to ensure adherence to the Lighting in the Vicinity of Aerodromes: Advice to Lighting Designer (CASA, 1999) and National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports (DIRD, 2012). Should lighting be amended an assessment will be undertaken to ensure compliance and if identified in the assessment provide mitigation measures to manage any residual night lighting impacts to protect aircraft operations, in consultation with CASA and DIRD.

5.16 Flood Review

A Flood Review Report(s) will be prepared, in accordance with CoA E153, after the first defined flood event for any of the following flood magnitudes – the 5 year ARI event, 20 year ARI event, 100 year ARI event and probable maximum flood – to assess the actual flood impact against that predicted in the documents referred to in CoA A1. The Flood Review Report(s) will be prepared within three (3) months of each flood event. The report(s) will be prepared by an appropriately qualified person(s) and include:

(a) identification of the properties and infrastructure affected by flooding during the reportable event;

(b) a comparison of the actual extent, level, velocity and duration of the flooding event against the impacts predicted in the documents referred to in Condition A1 and the requirements specified in Condition E151; and

(c) where the actual extent and level of flooding exceed the predicted level and / or the requirements specified in Condition E151, with the consequent effect of adversely impacting on property(s), structures and infrastructure, identification of the measures to be implemented to reduce future impacts of flooding related to the CSSI works, including the timing and responsibilities for implementation.

Where the report identifies additional flood mitigation measures are required, per requirement (c) above, these will be developed in consultation with the affected property / structure / infrastructure owners and the relevant council(s).

A copy of the Flood Review Report(s) will be submitted to the Secretary and relevant council(s) within one (1) months of finalising the report(s).

5.17 Sustainability

The project will be operated in accordance with the relevant aims of the WestConnex Sustainability Strategy detailed in in Table 5-3. The Rozelle Sustainability Strategy shall be implemented during operation. This Strategy provides the detailed means and methods by which sustainability aims shall be achieved.

Table 5-3 WestConnex Specific Sustainability Objectives

Sustainability pillar	Areas	Objectives
People – *Make life better*	Health and safety	• Provide a healthy and safe environment for our employees, contractors, customers and the community
	Diversity, inclusion and reconciliation	• Enhance belonging and wellbeing within WestConnex and encourage the same for our suppliers • Strive to advance reconciliation in Australia through the Reconciliation Action Planning process
	Human rights	• Protect human rights in WestConnex's operations and across our extended supply chain
	Social investment	• Partner with not-for-profits to pursue opportunities that help address key transport-related social or environmental issues
	Customer experience and financial inclusion	• Make it easy for customers to use and understand our toll roads, offering choices to meet their individual needs and show we care by listening, being transparent and flexible • Make it easy for customers facing social and financial hardship to reduce tolling debt
Planet – *Use resources wisely*	Carbon neutrality	• Work towards becoming a carbon-neutral organisation and seek to meet our energy needs predominantly through renewable energy
	Climate change	• Regularly review the vulnerability of assets to climate-related physical risks and, where appropriate, take action to mitigate these risks
	Whole-of-life sustainability	• Examine and challenge the way we plan, design, construct and operate assets to reduce their whole-of-life impact while maintaining or improving their economic performance including: – Reducing energy demand and embodied energy in materials – Minimising potable water use and beneficially reusing water – Avoiding where possible clearing of valued natural areas – Reducing the amount of materials used, and favouring low impact materials – Avoiding, reducing, reusing and recycling wastes
	Pollution	• Minimize environmental impacts and strive to meet or exceed our statutory requirements
Places – Build better transport	Economic growth and productivity	• Improve productivity and support growth through contributing to efficient and effective transport networks • Seek to contribute to Sydney's social and economic health by seeking out opportunities to carry out local recruitment and procurement
	Integrated transport	• Advocate for integrated and multi-modal transport solutions to ensure efficient transportation networks

5.18 Environmental schedules

The environmental schedules include documents such as site inspection checklists, environmental incident reports and waste registers. These are outlined in Section 5.5 to Section 5.14 and in the appropriate sub-plans (refer to Annexure F, Annexure G, Annexure H and Annexure I).

5.19 Subcontractor environmental management

All O&M personnel are required to undertake work in accordance with this OEMP and sub-plans. Sub-contractors are required to provide their own environmental management system (EMS) relating to the activities they are contracted to perform. Sub-contractors' EMS must be consistent with this OEMP and sub-plans.

Sub-contractors to the O&M Contractor will be evaluated, selected and effectively monitored by the O&M Contractor to ensure their activities do not adversely affect the conforming deliverables. Additional detail is included in the O&M Contractor's Quality Plan.

6 Compliance, training and awareness

This section describes the processes and tools to inform the O&M personnel of their environmental obligations in undertaking their roles and responsibilities as discussed in Section 3.4. Relevant training and induction must be provided by the O&M Contractor to inform personnel of their environmental and compliance obligations under the conditions of approval.

Training requirements will be regularly reviewed and may form part of staff performance reviews, compliance tracking and ISO14001 audits. The QSE Manager may also determine additional training requirements relevant to any O&M personnel's environmental responsibilities based on his/her education, training and/or experience.

6.1 Environmental induction

The O&M Contractor will implement a compulsory site induction that includes an environmental component for all O&M personnel attending the site.

O&M personnel must be aware of the requirements of this OEMP and be familiar with implementing the associated management measures. Visitors will be required to be accompanied by inducted personnel at all times.

The environmental component of the site induction will include, but not be limited to an overview of:

- relevant details of this OEMP;
- key environmental issues;
- conditions of environmental licences, permits and approvals;
- specific environmental management requirements and responsibilities;
- mitigation measures for the control of environmental issues;
- incident response and reporting requirements, including near misses;
- spills, leaks, emissions, and contamination treatment;
- emergency response procedures, communications and equipment;
- localised health, safety and environment meetings;
- site and job-specific environmental impacts and aspects;
- environmental management system obligations;
- the media protocol summarised in Section 7.4.4; and
- information relating to the location of environmental constraints.

6.2 Toolbox talks

Toolbox talks will be one method of awareness training and educating for O&M personnel on issues related to all operational related aspects including environmental issues. The toolbox talks will be used to maintain environmental awareness throughout the Asset's lifetime. They will also be tailored to specific issues relevant to upcoming work, and include such as:

- environmental hazards and risks;
- SOPs, EWMSs and incident response procedures (IRPs);
- legislation changes;
- inspection findings;
- audit results;

- incident or near-miss investigations;
- O&M personnel and community suggestions for improvements; and
- community feedback and actions.

6.3 Environmental awareness training

Targeted environmental awareness training will be provided to O&M personnel with a specific authority or responsibility for environmental management or those undertaking an activity with a high risk of environmental impact.

Awareness notes will also be developed and distributed to inform O&M personnel. These will typically take the form of a poster, booklet, or similar and will be distributed to those responsible for managing specific work locations or activities. Training may include:

- ISO 14000 awareness, obligations and requirements;
- Project Company's and O&M Contractor's environmental policies, procedures, standards and guidelines;
- SOPs and EWMSs;
- auditing (including spot and formal auditing) and workplace inspections;
- incident reporting and investigation;
- continuous improvement policies;
- environment protection and sustainability;
- spill, leaks, emissions and contamination management; and
- the waste hierarchy.

Awareness training may be delivered through:

- distance and online training in the form of memoranda and instructions; and
- training sessions prepared and delivered by the QSE Manager.

6.4 Emergency response training

O&M personnel who are required to participate in an incident and/or emergency response will be trained under a program that focuses on implementing effective environmental management controls. The training will address:

- stop work procedures and follow-on actions;
- oil, fuel, chemical spill response;
- containment;
- clean up;
- waste management including removal, classification, storage, transport and disposal;
- liaison with Fire Brigade, NSW EPA and other emergency response services; and
- environmental management controls (e.g. water quality basins).

The O&M Contractor will be suitably trained in emergency response procedures identified in the Emergency Response Plan (refer Section 8.2.3), including initiating the correct and most-appropriate response and reporting incidents to the correct authority, as required.

7 Communication

This section covers the requirements to implement internal and external communication procedures in operating, maintaining and repairing the Asset.

The Rozelle Interchange Communications Strategy, as approved by the nominee to the Planning Secretary, will be implemented for 12 months following the completion of construction.

7.1 Internal communication

The QSE Manager, Maintenance Manager and Operations Manager will meet regularly to discuss on-site environmental management, amendments to plans, changes to O&M activities, environmental monitoring results and other relevant aspects of the O&M Services.

Regular meetings may also be scheduled with Project Company Representative to communicate ongoing environmental performance and to discuss issues to be addressed.

The QSE Manager will participate in toolbox talks (Section 6.2) and other environmental awareness training (Section 6.3) to communicate to O&M personnel on environmental performance including sensitive environmental matters for future work areas, and to receive feedback from on-site personnel.

7.2 External and Government consultation

The O&M Contractor's QSE Manager will be the main point of contact regarding specific environmental issues for external and Government stakeholders.

Relevant Government agencies will be notified as required by this OEMP following an incident and/or emergency. Routine meetings will be used to discuss environmental performance, upcoming work, and high-risk activities. The meetings will include inspections of the Asset as needed.

7.3 Community communication

7.3.1 Community engagement strategy

The Project Company has developed a Community Involvement Plan to provide an approach to stakeholder and community engagement. The O&M Contractor will be responsible for engaging with the community members impacted by the operation and maintenance.

The Community Involvement Plan identifies opportunities for providing information and consulting with the community and stakeholders throughout the Asset's life. The plan defines:

- engagement groups (e.g. community, other road stakeholders);
- key messages; and
- tools that will be used to interact with community and stakeholders. These tools are detailed below in Section 7.4.

Consultation with stakeholders (e.g. relevant Councils, local community, other road stakeholder groups) will be undertaken throughout operation and maintenance of the Asset in accordance with the Project Company's Community Involvement Plan.

7.3.2 Complaints and enquiries procedure

A Complaints Management System, consistent with *AS/NZS 10002:2014 Guidelines for Compliant management in Organisations* will be implemented by the O&M Contractor during the operational life of the Asset.

There are several pathways to make a complaint or enquiry. These include the following:

- 24 hour phone number (1800 660 248) answered by the O&M Contractor's Community Engagement Advisor (CEA) or delegated on-site supervisor during out of hours works
- postal address (Locked Bag 3905 GPO Sydney NSW 2001)
- email address (info@westconnex.com.au).

Community members can access the above resources, as required, to address any complaints or enquires they have.

All enquiries, feedback and complaints received through the above pathways or received by personnel working on the project will be forwarded to the O&M Contractor's Stakeholder and Community Manager, and to the O&M Contractor's QSE Manager (where appropriate) for issues relating to management of the environment.

Information on all complaints received, including the means by which they were addressed, whether resolution was reached, and whether mediation was required, will be included in a complaints register by the O&M Contractor's Stakeholder and Community Manager. The information contained within the register will be made available to DPE on request.

The Project Company's Community Involvement Plan provides the framework to manage and resolve complaints that arise from a number of communication methods, with this framework summarised in Table 7-1, Figure 7-1 and Figure 7-2.

All complaints should be closed off in the complaints register. The stakeholder(s) will also be kept informed of when they will receive a response.

The O&M Contractor will manage, record and respond to all complaints. Complaints will be reported to Project Company through regular Asset reporting.

Table 7-1: Response processes for complaints, enquiries and feedback

Item	Response Process
Enquiries from Federal, State and local government representatives via email, telephone or written correspondence	• O&M Contractor notifies the Project Company immediately of all enquiries from Federal, State and local government representatives relating to the O&M Services. • O&M Contractor acknowledges the correspondence / contact within 48 hours of its receipt. A draft response (if required) is provided to the Project Company for approval within 5 working days of the correspondence/contact. • Any briefings for these representatives will be arranged by the Project Company Representative
Calls (complaints/enquiries/ feedback)	• All calls or enquiries will be responded to immediately or within two working hours. Calls will be answered by the O&M Contractor's Community Engagement Advisor (CEA) or a delegated on-site supervisor at the MOC during out of hours works. • When a complaint or enquiry cannot be responded to immediately a follow up verbal response on what action is proposed will be provided to the complainant / enquirer within 24 hours of the complaint or enquiry being received. • A written response to the complainant / enquirer will be made within 10 business days if the complaint or enquiry cannot be resolved by the initial or follow up verbal response. • A draft response will be provided to the Project Company (if required) before responding to the contact.
Written correspondence or representation	• Any representation is acknowledged within 5 business days of receipt by the O&M Contractor. • Draft responses to be approved by the Project Company. • The written response will be issued within 15 business days of receipt by FHEOM.

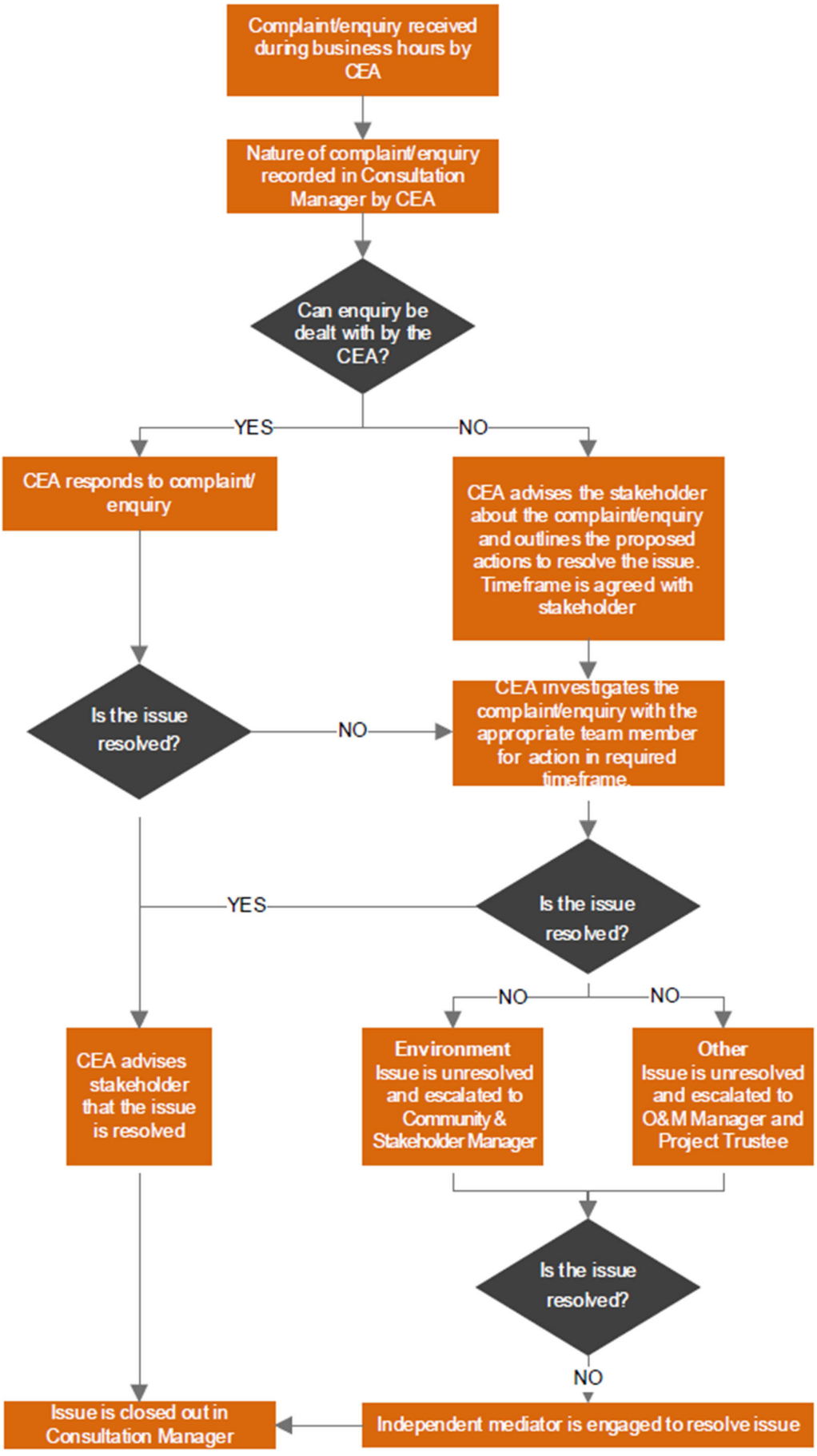


Figure 7-1: Process for enquiries and complaints recieved during business hours.

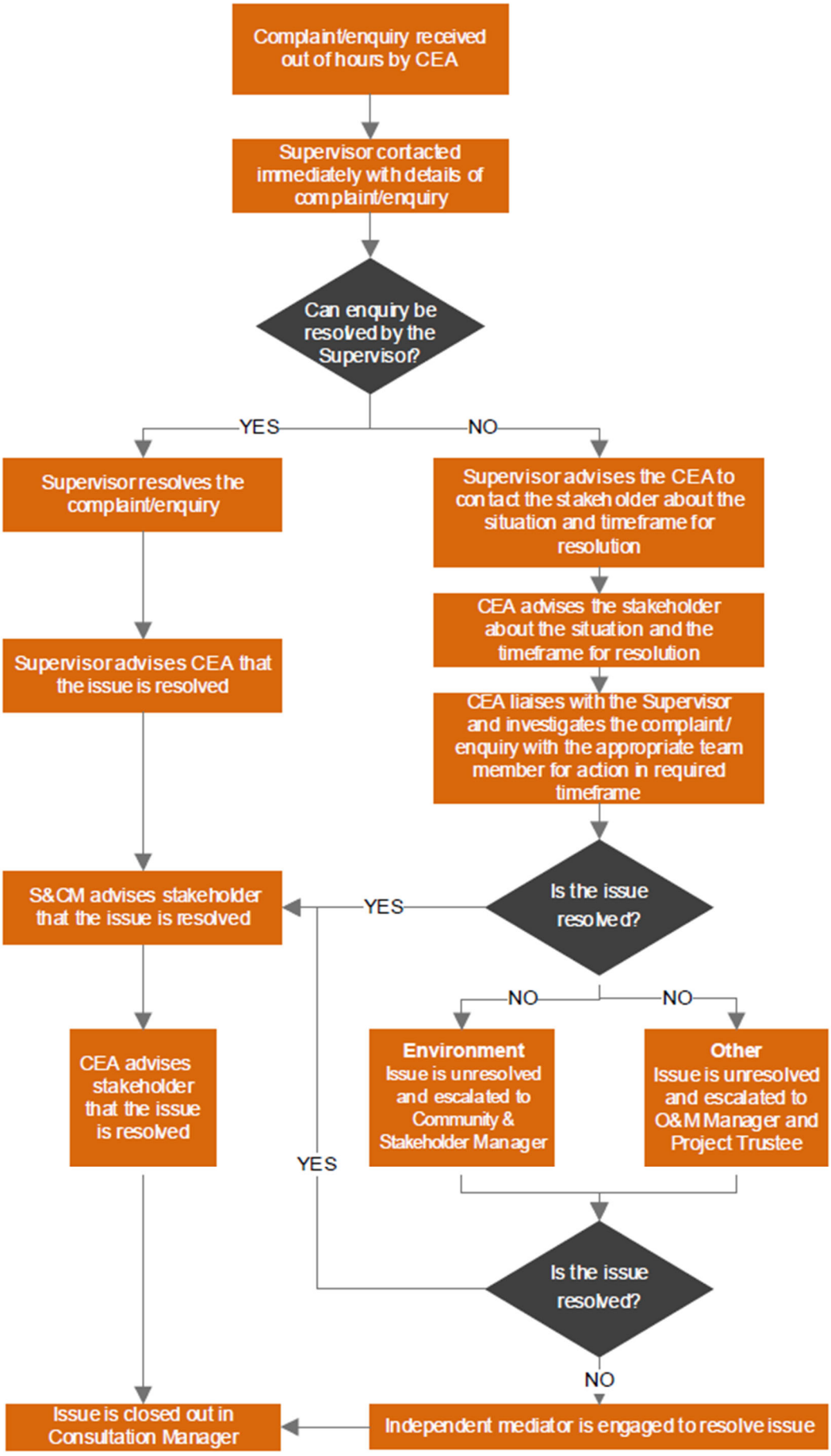


Figure 7-2: Process for enquiries and complaints received outside of business hours

7.4 Communication tools

Communication tools defined in the Project Company's Community Involvement Plan include:

- leaflets / letterbox notifications;
- advertisements;
- door knocking;
- signage;
- website updates;
- meetings; and
- 24-hour contact telephone number and email address.

7.4.1 Advertising routine operations and maintenance activities

Expected traffic delays and restrictions due to planned major operation and maintenance work will be publicly advertised through various media streams. The information to be advertised includes:

- the nature of the work;
- areas where the work is proposed;
- hours of work;
- contact information;
- changes to traffic and transport arrangements;
- how to register complaints;
- details of how to obtain further information.

The O&M Contractor must comply with the format of all written information and standard formats provided by the Project Company where appropriate.

Motorists will be informed of upcoming work and disruptions through:

- Variable message signs (VMS);
- WestConnex website;
- Livetraffic.com (http://www.livetraffic.com);
- Advertisements in newspapers and online; and / or
- Radio advertisements.

7.4.2 WestConnex website

Information relevant to the Asset is available to the public on the WestConnex website (https://www.westconnex.com.au/) including:

- information on the current implementation status of the SSI;
- the relevant approval documentation including the Project environmental impact statement (EIS), Submissions Report and modifications;
- the SSI 7485 approval;
- each relevant environmental approval, licence or permit required and obtained in relation to SSI 7485;
- each current report, plan or other document required under SSI 7485;

- details of contact point(s) to which community complaints and enquires may be directed, including a telephone number, a postal address and an email address;
- how to receive important information in the common community languages of the area; and
- Results of hourly updated real-time monitoring and relevant meteorological data in accordance with CoA E28.

7.4.3 Contact information

The relevant contact information for community complaints and enquiries is included in Table 7-2.

Table 7-2: Community contact information

Method	Information
24-hour telephone number	A permanent 24-hour contact number (Linkt 13 33 31) will be maintained, publicised and advertised on the WestConnex website, mail outs and in all publications.
Postal address	Locked Bag 3905 GPO Sydney NSW 2001
Email address	nswmotorwayenquiries@transurban.com and customerresolutions@transurban.com
Website	Project Company manages the Asset website (https://www.westconnex.com.au/). The website will be routinely and regularly updated to include: • The latest OEMP and sub-plans • EIS, Submissions report and Modification reports • Information on the current implementation status • Environmental approval, licences or permits required • Conditions of Approval and any future modifications • Tolling queries • Scheduled operations and maintenance activities • The outcome of compliance tracking • Complaints handling details • Contact details • Traffic management and patronage • Other relevant community information.

7.4.4 Media protocol

O&M personnel will adhere to the following media communication protocol:

- Media enquiries will be directed to the Project Company Representative;
- No O&M personnel will be authorised to make a public statement without consulting with the Project Company Representative;
- Media will not be permitted onsite without Project Company approval;
- All O&M personnel will be made aware the media protocol in their induction training.

7.5 Air Quality Community Consultative Committee

The Air Quality Community Consultative Committee (AQCCC) has been established in accordance with CoA E2. The AQCCC consists of representatives from TfNSW, the Project Company, relevant councils and the local community.

The AQCCC reviews and provides advice on the following, as they relate to air quality:

- location of the air quality monitoring station required under CoA E24, and the length of time during which monitoring is required;
- this OEMP and sub-plans;
- other operation stage documents;
- compliance tracking reports;
- the proposed air quality auditor(s) for the Asset, audit reports; and
- complaints received.

The AQCCC may also provide advice on the dissemination of monitoring results and other information on air quality issues. This OEMP will be updated, if required, in accordance with Section 1.3 of this plan to consider AQCCC advice on the availability of monitoring results or other air quality related information.

The AQCCC will provide advice for up to two (2) years after commencement of operation, or as otherwise approved or directed by the Secretary, in consultation with the Chair.

The AQCCC will:

(a) be comprised of –

  i. two representatives from the Proponent and tunnel operator,

  ii. one representative from each of the relevant councils, whose attendance is only required when considering matters relevant to their respective local government area,

  iii. three representatives from each local community adjacent to each ventilation facility whose attendance is only required when considering matters relevant to their respective local area, and whose appointment has been approved by an expression of interest process conducted by the Proponent in consultation with the Secretary, and

  iv. a Chair who is an independent from the design and construction of the CSSI put forward by the Proponent and approved by the Secretary;

(b) meet at least four (4) times a year, or as otherwise agreed by the Chair and the Secretary;

(c) review and provide advice on the location of the air quality monitoring stations required under Condition E24, operation environmental management plans and other operation stage documents, compliance tracking reporting, audit reports, or complaints as they relate to air quality; and

(d) provide advice on the dissemination of monitoring results and other information on air quality issues.

8 Risks, incidents and emergencies

This section covers the processes used to identify, monitor and manage risks, incidents and emergencies.

8.1 Environmental risk analysis

The typical inherent environmental risks associated with the Asset's operational key environmental performance issues are identified in **Error! Reference source not found.**. The environmental risk analysis adopts the methods included in Australian Standard AS ISO 31000:2009 Risk Management, Principles and Guidelines (Standards Australia, 2009) and ISO 14001:2016 Environmental Management Systems. It includes:

- Routine operational risks;
- Non-routine operational risks.

The analysis then describes the measures that serve to manage these risks and consequently the residual outcome. The OEMP and supporting sub-plans serve to introduce risk mitigation controls to reduce:

- Likelihood, such as training and awareness, as well as the assignment of roles and responsibilities;
- Magnitude, such as water quality detention basin maintenance.

The potential consequence, likelihood and risk level were assessed using the ratings in Table 8-1, Table 8-2 and Table 8-3.

Table 8-1: Potential environmental consequence

	Insignificant	Minor	Significant	Major	Catastrophic
Environmental Consequence	No impact on or off site	On-site impact requiring routing internal remediation	Off-site impact requiring internal remediation OR on-site impact requiring substantial internal remediation	Impact on- or off-site requiring specialist external remediation	Impact on- or off-site with long term effect OR requiring immediate external response

Table 8-2: Potential environmental likelihood level

	Almost certain	Likely	Possible	Unlikely	Rare
Potential Likelihood Level	The potential consequence is expected to occur in most circumstances	The potential consequence will probably occur in most circumstances	The potential consequence is expected to occur at some time	The potential consequence could occur at some time	The potential consequence may occur in exceptional circumstances

Table 8-3: Environmental risk rating

		Potential Consequence level				
		Insignificant	Minor	Significant	Major	Catastrophic
Potential likelihood level	Almost certain	Medium 11	High 16	High 20	Extreme 23	Extreme 25
	Likely	Medium 7	Medium 12	High 17	High 21	Extreme 24
	Possible	Low 4	Medium 8	Medium 13	High 18	High 22
	Unlikely	Low 2	Low 5	Medium 9	Medium 14	High 19
	Rare	Low 1	Low 3	Low 6	Medium 10	Medium 15

8.1.1 Continual improvement

The Project Company will ensure an asset risk register with environmental risks or a dedicated environmental risk register which will be reviewed, and upgraded if required following an incident, emergency, change in legislation, change in operating and maintenance procedures/activities, audit findings, non-compliance, continual improvement measures or otherwise annually. New, atypical, non-routine or major environmental risks will be included and assessed under environmental risk analysis.

Where additional key environmental impacts are identified through this process, an appropriately detailed assessment of key environmental impact will be undertaken.

The O&M Contractor's QSE Manager will be responsible for maintaining and reviewing the environmental risk analysis process and environmental risk register, with input from Project Company.

8.1.2 Risk identification

Environmental risks may be identified through:

- Site audits;
- Reporting checks and audits;
- On-the-job observations;
- Site meetings;
- Toolbox talks;
- Investigations into an actual or potential breaches of the CoA and/or this OEMP;
- Corrective actions;
- Regular reviews of the O&M Contractor's environmental management system;

- Continuous improvement measures.

8.2 Incident and emergency management

8.2.1 Definition of emergency

An ‘emergency’ is required to be defined in this OEMP as it applies to conditions E7, E8, E9 and E142. Relevant conditions are listed in Table 8-4.

Table 8-4: CoA relevant to the definition of an ‘emergency’

CoA	Requirement
E7	Conditions E2A, E3, E4, E5, and E6 do not apply in an emergency, as defined in the OEMP required by Condition D1.
E8	The Proponent must, as soon as reasonably practicable, notify the Secretary and the EPA of any discharge during an emergency.
E9	The tunnel ventilation systems must be designed, constructed and operated so as to only release emissions from ventilation outlets and not from the portals or the tunnel support facilities as identified in the documents listed in Condition A1, except for emergency smoke management purposes in the event of a fire in a tunnel or periodic testing of the system as defined in the OEMP required by Condition D1.
E142	Prior to operation, the Proponent must prepare an Emergency Response Plan, in consultation with FRNSW and NSW Police Force. The Emergency Response Plan must include, but not be limited to: (a) protocols and procedures to be followed during emergency situations associated with the operation of the project (including fires, explosions and, for the purposes of this condition, vehicle collisions). The protocols and procedures are to take into account the needs of people with a disability or who may experience access problems in emergency situations; (b) details of traffic management measures to be implemented during emergencies, where appropriate, to minimise the potential for escalation of the emergency; (c) design and management measures for containment of contaminated fire-fighting water, fuel spills and gaseous combustion products; (d) details of a training and testing program to ensure that – (i) all operational staff familiar with the Emergency Response Plan, and (ii) coordination with FRNSW and NSW Police is regularly exercised; and (e) provision for a simulated emergency response exercise, including the Proponent, FRNSW and NSW Police, to be conducted in accordance with the approved Emergence Response Plan on at least one occasion prior to the opening of the tunnel to traffic. The time for the exercise is to be agreed by the participants

The definition of an emergency for each of the above conditions is included in Table 8-5.

Table 8-5: Definition of 'emergency' by relevant CoA

CoA	Definition of the ‘emergency’ for each condition
E7 E8	An emergency discharge is an emission from the ventilation system that is caused by an incident or set of circumstances which does not ordinarily occur in the everyday use of the tunnel and is beyond: • Merely heavy traffic or congestion, or • The capacity of the tunnel operator to control or to have prevented by taking steps which a prudent, experience and competent operator would have taken. Conditions E2, E3, E4, E9 and E14 do not apply in the event of this emergency.
E9	An emergency smoke management purpose is what is reasonably necessary to manage smoke in response to a fire occurring in the tunnel, including in accordance with instructions given by NSW Emergency Services. An emergency smoke management purpose may also occur during a simulated emergency response exercise as referred to in the Emergency Response Plan required under condition E142 (e) of the approval.

CoA	Definition of the 'emergency' for each condition
	Periodic testing of the ventilation system is outlined within the OAQMP.
E142	An emergency to which the Plan applies is an out-of-the-ordinary event, or set of circumstances that causes or threatens to cause harm to the safety or well-being of the community, employees, or users of the Motorway or associated assets. It requires a coordinated response from NSW Emergency Services and the Tunnel Operator.

An emergency may require a coordinated response from relevant authorities, Emergency Services, O&M Contractor and Project Company.

Upon declaration of an emergency, the Operator will implement the relevant emergency or incident management plans and key O&M Contractor staff will form an emergency management team (EMT). The EMT will coordinate the O&M Contractor's response to best assist the Project Company's Crisis Management Team and Emergency Services in managing the event.

In relation to condition E9, all reasonable attempts have been made to avoid portal emissions during normal operations and during foreseeable incident conditions. The ventilation system has significant capacity to manage a broad range of Asset emergencies (as defined in Table 8-5), however, there may be cases whereby portal emissions will be necessary to protect occupants inside of the tunnel. Based on the capacity of the ventilation system, these cases will be infrequent.

8.2.2 Directing and stopping work

All management roles in the organisation charts provided in Section 3.4 have the responsibility to stop works in instances where there is likely to be an unacceptable environmental impact. The Project Company Representative and O&M Contractor roles are the key contacts with full authority over the works.

The O&M Contractor's Operation Manager will be available 24 hours a day, 7 days a week and has authority to stop or direct works.

8.2.3 Emergency Response Plan

An Emergency Response Plan has been prepared in consultation with Fire & Rescue NSW and NSW Police Force. The Emergency Response Plan consists of a number of O&M Contractor documents including an Incident Response Plan, safety plans, and emergency and evacuation plans.

These documents contain:

- protocols and procedures to be followed during emergency situations associated with the operation of the Asset (including fires, explosions and, for the purposes of this condition, vehicle collisions). The protocols and procedures are to take into account the needs of people with a disability or who may experience access problems in emergency situations;
- details of traffic management measures to be implemented during emergencies, where appropriate, to minimise the potential for escalation of the emergency;
- design and 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;
- training and testing programs for all operational staff;
- details of simulated emergency response exercises including the O&M Contractor, Project Company, NSW Police and NSW Fire & Rescue.

Prior to the opening of the tunnel to traffic, in accordance with CoA E142, a simulated emergency response exercise, including the Proponent, FRNSW and NSW Police, will be conducted in accordance with the approved Emergence Response Plan on at least one occasion. The time for the exercise is to be agreed by the participants.

In the event of a flooding emergency, which causes or is expected to cause major road closures which potentially impacting on the ability of Emergency Services to respond and to evacuate people, the project will notify the NSW State Emergency Service, along with our emergency services.

8.2.4 Environmental incidents, notifications and reporting

The O&M Contractor operates under an environmental incident management procedure (refer to Annexure D) that will apply to the operational Asset. The O&M Contractor must include elements of this environmental incident procedure into its EMS.

Notification to EPA and other agencies

The Project Company Representative will notify the Environment Protection Authority (EPA) in relation to any pollution incident in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act). The Secretary shall be provided with a record of any such pollution incident notification in accordance with CoA A43.

Notification to the Secretary, DPE

In accordance with CoA A40, the Project Company Representative, must notify the Secretary as soon as possible and in any event within 24 hours of any incident (include wording straight out of A40) that causes, or threatens to cause, material harm (as defined by SSI 7485) to the environment, community or any member of the community, being actual or potential harm to the health or safety of human beings or to threatened species, endangered ecological communities or ecosystems that is not trivial.

Notification of an incident under Condition A40 of this approval must include the time and date of the incident, details of the incident and must identify any consequent non-compliance with this approval.

Incident reporting

The Project Company and O&M Contractor will meet the requirements of the Secretary or relevant public authority (as determined by the Secretary), to address the cause of impact of any incident associated with the operation and maintenance of the Asset.

9 Managing and monitoring performance

This section addresses ongoing inspection and monitoring requirements, reporting obligations, non-conformance reporting, subcontractor requirements and operational audits of the OEMP. Project Company will remain responsible for managing and monitoring performance against the OEMP. The O&M Contractor will implement monitoring activities including inspections and will provide feedback to Project Company.

9.1 Environmental inspections

Environmental inspections of the operational Asset will be conducted in accordance with the requirements of the O&M Contractor's EMS to evaluate the effectiveness of environmental controls. Inspections will be scheduled in the EMS and will consider high risk activities. Inspections may include:

- works in environmentally sensitive areas
- issues such as spills, graffiti, vandalism and dust generation
- waste management, including illegal dumping, litter, contamination of waste streams, system capacity
- plant and equipment operations
- evaluation of sub-contractor management controls.

9.2 Operational performance monitoring

Monitoring will be undertaken to validate and confirm the operational impact of the Asset on the environment. This monitoring will extend to the effectiveness of the installed environmental mitigation controls, such as the water quality basins.

Monitoring to be undertaken during operations of the Asset is identified in Table 9-1. Monitoring requirements are addressed within specific programs or plans as identified in the final column.

Table 9-1: Operational performance monitoring

CoA	Monitoring	Implementation	Where addressed
D8	Surface water and groundwater monitoring required at specific locations and frequency that are representative of the potential extent of impacts from the project.	Annexure G	Water quality plan and monitoring program
E19A	Monitor pollutants from the ventilation outlets.	Pollutants from the ventilation outlets are measured at differing times such as continuous, quarterly and annual. This is dependent on the parameter being monitored.	Operational Air Quality Management Plan
E20	Monitor pollutants within the tunnel	In-tunnel monitoring will be continuous, with monitoring undertaken on CO, NO_2 and visibility.	Operational Air Quality Management Plan
E24	Monitor pollutants associated with ambient air quality.	Ambient air quality monitoring will be continuous. Monitoring will be undertaken for the following: • NO • NO_2 • NO_x • PM_{10} • $PM_{2.5}$	Operational Air Quality Management Plan

CoA	Monitoring	Implementation	Where addressed
		• CO • Wind speed @ 10m • Wind direction @ 10m • Sigma Theta @ 10m • Temperature @ 2m • Temperature @ 10m	
E95	Monitor operational noise and vibration to compare actual noise and vibration performance of the project against the noise performance predicted in the Operational Noise and Vibration Review, as detailed in Section 5.5.4 of this Plan.	Noise modelling was undertaken to provide predictions of the operational noise impacts. During operation monitoring will occur at similar locations, where possible, to compare outputs.	Operational Noise and Vibration Compliance Report

9.3 Operational audits

9.3.1 Routine audit schedule

Environmental audits will be conducted at regular intervals to operation of the Asset to evaluate compliance and identify opportunities for improvement. An audit schedule is included in Table 9-2.

Table 9-2: Audit schedule

Audit	Details	Timing	Responsibility	Recipient of the audit report
Internal audit	Compliance with approval and legal requirements, Roads and Maritime specifications, OEMP	6 monthly, or in accordance with the EMS schedule	O&M Contractor: suitably qualified and experienced internal member not directly associated with the O&M Services	O&M Contractor Project Company
CoA A36 Environment Audit Program Audit	Audits in accordance with Compliance Tracking and Environmental Audit Program RIC-JHC-PRG-00-PL-250-001	Annual	O&M Contractor to engage independent external auditor	DPE O&M Contractor Project Company
External audit	Compliance with EMS (ISO 14001) in accordance with environmental management system requirements	6 monthly, or in accordance with the EMS schedule*	O&M Contractor to engage independent external auditor	O&M Contractor Project Company

Additional audit requirements identified in the CoA are summarised in Table 9-3. The document in which the requirement is addressed is included in the final column.

Table 9-3: Additional audit requirements identified in the CoA

CoA	Audit details	Recipient of the audit report	Implementation
A38	Environmental Audit Program must be implemented and complied with for the duration of operation.	The Proponent must submit a copy of the audit report to the Secretary	Compliance Tracking and Environmental Audit Program
E19A	Ventilation outlet monitoring equipment must be independently verified prior to its commencement of monitoring. Auditing is to be undertaken by an independent auditor.	N/A	Operational Air Quality Management Plan
E22	All sampling points and visibility monitoring points must be audited prior to commencing monitoring, for compliance with the requirements set out in Conditions E3, E4, E5 and E20. Verification and compliance auditing is to be undertaken by an independent person(s) or organisation(s) whose appointment has been approved by the Secretary. The independent person(s) must be a Chartered Professional Engineer (either Mechanical, Chemical or Control Systems engineer).	N/A	Operational Air Quality Management Plan
E36	Continuous emissions monitoring systems installed and operated as required by CoA E21 must undergo relative accuracy test audits at an interval not exceeding 12 months, or as otherwise agreed to by the Secretary.	N/A	Operational Air Quality Management Plan
E37	Conduct an audit of the air quality monitoring (in tunnel and ambient) at six-monthly intervals.	All audit data will be available for inspection by the Secretary, upon request. A copy of the audit report must be issued to the Proponent and AQCCC.	Operational Air Quality Management Plan
E64	Traffic mitigation measures recommended as part of the Road Network Performance Review Plan would be subject to independent road safety audits.	N/A	Operational Road Network Performance Review

9.4 Operational reviews and checks

Operational reviews and other maintenance / checks or tests will be conducted as required during the operation of the Asset. Reviews identified in the CoA are summarised in Table 9-4. The document in which the requirement is addressed is included in the final column.

Table 9-4: Review requirements identified in the CoA

CoA	Audit details	Frequency / Timing	Recipient of the review report	Implementation
E64	An Operational Road Network Performance Review will be prepared. The Review will address road network performance and review the performance of the CSSI on the adjoining road network. The Review will confirm the adequacy of the mitigation measures identified in the Road Network Performance Plan required under Condition E63. The Review will be undertaken in consultation with Transport for NSW and relevant council(s) and be completed	Within 12 months and 5 years after the commencement of operation of the full CSSI (of the mainline tunnels and Rozelle Interchange).	The Secretary within 60 days of its completion.	Road Network Performance Review Plan

CoA	Audit details	Frequency / Timing	Recipient of the review report	Implementation
	within six (6) months of the review timeframes. The Review will be provided to the Secretary within 60 days of its completion. Further mitigation measures, if required, will be included in the Review. Transport for NSW is responsible for the implementation of the identified measures. Note: Identified mitigation measures may need to be further assessed under the Environmental Planning and Assessment Act, 1979. Works will need to meet relevant design standards and to subject to independent road safety audits.			
E94A	Within three months of commencement of operation of the high voltage regulators at Iron Cove, the Proponent must undertake noise monitoring to compare the actual noise level emitted by the regulators to the noise performance at sensitive receivers as predicted in the document WestConnex M4-M5 Link Rozelle Interchange Iron Cove Ventilation Underground Modification Report (dated November 2019) and project-specific noise level as determined in accordance with the NSW Industrial Noise Policy (EPA, 2000). Monitoring must capture the onload tap changer noise and peak loading. A report detailing the noise monitoring results must be provided to the Secretary for information within one month of undertaking the monitoring. If the noise level at the nearest sensitive receiver exceeds either the predicted noise level or project-specific noise level, then the Proponent must implement noise reduction measures within six months of when the noise monitoring was undertaken.	Within three months of commencement of operation of the high voltage regulators at Iron Cove.	A report detailing the noise monitoring results must be provided to the Secretary for information within one month of undertaking the monitoring.	OEMP Section 5.5.3
E144	Hazard Reviews detailing all hazardous incidents that have occurred during the preceding review period, identify safety measures required to rectify those incidents, and address any ongoing issues.	For the first 5 years of operation: • first 3 months of operation • subsequent 9 months Thereafter 12 month intervals. Additionally, FRNSW may also direct the Proponent to undertake a Hazard Review following any major incident in the tunnel.	FRNSW	O&M Manual
E145	A Hazard Review Report, outlining the results of the Hazard Review, and any proposed additional safety measure(s) to be implemented in response to the findings of the Hazard Review, must be	One month after the E144 Hazard Review	FRNSW	Findings of Hazard Reviews

CoA	Audit details	Frequency / Timing	Recipient of the review report	Implementation
	submitted to FRNSW no later than one (1) month after the review period. The Proponent must respond in writing to any recommendation made by FRNSW in relation to the findings of a Hazard Review, within such time as may be agreed to by FRNSW.			
E150	Annual maintenance testing of fire and life safety systems. Results of maintenance testing will be made available to FRNSW for review, and the Proponent must respond in writing to any recommendations from FRNSW to ensure the reliability of the fire and life safety systems.	Annual, or any other interval as required by the design engineer and to the satisfaction of FRNSW	FRNSW	O&M Manual

9.5 Periodic Testing

In accordance with CoA E9, the operation of the tunnel ventilation system is to avoid emissions of tunnel air from the portals and/ or the tunnel support facilities. Portal emissions are prohibited, except for the following circumstances:

- Emergency smoke management purposes in the event of a fire in the tunnel;
- Period testing.

Periodic testing may include, but not be limited to testing during commissioning; replacement, repair and testing of faulty ventilation equipment; and routine testing and maintenance periods. Further detail on periodic testing is outlined in Section 5.11.

9.6 Compliance tracking

The CTEAP prepared to support design and construction was submitted for information to DPE on 23 May 2019. It described how the requirements of CoA A27 and A36 will be met. It also identifies the frequency for the compliance reporting and independent auditing. The Project Company will use this CTEAP during this Asset's operation. The CTP contains:

- Provisions for:
  - Notifying DPE before the Asset is operational;
  - Periodic compliance reviews against the CoA and REMMs;
  - Periodic reporting to DPE including a pre-operation compliance report;
  - All employees, contractors and sub-contractors to be aware and comply with the relevant CoA relating to their respective roles and responsibilities;
- An independent environmental auditing program;
- Procedures for rectifying any non-compliance identified during environmental auditing.

The CTEAP will operate for at least 24 months following the commencement of operation.

9.7 Reporting to Department of Planning and Environment

Table 9-5 lists the DPE reporting requirements relevant to the operation of the Asset and this OEMP.

Table 9-5: DPE reporting requirements

Document (CoA ref)	Details / timing
Revised Staging Report (CoA A16)	One month prior to proposed change in the staging during operation.
Compliance tracking program (CoA A27/A28): notification	Notification to the Secretary prior to the commencement of operation and operate for a minimum of 12 months.
Independent environmental audit report (CoA A39): submission	Independent Environmental Audit report (and responses to recommendations) to be provided to the Secretary within six (6) weeks of completing the audit.
Incident notification (CoA A40): notification and submission	Notification as soon as possible and in any event within 24 hours of any incident, as detailed in Section 8.2.4.
EPA notification (CoA A43): notification	Following any EPA notification, provide DPE with record of such notification within 24 hours.
OEMP (CoA D1): submission	The OEMP must be submitted to DPE no later than one month prior to commencement of operation
OEMP (CoA D6): submission	The OEMP must be submitted to DPE no later than one month prior to commencement of operation
Groundwater monitoring review (CoA D12)	At least one (1) month prior to the end of the five (5) year monitoring period. The Proponent must notify the Secretary within two (2) weeks of the review as to the outcomes of the review and any requirements for future monitoring.
Operational monitoring programs (CoA D14): submission	The Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation
Groundwater and surface water quality plan and monitoring program (CoA D17): submission	Summary report of water monitoring data to be provided to DPE, EPA and relevant councils.
Road Network Performance Review (CoA E64): submission	At both 12 months and 5 years after commencement of operation the plan must be prepared. Within 60 days of its completion, the plan must be submitted to the Secretary, Transport for NSW and to relevant councils, and made publicly available.
Operational Noise and Vibration Compliance Report (CoA E95): submission	The Operational Noise and Vibration Compliance Report will be submitted to the Secretary and the EPA within 60 days of completing the operational noise monitoring (undertaken within 12 months of commencement of operation), as detailed in Section 5.5.4 of this Plan.
Flood Review Report(s) (CoA E153): submission	The Flood Review Report(s) will be submitted to the Secretary and the relevant council(s) within one (1) month of finalising the report(s). Refer to Section 5.16.

9.8 Non-conformity, correction and preventative actions

A non-conformance is a failure to comply with a requirement, standard or procedure such as the Conditions of Approval, this OEMP or associated documents. Environmental non-conformances may be identified through regular inspections, monitoring, audits, complaints, observations or through incident management. They may be identified by the O&M Contractor, the Project Company and/or a public authority.

Environmental incident reports will be used to record non-conformances.

Following the identification of a non-conformance, corrective actions will be identified and determined by the relevant manager and will reflect the nature and scale of the incident and whether it presents and material risk to human health, the environment or property.

Corrective actions will be preventative-based, where possible. They will be implemented, monitored, checked and reviewed. The corrective action process is summarised as:

- O&M Contractor's QSE Manager to be made aware of the non-conformance;

- O&M Contractor's QSE Manager to prepare an environmental incident report and/or environmental improvement notice;
- O&M Contractor's QSE Manager (or relevant manager) to assign corrective actions and responsibility to specific O&M personnel(s) including timeframes, follow-up dates, and close-out expectations;
- Close-out the action, following monitoring, and follow-up observation that the non-conformance and associated risks have been removed or appropriately managed to limit the potential for material harm as far as is reasonably feasible and reasonable.

10 OEMP review and records management

10.1 OEMP review

The OEMP and sub plans will be checked, reviewed and updated annually or as required if there is a significant change in operations, maintenance, organisational structure, reporting lines or legislation. The review will ensure that identified issues and corrective actions are being appropriately managed and reported. The review will be conducted by the QSE Manager and will include relevant O&M personnel who may include:

- O&M Contractor's O&M Manager;
- O&M Contractor's Quality, Safety & Environment Manager;
- Project Company Representative;
- O&M Contractor's Operations Manager.

As a minimum, the review will consider:

- Changes to the environment or generally accepted environmental management practices;
- Opportunities to improve environmental management processes and practices;
- Feedback, comments, actions and communications provided by Government agencies, regulators, and independent specialists;
- Audit findings;
- Environmental monitoring outcomes;
- Incidents and non-conformances;
- Environmental risks, including any new or additional (type or volume) of hazardous substances or contamination;
- Community feedback, including trends and persistent issues;
- Organisational structure changes;
- Role and responsibility changes;
- Operations and maintenance responsibility changes;
- Legislative and regulatory changes.

A summary of the OEMP management review will be provided to the Project Company. Any required updates to the OEMP will be undertaken in accordance with Section 1.3 of this OEMP. Changes to the OEMP will be communicated by the Project Company Representative using either management meetings for non-critical updates or through formal communication (e.g. email, other transmittal) for critical and essential updates.

10.2 Records management

The O&M Contractor's QSE Manager will be responsible for all environmental records and information relating to this OEMP, including the resources and training needed to maintain:

- The OEMP and sub plans
- Monitoring data, inspections and corrective actions
- Audit reports and corrective actions
- Environmental incident reports and notifications
- Internal and external communications
- Training and induction records
- Operations and maintenance activities
- Complaints Compliance tracking
- Subcontractor monitoring and performance

- Waste management records
- Greenhouse gas emissions
- Meeting minutes
- Monitoring environmental planning obligations
- Agency, regulatory, Governmental and Roads and Maritime correspondence.
- Climate change and energy use records

All environmental management documents will be subject to ongoing review, revision and continual improvement. This includes changes to scheduled activities and legislative and licencing requirements.

Records will be held for 10 years. Roads and Maritime, the DPE and key Government agencies will have access to all records upon request. Records will be managed in accordance with Project Company's record management system.

10.3 Document control

OEMP and sub plan preparation, distribution and review will be led by the O&M Contractor's QSE Manager. During the Asset's operation, the environmental documentation will be stored in the O&M Contractor's integrated management system.

A document control procedure will manage the flow of information between internal and external parties in line with the communication requirements in Section 7. This procedure will identify measures to ensure that documents are:

- Developed, reviewed and approved before being issued;
- Issued for use;
- Controlled and stored for 10 years, or the current prevailing legal requirements;
- Removed when superseded or updated.

A distribution list will identify the current version of each document, report and/or data.

Annexure A Compliance table for DIPNR, 2004

Guidelines for the preparation of Environmental Management Plans (DIPNR, 2004)

EMP guideline section		Document reference
Background		
	Introduction Location Operation and maintenance activities Timing and schedule	Section 1 Section 2.1; Figure 2-1 Section 3.1 Section 3.2
	Project description	Section 2
	EMP context	Section 1.2, Section 5.1
	EMP objectives	Section 1.2
	Environmental Policy	Section 5.2, Annexure A
Environmental Management		
	Environmental management structure and responsibility	Sections 5.4 to 5.19
	Approval and licensing requirements	Section 4
	Reporting	Sections 9.2 to 9.7
	Environmental training	Section 6
	Emergency contacts and responses	Section 8.2; Annexure E
Implementation		
	Risk assessment	Section 8.1, **Error! Reference source not found.**
	Environmental management activities and controls	Issue-specific strategies and sub-plans
	Environmental control plans or maps	
	Environmental schedules	Environmental schedules (e.g. site inspection checklists, environmental incident reports, waste register) will be included in issue-specific sub-plans, where appropriate, or will be retained on the project's document management system.
Monitor and review		
	Environmental monitoring	Section 9.2; issue-specific environmental strategies and sub-plans
	Environmental auditing	Section 9.3
	Corrective actions	Section 9.8
	EMP review	Section 10.1

Annexure B Environment and sustainability policy

Transport for NSW Environment and Sustainability Policy:

https://www.transport.nsw.gov.au/system/files/media/documents/2020/transport-environment-and-sustainability-policy_0.pdf

Transurban Sustainability Policy:

https://www.transurban.com/content/dam/transurban-pdfs/02/corporate-governance/Sustainability-Policy.pdf

Transurban Health Safety and Environment Policy:

https://www.transurban.com/content/dam/transurban-pdfs/02/corporate-governance/HSE_Policy.pdf

Annexure C Environmental control maps

Available on request.

Annexure D Environmental incident procedure

Transport for NSW Environmental Incident Procedure:

https://roads-waterways.transport.nsw.gov.au/documents/about/access-to-information/tfnsw-ems-tp-07.pdf

Annexure E Environmental contacts

Emergency contacts will be available to be contacted by the EPA and Project Company on a 24 hour basis.

Title	Name	Phone number
O&M Contractor project representatives		
Operation and Maintenance Manager	To be provided prior to commencement of operation	To be provided prior to commencement of operation
QSE/ICMS Manager	To be provided prior to commencement of operation	To be provided prior to commencement of operation
Motorway Operations Centre	Motorway Controller on duty	To be provided prior to commencement of operation
Project Company representatives		
Project Company Project Representative		
External parties		
Fire and Rescue NSW	N/A	000 (emergency) 1300 729 579 (non-emergency)
EPA	N/A	(02) 9995 5000 131 555
Ministry of Health / Camperdown Public Health Unit	N/A	Business hours: (02) 9515 9420 After hours: (02) 9515 6111 (ask for Public Health Officer on call)
SafeWork NSW	N/A	131 050
Cumberland Council	N/A	(02) 8757 9000
Inner West Council	N/A	(02) 9392 5000
Burwood Council	N/A	(02) 9911 9911
City of Canada Bay Council	N/A	(02) 9911 6555
Strathfield Council	N/A	(02) 9748 9999
Transport Management Centre	N/A	(02) 8396 1400

Annexure F Operational Water Management Plan

WestConnex
Rozelle Interchange

JOHN HOLLAND | CPB CONTRACTORS

Operational Water Management Plan

RIC-JHC-PLN-00-PL-000-007

Project:	Rozelle Interchange
Document Number:	RIC-JHC-PLN-00-PL-000-007
Revision Date:	03/08/2023

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
A	09/11/2022	JHCPB JV	JHCPB ESA Manager	Draft for internal review
B	28/11/2022	JHCPB JV	JHCPB ESA Manager	Issue to TfNSW
00	31/03/2023	JHCPB JV	JHCPB Env Manager	Addressing TfNSW comments for DPE submission
01	16/06/2023	JHCPB JV	JHCPB ESA Manager	Updated to include DPI Water recommendations
02	03/08/2023	JHCPB JV	JHCPB ESA Manager	Addressing DPE Comments

Contents

Annexures

Glossary / Abbreviations

Abbreviations	Expanded text
ASSMP	Acid Sulfate Soils Management Plan
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
Bi-monthly	Every two months
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
CFU	Colony Forming Unit
CSSI	The Critical State Significant Infrastructure, as described in Schedule 1, the carrying out of which is approved under the terms of the SSI 7485 approval
DPIE	NSW Department of Planning, Industry and Environment
DoI Water	NSW Department of Industry Water (formerly DPI Water)
DPI Water	NSW Department of Primary Industries - Water
DPIE Water	NSW Department of Planning, Industry and Environment – Water (formerly DoI Water)
EC	Electrical Conductivity
EIS	M4-M5 Link Environmental Impact Statement
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
EWMS	Environmental Work Method Statement
GDEs	Groundwater Dependent Ecosystems
GMP	Groundwater Management Plan (this document)
GWMP	Groundwater Monitoring Program
GMR	Groundwater Modelling Report
GWQ	Groundwater quality
JHCPB	John Holland CPB Contractors Joint Venture
mAHD	elevation in metres with respect to the Australian Height Datum
mBGL	metres below ground level
mTOC	metres below top of casing
m/day	metres per day
NRAR	Natural Resources Access Regulator
µS/cm	micro-Siemens per centimetre
REMM	Revised Environmental Management Measures

Abbreviations	Expanded text
Roads and Maritime	Roads and Maritime Services (now Transport for NSW)
SPIR	M4-M5 Link Submissions and Preferred Infrastructure Report
SSTV	Site Specific Trigger Value
TWG	The Water Group
TfNSW	Transport for NSW
SSWMP	Soil and Surface Water Management Sub-plan
WTP	Water Treatment Plant

1. Introduction

1.1. Context

This Operational Water Management Plan (OWMP or the Plan) and accompanying Operational Groundwater Monitoring Program (OGWMP, Annexure A) and Operational Surface Water Monitoring Program (OSWMP, Annexure B) forms part of the Operational Environmental Management Plan (OEMP) for the operation of the Rozelle Interchange (the Asset).

This Plan has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), project approvals and all applicable guidance and legislation.

The Plan will be submitted to the Secretary for information no later than one (1) month prior the commencement of operation and will be implemented for the duration of operation. This Plan, as part of the OEMP, will be made publicly available prior to the commencement of operation.

This document acknowledges the authors of the groundwater and surface water reports for the Environmental Impact Statement (EIS) (AECOM 2017). Words have been appropriated from these documents within certain sections of this Plan, the OSWMP and OGWMP to provide continuity.

1.2. Project background

The M4-M5 Link EIS (AECOM 2017) assessed the impacts of construction and operation of the Asset on groundwater and surface water, within Chapter 19 and Appendix T (Technical working paper: Groundwater). For a detailed understanding and background of the Asset, please refer to these documents. The information provided within this plan relates only to the Asset area.

The EIS identified the potential for minor impacts on groundwater during operation typically associated with drawdown. However, it concluded any potential impacts could be managed by the standard mitigation and management measures that are described in this Plan.

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

1.3. Scope of the Sub-plan

The scope of this Plan is to describe how to manage and protect groundwater and surface water quality during operation of the Asset. This document applies to all activities associated with the operation and maintenance of the Asset. It does not address groundwater or surface water management within the construction stage of the project.

2. Purpose and Objectives

2.1. Purpose

The plan applies to all activities associated with the operation and maintenance of the Asset. The management of groundwater level, inflows, treatment and discharge, soil and subsidence, surface water quality and hydrology and stormwater management are identified within this plan. This Plan should be read in conjunction with the OEMP.

This plan will be reviewed, audited and updated in accordance with the OEMP, except where specifically identified in this Plan.

2.2. Objectives

The OWMP's Objectives are:

- Manage all activities to ensure they do not harm or impact groundwater or surface water quality
- To prevent and monitor for groundwater contamination and levels within the Asset area
- Ensure the quality of water discharged to the receiving environment meets statutory requirements and relevant objectives
- Maintain the Asset so as not to cause a flood risk.
- Ensure that the Asset's water quality and management systems and its pollution prevention infrastructure (e.g. water treatment plant) is maintained and effective

The other key objective of the Plan is to ensure all CoA, REMMs and licence / permit requirements relevant to water management are described, scheduled, and assigned responsibility as outlined in:

- All documents listed in CoA A1
- Conditions of Approval: SSI-7485,
- The Roads and Maritime Services (Roads and Maritime) Specifications G36, G38 and G40,
- The Operational Environment Protection Licence (EPL), and
- All relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3. Operation and maintenance activities

Operation and maintenance activities of the Asset that are relevant to water management are identified in Table 1.

Table 1 Activities relevant to water management

Activity
Routine operation: • Traffic operations and monitoring • Operation and monitoring of tunnel water treatment plant
Routine maintenance / repair work: • Road infrastructure maintenance and repair • Pavement renewal and resurfacing • General maintenance and repair work • Landscape management
Routine equipment maintenance: • Water treatment plant • Tolling equipment • Intelligent Transport Systems • Wetland ponds • Gross Pollution Traps (e.g. stormceptors)

Activity
Non-routine operation: • Tunnel washing • Road traffic accidents and incidents • Vehicle washing • Road maintenance plant and machinery • O&M vehicles
Non-routine maintenance and repair: • Asset damage (e.g. vehicle strike) • Major spill including clean-up • Equipment failure leading to damage, spill or an uncontrolled outcome

2.4. Potential Impacts

The highest risk of impacts on water quality during operation of the project would be associated with:

- Increased stormwater runoff and associated increases in pollutant loading from roads
- Poor maintenance of stormwater quality treatment devices
- Spills or leaks of fuels and / or oils from vehicle accidents or from operational plant and equipment
- Discharges of poorly treated tunnel wastewater (e.g., groundwater ingress, stormwater ingress, tunnel wash-down water)
- Erosion of soft landscaped areas during the vegetation establishment period
- Scour / mobilisation of contaminated sediments at potential new outlet locations (i.e., Rozelle Bay).

3. Environmental requirements

3.1. Legislation

Legislation relevant to water quality and hydrology management for the operation and maintenance of the Asset is included in Table 2.

Table 2 Legislation relevant to water management

Legislation	Relevance
General	
Protection of the Environment Operations Act 1997	Water and pollution management
Water Quality and Hydrology	
Soil Conservation Act 1938	Erosion and sediment control
Contaminated Land Management Act 1997 *National Environment Protection (Assessment of Site Contamination) Measure 1999* (April 2013), NEPC 2013, Canberra.	Contaminated land management Stockpile management Spill management
Water Management Act 2000 *Water Management Amendment Act 2014*	A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000* is not required for State significant infrastructure in accordance with the EP&A Act Section 5.23. See also Section 3.1.1
Sydney Water Act 1994	Requirement to obtain consent to discharge waste water to sewer
Pesticides Act 1999	Safe use and application of pesticides
Road and Rail (Transport) Dangerous Goods Act 1997	Safe and licensed transportation of dangerous goods
Work Health and Safety Act 2011	Storage, handling, and use of hazardous materials

3.1.1. Water Management Act 2000

The M4-M5 Link Environmental Impact Statement Appendix Technical Working Paper: Groundwater Section 9 Policy Compliance (as listed in Infrastructure Approval SSI 7485 condition A1) assessed what permits or licences may be required under the Water Management Act 2000. This assessment is reproduced below;

> The *Water Act 1912* (NSW) has been replaced by the (WM Act) and does not apply to areas of the state where water sharing plans are in place. Groundwater and surface water within the project footprint are covered by the Groundwater Metropolitan Region Groundwater Sources and the Greater Metropolitan region Unregulated River Water Sources.
>
> The AIP explains the requirements of the WM Act. It clarifies the requirements for licences for aquifer interference activities and establishes the considerations required for assessing potential impacts on key water dependent assets. Any potential impact on local aquifers would be assessed under this policy.

Under this policy, a controlled activity approval (such as a water access licence or aquifer access licence) and/or an aquifer interference approval is required under the for any activity that results in interference to an aquifer. Under section 91F of the WM Act, approval is required for aquifer interference activities. These activities include the taking of groundwater. The policy applies to all aquifer interference activities, but has been developed to address a range of high risk activities.

Road authorities including RMS are exempt (under Schedule 5, Part 1, clause 2 of the Water Management (General) Regulation 2011) from the requirement to hold a water access license to access water during the construction and operational phases including major tunnelling projects.

Schedule 5, Part 1, clause 2 of the Water Management (General) Regulation 2011 is reproduced below;

Schedule 5 Exemptions

(Clauses 18 and 39)

Part 1 Access licence exemptions

2 Roads authorities A roads authority (within the meaning of the Roads Act 1993)—in relation to water required for road construction and road maintenance.

3.2. Guidelines and standards

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

Table 3 Policies, Guidelines and Specifications

Policies, Guidelines and Specifications	Relevance
• G36: Environmental Protection (Roads and Maritime, 2017) • NSW Aquifer Interference Policy (NSW DPI – Water, 2012)	Environmental Protection
• G38: Soil and Water Management (Roads and Maritime, 2015) • Stockpile Site Management Guidelines (Roads and Maritime, 2008) • Guidelines for Bunding and Spill Management (NSW EPA, 2011) • Code of Practice for Water Management: Road Development and Management (Roads and Maritime, 1999) • Australian Standard AS 1940B:1993: The Storage and Handling of Flammables and Combustibles (Standards Australia, 1993) • Australian Standard AS 4452B:1997: The Storage and Handling of Toxic Substances (Standards Australia, 1997) • Storage and Handling Liquids: Environmental Protection: Participants Manual (NSW EPA, 2007) • Guidelines for Controlled Activities on Waterfront land (DPI, 2012) • 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	Soil and water quality management

Policies, Guidelines and Specifications	Relevance
Environment and Conservation Council, 2000) • Australian National Water Quality Management Strategy	
• 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) • NSW Floodplain Development Manual: the Management of Flood Liable Land (NSW DIPNR, 2005) • Urban Stormwater Drainage Design Guidelines in Australia: Rainfall and Runoff (the ARR Guidelines, Australian Government, Geoscience Australia, 2016).	Stormwater runoff management
• Floodplain Risk Management Guideline: Practical Consideration of Climate Change (NSW DECC, 2007) • Guidelines for watercourse crossing on waterfront land (NSW DPI – Water,2012)	Working in flood plains and over/close to watercourses
• 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,2018) • Guidelines for Construction Water Quality Monitoring (Roads and Maritime,2003) • The Blue Book: Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (Landcom, 2004)	Water quality sampling
• Guidelines for Assessment and Management of Contaminated Groundwater (DEC, 2007)	Contaminated waters and leachate management

Policies, Guidelines and Specifications	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)	
• Best Practice Guidelines for Contaminated Water Retention and Treatment • Systems (NSW Government, 1994)	Storage and treatment of firefighting Water
• Why do Fish Need to Cross the Road? Fish Passage Requirements for • Waterway Crossings (NSW DPI - Fisheries, 2005)	Safe fish passage
• Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil Management Advisory Committee, 1998) • Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998) • Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (Roads and Maritime, 2005) • Waste Classification Guidelines Part 4: Acid Sulfate Soils (EPA. 2014)	Acid sulfate soils
• Environmental Compliance Report: Liquid Chemical Storage, Handling and • Spill Management - Part B Review of Best Practice and Regulation (NSW DEC, 2005) • Storing and Handling Liquids, Environmental Protection: Participants Manual (NSW DECC, 2007) • Stormwater Exemption 2014 (NSW EPA, 2014)	Materials handling and storage, and waste 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 goods storage and handling

3.3. Minister's Conditions of Approval

The CoA relevant to this plan are listed in Table 4 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other project management documents.

Table 4: Summary of the Conditions of Approvals relevant to and addressed in this Plan.

CoA No.	Condition requirements	Document reference
D2	An OEMP is not required for the CSSI if the Proponent has an Environmental Management System(EMS) or equivalent as agreed with the Secretary, and can demonstrate, to the written satisfaction of the Secretary, that through the EMS:	An OEMP has been developed

<table>
<tr><th>CoA No.</th><th>Condition requirements</th><th>Document reference</th></tr>
<tr><td></td><td>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.</td><td></td></tr>
<tr><td>D3</td><td>Where an OEMP is required, the Proponent must include the following OEMP Sub-plans in the OEMP:
<table>
<tr><th></th><th>Required OEMP Sub-plan</th><th>Relevant authority(s) to be consulted for each OEMP Sub-plan</th></tr>
<tr><td>(a)</td><td>Groundwater management</td><td>DPI Water and Sydney Water</td></tr>
</table></td><td></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 authorities as identified in Condition D3.</td><td>This Plan addresses Condition D2 and D3, see above</td></tr>
<tr><td>D5</td><td>The OEMP Sub-plans must be submitted to the Secretary as part of the OEMP.</td><td>Section 1.1</td></tr>
<tr><td>D6</td><td>The OEMP or EMS or equivalent as agreed with the Secretary, must be submitted to the Secretary for information no later than one (1) month prior the commencement of operation.</td><td>Section 1.1</td></tr>
<tr><td>D7</td><td>The OEMP or EMS or equivalent as agreed with the Secretary, as submitted to the Secretary and amended from time to time, must be implemented for the duration of operation and the OEMP or EMS must be made publicly available prior to the commencement of operation</td><td>Section 1.1</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 operational performance against predicted performance.
<table>
<tr><td>Required Operational Monitoring Programs</td><td>Relevant authority(s) and council(s) to be consulted for each Operational Monitoring Program</td></tr>
<tr><td>(a)
Surface Water Quality Plan & Monitoring Program</td><td>EPA; DPI Water; OEH; Sydney Water; and relevant council(s)</td></tr>
<tr><td>(b)
Groundwater Monitoring Program</td><td>DPI Water, relevant council(s), EPA and Sydney Water</td></tr>
</table></td><td>Refer to Annexure A and B</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;</td><td>Refer to Annexure A and B</td></tr>
</table>

CoA No.	Condition requirements	Document reference
	(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.	
D10	The Operational Surface Water Quality Plan and Monitoring Program must address wetland and mosquito management.	Refer to Annexure B
D11	The Operational Groundwater Monitoring Program must include: (a) daily measurement of the amount of water discharged from all water treatment plants; (b) water quality testing results of the water discharged from all water treatment plants; (c) monitoring of groundwater pore pressures in the Hawkesbury Sandstone aquifers adjacent to the tunnel alignment, in consultation with DPI Water; — (d) monitoring of groundwater electrical conductivity in key locations between saline water bodies and the tunnel as identified by the project groundwater model including: (i) in the Haberfield / Lilyfield area to the south of Iron Cove, — (ii) in the Rozelle area to the north of Rozelle Bay, — (iii) in the Annandale area to the west of Rozelle Bay, — (iv) in the Rozelle area to the south east of Iron Cove, and — (v) in the St Peters area to the north west of Alexandra Canal, (e) measures to record or otherwise estimate and report groundwater inflows into the tunnels; (f) a method for providing the data collected in (a) and (b) to Sydney Water every three (3) months to demonstrate the project's compliance with the discharge criteria and, if applicable, the Proponent's trade waste licence; (g) a process for annually forwarding data on the monthly volume of groundwater discharged from each water treatment plant to DPI Water for a minimum period of five (5) years, consistent with Condition D12; (h) the installation of a minimum of two (2) groundwater open hole monitoring wells in the north Rozelle / Lilyfield area to the west of the ventilation tunnel at Iron Cove to monitor groundwater quality and groundwater levels, in consultation with DPI Water.	Refer to Annexure A

CoA No.	Condition requirements	Document reference
D12	Groundwater monitoring must continue for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, the Proponent must undertake a review of future monitoring requirements in consultation with DPI Water. The review must determine if additional monitoring is required, and the time period for continued monitoring. The Proponent must notify the Secretary within two (2) weeks of the review as to the outcomes of the review and any requirements for future monitoring.	Section 3.4 Section 2.3 of the GWMP (Annexure A)
D13	The Operational Monitoring Programs must be developed in consultation with relevant authorities as identified in Condition D8 of this approval.	Annexure A and B
D14	The Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation.	Annexure A and B
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.	Annexure B and C
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.	Annexure B and C
D17	The results of the Operational Monitoring Programs must be submitted to the Secretary, and relevant regulatory authorities, for information in the form of an Operational Monitoring Report at the frequency identified in the relevant Operational Monitoring Program.	Annexure B and C
D18	Where a relevant OEMP Sub-plan exists, the relevant Operational Monitoring Program may be incorporated into that OEMP Sub-plan.	Refer to Annexure A and Annexure B
E142	Prior to operation, the Proponent must prepare an Emergency Response Plan, in consultation with FRNSW and NSW Police Force The Emergency Response Plan must include, but not be limited to: …….. (c) design and management measures for containment of contaminated fire-fighting water, fuel spills and gaseous combustion products;	Section 8.2.3 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	Section 7.1

CoA No.	Condition requirements	Document reference
	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.	
E190	The Proponent must take all practicable measures to limit operational groundwater inflows into each tunnel to no greater than one litre per second across any given kilometre (1L/s/km). Compliance with this condition cannot be determined by averaging groundwater inflows across the length of the tunnel.	Section 7.2
E191	The Proponent must identify and commit to the implementation of 'make good' provisions for groundwater users in the event of a decline in water supply levels, quality and quantity from registered existing bores associated with groundwater changes from either construction and/or ongoing operational dewatering caused by the CSSI	Section 5.1.3
E195	The Proponent must undertake further hydrological and hydraulic modelling based on the detailed design of the CSSI to determine the ability of the receiving drainage systems to effectively convey pavement drainage from the CSSI and include wastewater flows from operational water treatment plants where it is proposed to discharge these flows to the receiving drainage systems. The modelling must be undertaken in consultation with the relevant council(s) and Sydney Water and the outcomes documented in the Stormwater Drainage Report required under Condition E196.	Stormwater and Drainage Report
E196	The Stormwater Drainage Report must be prepared at least one (1) month prior to the commencement of any new drainage works, modifications or connections to existing drainage works, construction of hard surfaces that are associated with the operation of the project and would result in runoff to existing stormwater drainage systems, and the discharge of wastewater flows from operational water treatment plants to existing stormwater drainage systems. The Stormwater Drainage Report must: (a) assess the potential impacts of pavement drainage discharges from the CSSI drainage systems and wastewater flows from operational water treatment plants on the receiving environment and capacity of council or Sydney Water drainage infrastructure. (b) identify all mitigation measures to be implemented where pavement drainage from the CSSI drainage systems or wastewater flows from operational water treatment plants are predicted to adversely impact on the receiving environment or capacity of council or Sydney Water drainage infrastructure; and (c) set out a clear time frame for the implementation of mitigation measures. Nothing in this condition prevents the Proponent from preparing separate Stormwater Drainage Reports for pavement discharges or wastewater discharges from operational water treatment plants to the drainage system provided that each report is prepared at least one month prior to the subject works/discharges commencing.	Stormwater and Drainage Report

CoA No.	Condition requirements	Document reference
E198	The Proponent must prepare a Water Reuse Strategy which sets out options for the reuse of collected stormwater and groundwater during construction and operation of the CSSI. The Water Reuse Strategy must include, but not be limited to: (a) evaluation of reuse options; (b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required; and (c) a time frame for the implementation of the preferred reuse option(s). The Water Reuse Strategy must consider public health risks from water recycling and must be managed to avoid misuse of recycled water as potable water. The Water Reuse Strategy must be undertaken following best practice and advice from sought from relevant agencies as required. Justification must be provided in the event that it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be submitted to the Secretary for approval prior to commencement of tunnelling works. Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction and operational phases of the CSSI. Where a separate Strategy is prepared for the operation of the CSSI, this must be submitted to the Secretary for approval at least six (6) months prior to the commencement of operation of the CSSI.	Operational Water Reuse Strategy

3.4. Revised Environmental Management Measures

The revised environmental management measures (REMMs) included in the M4-M5 Link Submissions Report that are relevant to the management of water during the operations and maintenance of the Asset are included in Table 5.

Table 5 REMM relevant to operational water management

REMM	Relevant Requirement	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 treatments will be supported by MUSIC modelling and water sensitive urban design principles.	Section 6.5 discuss the MUSIC modelling and Section 7.4 discusses the stormwater treatment devices Section 7.1.1 discusses the wetlands
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	Section 7.4
OSW14	Spill containment will be provided on the motorway. Spill management and emergency response procedures will be documented in the Operation Environmental Management Plan (OEMP) **and/**or Emergency Response Plan.	Section 8.2.3 OEMP
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**	Section 7.1.1
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 developed 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.	Section 7.1
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.	Construction
OSW18	Existing drainage outlets that will 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.	Construction

REMM	Relevant Requirement	Reference
OGW10	The groundwater monitoring program prepared and implemented during construction will be augmented and continued during the operational phase. Groundwater will be monitored during the operations phase for three years or as otherwise required by the project conditions of approval and will include trigger levels for response or remedial action based on monitoring results and relevant performance criteria. At least three monitoring wells and vibrating wire piezometers (VWPs) should be constructed as close as possible to the tunnel centrelines to allow for the comparison of pore pressures and standing water levels. The wells could be constructed about 5-10 metres above the top of the tunnel crown to allow for groundwater drawdown monitoring in the Hawkesbury Sandstone. The program will include procedures for monitoring and reporting of extracted groundwater volumes to DPI-Water annually for the duration of construction and operation, unless otherwise agreed to or directed by the Secretary. The operational groundwater monitoring program will be developed in consultation with the NSW EPA, DPI-Fisheries, DPI-Water and the Inner West and City of Sydney relevant councils and documented in the OEMP or EMS.	Annexure A Note this REMM requires "Groundwater will be monitored during the operations phase for three years or as otherwise required by the project conditions of approval". Condition of Approval D12 is the governing requirement and requires "Groundwater monitoring must continue for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, the Proponent must undertake a review of future monitoring requirements in consultation with DPI Water. The review must determine if additional monitoring is required, and the time period for continued monitoring. The Proponent must notify the Secretary within two (2) weeks of the review as to the outcomes of the review and any requirements for future monitoring."
OGW11	Where the corrosion assessment that will be carried out prior to construction indicates potential issues, corrosion and other associated impacts of highly aggressive groundwater on the tunnel infrastructure will be monitored during operations. The monitoring program will be documented in the OEMP or EMS. Corroded or otherwise impacted infrastructure will be repaired or replaced as required to maintain operational integrity of the road infrastructure.	Durability Report (RIC-WAJ-TRP-00-DU-030-001), Section 6 no highly aggressive water identified in the Asset footprint, no monitoring required.
OGW12	In accordance with the *NSW Aquifer Interference Policy* (DPI-Water 2012), measures will be taken to 'make good' the impact on an impacted water supply bore by restoring the water supply to pre-development levels. The measures taken will be dependent upon the location of the impacted bore but could include, for example, deepening the bore, providing a new bore or providing an alternative water supply.	Section 5.1.3
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).	Section 7.5

REMM	Relevant Requirement	Reference
	Storage methods may include bulk storage tanks, chemical storage cabinets/ containers or impervious bunds.	
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 7.5
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 7.5
OpHR9	Material Safety Data Sheets for dangerous goods and hazardous substances will be stored on site prior to their arrival.	Section 7.5
OpRW3	Opportunities to reuse treated groundwater during project operation will be considered in preference to discharge to the stormwater system or receiving waterbodies. This could include irrigation of landscaped areas within the project footprint such as new open spaces at the Rozelle interchange	Operational Water Reuse Strategy
OpRW4	In order to reduce demand on local water supplies, options will be investigated to provide water for the deluge system from wastewater produced through the tunnel drainage system, where it meets appropriate quality parameters	Operational Water Reuse Strategy

3.5. Consultation

This plan and the OGWMP and OSWMP will be provided to stakeholders nominated in CoAD3 and CoA D8 (a) and (b). Further to this, the OGWMP will be provided to DPI Fisheries and EPA in accordance with REMM OGW10.

Consultation with relevant councils and stakeholders, including any unique local receivers, may be undertaken for issues pertaining to the Assets impact on groundwater or surface water. Community feedback and complaints relating to water management will be dealt with in accordance with the Operational communication and complaints management is outlined in Section 7 of the OEMP.

4. Goals and limitations

4.1. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) defines waters as the whole or any part of:

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

Section 120 of the POEO Act states that it is illegal to pollute waters. Under the POEO Act, 'water pollution' includes introducing litter, sediment, oil, grease, wash water, debris, and flammable liquids such as paint etc.into waters or placing such material where it is likely to be washed or blown into waters or the stormwater system or percolate into groundwater. All practicable steps should be taken to minimise the risk of pollution of waters.

4.2. ANZECC (2000) objectives

The Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand have developed the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000) (ANZECC guidelines). The ANZECC (2000)guidelines for marine water quality and fresh water quality specific to south-east Australian lowland rivers and NSW coastal rivers are applicable to this Project, as described in more detail in the Water Quality Monitoring Program.

For each catchment in NSW, the State Government has endorsed the community's environmental values forwater, known as 'Water Quality Objectives' (WQOs). The NSW WQOs are the environmental values and long term goals for consideration when assessing and managing the likely impact of activities on waterways (ANZECC 2000).

Both local waterways and the upper estuary waters could be affected by the project. The water qualityobjectives for both these are:

Protection of:

- Aquatic ecosystems;
- Visual amenity;
- Secondary contact recreation (e.g. boating);
- Primary contact recreation (e.g. swimming) in the longer term (10-year); and
- For the upper tributary waters only, protection of aquatic foods (cooked).

A range of water quality indicators are used to help assess whether the current condition of a waterway supports these values. Each indicator has an associated "trigger" value which, if exceeded, could mean one or more of the water quality objectives might not be met. These key indicators are derived from ANZECC (2000). Note that some of the indicators associated with contact recreation are biological indicators such as faecal coliforms and viruses and, given the project would not result in an increase in these, they have not been included.

Much of the Asset's catchment is urbanised, therefore waterways are affected by poor water quality and a changed flow regime. The waterways have been greatly modified, with creek systems being extensively channelised or hard-edged with concrete

Baseline water quality results show that the ambient water quality of the receiving waters is poor, with concentrations of most indicators exceeding the default values given in ANZECC (2000) (AECOM, 2017) for *highly disturbed* ecosystems.

4.3. Site-specific trigger values

The ANZECC (2000) guidelines consider a wide range of species in Australia and New Zealand, however they are not site-specific and do not consider the local natural environment, i.e., the influence of local geology on water quality. The exceedance of an ANZECC (2000) guideline value is very common and is often a product of local natural environmental factors including water-rock hydrogeochemical interactions.

Therefore, site specific trigger values (SSTV) derived using site-specific baseline data are a much more rigorous and accurate approach to assess potential project related impacts. The ANZECC (2000) guidelines provide guidance on the development of SSTV. SSTV were developed during the construction phase, as described in the monitoring programs in Annexure A and Annexure B.

5. Baseline Water quality

5.1. Groundwater Quality

The baseline water quality data is discussed in Annexure A and summarised in Table 6. Interpretation of baseline groundwater monitoring data is also included in the EIS (AECOM 2017) and the final baseline interpretive report (AECOM 2018).

Table 6: Summary of baseline groundwater quality within the Project area

Parameter	Alluvium	Hawkesbury Sandstone
EC	Range: 1,561 to 9,068 µS/cm	Range: 558 to 16,300 µS/cm
pH	Weakly acidic to weakly basic Range: 5.96 to 8.06	Slightly acidic to strongly basic Range: 5.77 to 12.69
Major ions	Dominated by sodium, magnesium, chloride and bicarbonate. The dominance of sodium and chloride is attributed to tidal influences.	Dominated by sodium and chloride, which may be in part due to the influence of saline water intrusion.
Metals	Maximum levels exceeded guideline[1] concentration values for all but cadmium and nickel. In most cases the exceedance is marginal, indicating that background levels are already elevated.	Maximum levels exceeded guideline[1] concentration values for chromium, copper, iron, lead, manganese, nickel, and zinc. Consistently elevated iron and manganese, which is typical for Hawkesbury Sandstone (McKibbon and Smith 2000).
Nutrients	Nitrite and nitrate concentrations indicate that background nutrient levels are low. Reactive phosphorous levels are also low. Ammonia values exceeded guideline[1] concentration values.	Nitrite and nitrate concentrations indicate that background nutrient levels are low. Reactive phosphorous levels are very low. Ammonia values marginally exceeded guideline[1] concentration value.
Sulfate reducing bacteria[2]	Not assessed	No pattern was assessed for sulfate reducing bacteria because many samples were above the measurement limit (500,000 CFU/mL). Groundwater from the Hawkesbury Sandstone has high sulfate concentrations. When reducing conditions are present, SRB flourish in the absence of oxygen.
Groundwater aggressivity	Not assessed	Mildly aggressive towards concrete piles for average concentrations of chloride, pH, and sulfate. Mildly aggressive towards steel piles for average concentrations of chloride and pH. Severely aggressive towards steel piles for groundwater with low conductivity.

EC = electrical conductivity; µS/cm = micro-Siemens per centimetre
[1] Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000)
[2] measured as a colony forming unit (CFU) per 100 mL

5.1.1. Priority groundwater dependent ecosystems

There are no priority Groundwater Dependent Ecosystems (GDEs) identified in the Water Sharing Plan (NoW 2011) within 5 km of the Asset alignment.

5.1.2. Non-priority groundwater dependent ecosystems

A manmade wetland has been constructed at Whites Creek Valley Park at Annandale, immediately west of Whites Creek. This wetland is unlikely to have any groundwater dependence as it continually receives low flows from Whites Creek.

Vegetation within low lying areas (typically containing alluvium soils) may utilise some portion of shallow groundwater for support. These areas are subject to periodic flooding, which recharges the groundwater in the underlying alluvium.

A Groundwater Modelling Report (GMR) was developed during construction, which will assess the impacts of groundwater drawdown on groundwater dependant ecosystems. The GMR has been developed in consultation with DPI Water and was provided to The Secretary prior to the finalisation of the tunnel design. The GMR identified that no additional mitigations measures are required to prevent adverse impacts on groundwater dependant ecosystems.

5.1.3. Registered groundwater bores

A review of bores registered with DPIE Water (AECOM 2017) indicates that all of the registered bores within 2 km of the Asset alignment (153 bores), are registered as monitoring bores. Within the Rozelle Interchange, limited registered bores, including monitoring wells, exist at the Rozelle Rail Yards. There are no registered supply bored or bores subject to the Aquifer Interference Policy in the zone of depression. Therefore, there are no other bore water users subject to impacts and no further assessments or measures are required.

5.2. Surface Water Quality

Baseline surface water monitoring program was implemented as part of the project EIS (AECOM, 2017). Further detail on baseline surface water quality is found in Section 3, Annexure B.

The baseline surface water monitoring program was implemented to:

- Evaluate the existing surface water quality at key locations in the project area,
- Identify potential pathways of pollutants to surface water receivers, and
- Monitor and assess the surface water quality in the project area to form a baseline of environmental conditions, to measure the environmental performance of the project during the construction and operation of the project.

6. Potential Water Quality Impacts

6.1. Potential groundwater contamination

An assessment of contaminated land risk is provided in the EIS, Appendix R (Technical working paper: Contamination) (AECOM 2017). Areas within the overarching Asset footprint that may contain contaminated soil and/or groundwater due to past or present land use practices have been investigated. During routine monthly baseline groundwater monitoring to inform the EIS, a suite of contaminants was assessed for laboratory analyses including cations and anions, heavy metals, and nutrients.

Site management works for contamination within the Rozelle Rail Yard, located north and northwest of Rozelle Bay, were undertaken in 2017 (AECOM 2018) and were subject to a separate environmental assessment. The review of environmental factors (REF) was approved by Roads and Maritime in April 2017. Contamination investigations undertaken as part of the REF and for the M4-

M5 WestConnex Link project confirmed contamination within the Rozelle Rail Yard is likely from historic land use and importation of fill materials of unknown origin. This has resulted in the presence of variable concentrations of heavy metals, PAHs, TRHs, and bonded and friable asbestos in the soils, fill, ballast and existing stockpiles. In addition, contamination of groundwater was also identified with limited exceedances of zinc and copper (one location), zinc (one location) and TRHs, naphthalene and Bis(2-ethylhexyl) phthalate (one location).

The primary risk to groundwater at the Rozelle Rail Yards is the migration of contaminated groundwater due to altered groundwater flow paths from tunnel construction. The remediation of the soils within the Rozelle Rail Yards was completed in 2018 (AECOM 2018b) and through construction phase and therefore has reduced the potential for leachate to contaminate the groundwater.

6.2. Potential impacts on surface water baseflow

Groundwater modelling (AECOM 2017) indicated that the overall contribution to flow to surface watercourses from groundwater is relatively small, since the watercourses are mostly concrete lined channels. It is expected that the majority of stream flow would be derived from rainfall runoff and tidal inflow. Groundwater inflows to the tunnels that would have the potential to impact surface water levels are unlikely for the section of the tunnels that is through the Whites Creek alluvium beneath the Rozelle Rail Yards. Permanent works tunnels excavated through the alluvium in the Rozelle Railyards have engineering measures such as targeted grouting to mitigate groundwater inflow where required. Interaction between the tunnel and surface water baseflow is also minimised as Whites Creek and Eastern Channel (the principal surface water creeks near proposed tunnel in alluvium) are concrete lined culverts / stormwater pipes and have negligible interaction with groundwater.

In areas where tunnels are within the alluvium and palaeochannels, including at the Rozelle Rail Yards, additional mitigation measures including targeted grouting to limit permeability in hydraulic conductive ground and engineered structures such as diaphragm walls are in place to restrict groundwater ingress from the alluvium entering the tunnels as required.

Where groundwater does enter the tunnels, it is to be pumped and treated at designated water treatment plants before discharge back into the receiving environment.

6.3. Ground movement (settlement)

Ground movement (settlement) or subsidence can be caused by the compression of the soil structure due to groundwater drawdown. Within the footprint of the Rozelle Interchange, natural soils are classified as part of the Gymea residual soil profiles that developed on the weathered Hawkesbury Sandstone bedrock. These soils are typically thin, stiff or medium dense to dense, and of limited compressibility, and as such would be less susceptible to ground settlement. Settlement within the alluvium would be dependent on the amount of groundwater drawdown and has been negligible due to design measures for the shafts, including constructing tanked shafts through the alluvium to minimise groundwater ingress. Cut and cover structures through Rozelle Rail Yards are designed to include a lining between the road and soil which mitigates groundwater ingress, which would reduce potential settlement.

Small scale dewatering of the alluvium and Hawkesbury Sandstone may be required during construction. This could result in an increase in effective stress, leading to ground settlement. Movement in clay soils between hydrogeological units would cause both consolidation settlement and creep settlement, which may result in settlement continuing over an extended period.

Settlement monitoring has ceased post construction after the decommissioning criteria of a minimum of 3 months of stable results were recorded.

6.4. Tunnel Discharge Quality

Tunnels are equipped with drainage infrastructure to capture groundwater ingress, stormwater ingress at portals, spills, maintenance washdown water, fire suppressant deluge and other potential water ingress events.

Groundwater is collected and pumped to the water treatment plant. Sources other than groundwater that are captured by the tunnel drainage system will be collected in one of the tunnel sumps.

To prevent adverse impacts on downstream water quality within Rozelle Bay treatment facilities will be designed so that the effluent will be of suitable quality for discharge to the receiving environment. An operational water treatment plant is provided for the Asset.

Treated flows from the WTP would drain via a constructed wetland to Rozelle Bayat maximum 22 litres per second..

. The proposed constructed wetland at Rozelle will provide 'polishing' treatment to the treated groundwater flows removing a proportion of the nutrient (forms of nitrogen and phosphorus).

A summary of the groundwater quality considering ANZECC (2000) guideline criteria, receiving water quality and proposed treatment measures. With consideration of groundwater quality and proposed treatment, the concentration of the key constituents in the treated discharge to Rozelle Bay are unlikely to be significantly higher than the ambient concentration of the constituents in Rozelle Bay. Due to the mixing and dilution affect which would occur at the outlet to the receiving waters, impacts to ambient water quality are likely to be negligible and localised to near the outlet.

6.5. Stormwater Discharge Quality

MUSIC modelling of the existing and operational conditions was undertaken during the EIS to assess potential impacts on receiving waters associated with pollutant loads generated from pavement runoff and the performance of the proposed surface water treatment system.

The project is split into sections of above ground roadway, including interchanges with existing surface roads, and subsurface road through tunnels. New surface roadway, exposed to direct rainfall, is proposed at Rozelle interchange and Iron Cove Link.

Increases in impervious area, such as road pavement, exposed to direct rainfall will contribute to an increase in runoff volume and associated increase in pollutant mobilisation. Runoff from road pavement would typically contain pollutants such as sediments, nutrients, oils and greases, petrochemicals and heavy metals, which result from atmospheric deposition, vehicle leaks, operational wear, road wear or spills of materials on the road. These pollutants could potentially impact on water quality when discharged to receiving waterways.

Stormwater pollutant loads generated by the Asset would be controlled by a stormwater quality treatment system designed in accordance with the Asset stormwater quality objectives.

Surface water and flooding stormwater quality treatment measures have been constructed within the vicinity of Rozelle interchange and Iron Cove Link to treat stormwater prior to discharge. MUSIC modelling was undertaken to assess the impact of the project and performance of the stormwater quality treatment measures with consideration to the receiving catchment water quality objectives and the project pollutant load reduction targets.

The modelling results indicates that the Asset as a whole will generally reduce the mean annual stormwater pollutant loads being discharged to the Sydney Harbour when compared to the existing conditions

Oversizing other treatment measures to offset the reduced treatment within all the constrained zones was assessed and is not considered to be feasible and/or reasonable given that improvements in treatment performance diminish significantly with increasing footprint of the treatment devices. Treatment performance could potentially diminish over time if the stormwater quality treatment devices (both vegetated WSUD and proprietary devices) are not adequately maintained during the operational phase. A maintenance plan is included in the Operational and Maintenance Manual.

6.6. Spills

Spills of oils, lubricants, hydraulic fluids and chemicals could potentially occur during the operation of the project due to vehicle or plant and equipment leakages or a vehicle crash. Any contaminant spill within the project footprint has the potential to pollute downstream waterways, as a result of being

conveyed to waterways via the stormwater network. The severity of the potential impact depends on the magnitude and/or location of the spill in relation to sensitive receptors, emergency response procedures and/or management controls implemented. Surface roads within close proximity to Rozelle Bay and Iron Cove are likely to present the greatest risk due to the short distance and time it would take contaminants to reach the receiving waters

6.7. Scour and channel geomorphology

There is potential for sediment to be scoured and mobilised where stormwater or wastewater is discharged to receiving waterways and bays including Rozelle Bay, Iron Cove, and Whites Creek. This could increase turbidity locally and lead to mobilisation of contaminants bound to sediments. Scour protection and energy dissipation measures will be assessed and provided as required at outlets.

The Asset includes widening and improvements to the channel and bank at Whites Creek Annandale to manage flooding and drainage. The channel form is naturalised with works extending back to the railway bridge to integrate with Sydney Waters channel naturalisation. The naturalisation works incorporates features such as sandstone blocks and vegetated benches to provide ecological benefits to the channel. The proposed channel bed and bank treatments would be hard lined therefore impacts on channel form and geomorphology are unlikely to occur.

6.8. Erosion and Sediment

Once the construction phase of a project is completed, there is a period within the operational phase where recently disturbed soils are potentially susceptible to scour and erosion from stormwater runoff. This will be an issue in areas where soft landscaping, including public open space areas at Rozelle interchange, where topsoil is settling and vegetation is establishing. The potential for sediment transport and sedimentation issues to occur during operation of the project is influenced by factors such as severity of storm events, the slope and corridor of disturbance within an area, and the management controls that are implemented on site.

The erosion of landscaped areas during rainfall events could potentially cause sediment loads to enter into waterways through the stormwater pipe network. Landscaping at Rozelle interchange presents the greatest risk due to the extent of landscaping proposed. Suitable stabilisation and management techniques are deployed during the vegetation establishment period to minimise the potential for erosion within areas at risk.

Provided appropriate controls are implemented, short term impacts during the establishment period are expected to be manageable with negligible impacts on receiving water quality.

6.9. Cumulative impacts

A cumulative impact assessment was undertaken for the EIS (AECOM 2017). The assessment:

- Used the groundwater model to predict the cumulative impacts on groundwater due to the Project in combination with other WestConnex tunnel projects (M4 East and New M5)
- Qualitatively assessed the cumulative impacts of the Project, other WestConnex projects, and other proposed infrastructure projects (Sydney Metro City and Southwest).

6.9.1.1. WestConnex projects

During construction, cumulative impacts on groundwater were greatest at either end of the Project alignment where the Project tunnels would overlap with the tunnels for the M4-M5 Link. Once all three of these WestConnex tunnel projects are operational, cumulative groundwater drawdown impacts due to the three tunnel projects are not predicted to be greater than in any one section of the overall Project footprint (AECOM 2017).

The tunnels and associated lining for each project are designed and constructed to comply with the groundwater inflow criterion of one litre per second per kilometre for any kilometre length of tunnel.

Long-term cumulative groundwater tunnel inflows due to the WestConnex tunnel projects may cause groundwater salinity to increase due to surface water from tidal reaches being drawn into or towards the tunnels. Initially, the saline water would be a small fraction of total tunnel ingress, but this is expected to increase over time as water is drawn from further afield, although it is expected to always be a minor component of total inflow volume and negligible during construction.

6.9.1.2. Other relevant projects

The Sydney Metro tunnels are to be constructed as tanked tunnels resulting in negligible impacts on groundwater drawdown. The station boxes are to be constructed and operated as drained shafts and will extract groundwater over time. The closest drained structure is proposed at Rozelle which is close to the boundary of the Asset, and it is considered unlikely to have significant cumulative impacts on groundwater drawdown in the Asset area. There is potential for the concrete lined tunnels of the Sydney Metro project to create a partial hydraulic barrier to groundwater flow, however the risk is considered low since the tunnels are constructed below the water table.

The Stage 3A of the Western Harbour Tunnel and Warringah Freeway Upgrade Project is underway for a new crossing of Sydney Harbour involving twin tolled motorway tunnels connecting WestConnex at Rozelle and the existing Warringah Freeway at North Sydney. Stage 3A runs above the Asset and is also a similar small diameter tanked tunnels.

7. Management of Impacts

7.1. Water treatment

Water treatment forms a key environmental control measure. Groundwater captured during operation of the Asset will be treated at one WTP at the Maintenance Facilities Area (MOC2). The WTP will be of a modular design so that they can be modified if required to meet design requirements. WTP will be designed so that the water will be of suitable quality for discharge to the receiving environment in compliance with the relevant discharge criteria. In accordance with CoA E187 water to be discharged from the water treatment plant must comply with the ANZECC (2000) 95 per cent species protection level unless the EPL is in force.

Refer to Annexure A the GWMP for more details regarding monitoring of discharge volume and discharge water quality and relevant discharge criteria.

The WTP will undergo commissioning and testing to determine the treatment efficacy of the WTP. During commissioning of each of the WTP, a minimum of two rounds of commissioning sampling will be undertaken to confirm its efficacy. The WTP will not be deemed commissioned until the two rounds of commissioning sampling demonstrate compliance with the criteria.

Monthly sampling will be undertaken to ensure that the WTP continues to meet design specifications. The results will be reviewed by trained personnel to ensure that the discharged water meets discharge criteria. Where in-line sensors (typically pH and turbidity) or monitoring identify WTP performance drift outside of the required criteria measures will be implemented to return the WTPs performance back into the required range. In these instances, water will be retreated to meet appropriate discharge criteria, discharged to trade waste (where permitted), or disposed offsite at an appropriate licenced liquid waste facility.

Water quality results and an overview of corrective actions will be reported in the six-monthly operational groundwater monitoring report.

Procedures relating to the management of the WTP will also be prepared and implemented in an Environmental Work Method Statement (EWMS).

7.1.1. Wetlands

The Wetlands serve a primary purpose of treating tunnel water, prior to being released into the receiving waters of Rozelle Bay. The treatment of tunnel water will begin at the water treatment plant

which is in the Rozelle West Motorway Operations Complex. From there, the water is piped to the wetlands as the final stage of treatment and held for a minimum of 18 hours of polishing, before being released into the drainage channel.

The Wetlands comprises of a combination of shallow marsh and clear water areas to improve the cleansing performance, reduce evaporation loss, discourage inappropriate access, and increase habitat value. At Rozelle, overland flow and stormwater predominantly travels through the Rozelle Rail Yard as it heads to Rozelle Bay. Regional stormwater is directed through the site via a network of vegetated swales, drains and pipes which have been designed to cater for a 1 in 100 year flood event. Most of the regional stormwater is conveyed along the southern edge of the Rozelle Rail Yard site in a wide channel referred to as the eastern drainage channel. Stormwater that is collected within the Rozelle Rail Yard is treated through a network of vegetated bioswales, bioretention basins and a constructed wetland, before being released into receiving waters at Rozelle Bay.

The constructed wetland at the Rozelle interchange has been 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 is lined to prevent potential interaction with groundwater.

7.2. Tunnel Design

All feasible and reasonable measures must be undertaken to limit operational groundwater inflows into each mainline tunnel to no greater than 1 litre per second across any given kilometre (1 L/sec/km) in accordance with CoA E190.

The project mainline tunnel was designed and constructed to meet the groundwater inflow criteria identified in CoAE190 using water-resisting treatment along the mainline tunnel.

The following waterproofing control measures for underground structures include:

- Geotextile
- Sheet membrane
- Band anchors
- Spray-on membrane
- Strip drains
- Water-resistant shotcrete admixtures

The remaining ongoing inflow of groundwater into the tunnels will be managed through the tunnel drainage system, which has been designed to accommodate the capture, removal, treatment, and discharge of groundwater.

For further information on waterproofing systems see Section 9 of the Operation and Maintenance Manual.

7.3. Tunnel Sump and Pump

The tunnel drainage system controls runoff for all groundwater and surface water inflows including deluge, rainfall runoff, spills and washdown. Flows are captured by a pit-and-pipe system that diverts water from the surface to avoid or minimise damage or loss resulting from uncontrolled flow.

The sump includes a spill containment chamber for separating hydrocarbons from water, a main chamber for detaining capture water and submersible pumps for pumping the detained water to the

MOC2 site. The sump detains the surface water and groundwater intercepted by the driven tunnel and ancillary tunnel drainage systems. This includes rainfall from the tunnel portals and ventilation building chimneys, deluge and hydrants systems, seepage, and runoff produce by maintenance activities. The sump has the capacity to separate hydrocarbons/oils from water. All flows are discharged initially into the spill containment chamber, with overflow end up in the main storage chamber while hydrocarbons are retained by the spill containment chamber. The sump is fitted with submersible pumps to facilitate the pumping of water from the in-tunnel sump to the MOC2 site via rising main. The in-tunnel sump is in the lowest low point of the driven tunnel network, which is in the M170 tunnel.

7.4. Stormwater treatment devices

The surface drainage system consists of gutters, pits, pipes, and open channels to collect and convey stormwater runoff from the road pavement to receiving waters. Where a water quality treatment device has been provided, the drainage network routes the flow through the water quality treatment device before discharging into the receiving waterway/drainage line. Note that for the City West Link, all outlets of the permanent drainage network discharge directly into Rozelle Bay, and at Iron Cove Link into Parramatta River. Further detail is included in Table 7 below, outlining the potential impacts on receiving environments and the mitigation measures.

Maintenance requirements for all stormwater treatment systems and devices installed has been identified and included in the Operation and Maintenance Manual.

Table 7 – Stormwater Mitigation Measures

Potential impacts on the receiving environment andcapacity of council or Sydney Water drainage infrastructure	**Mitigation measures**
▪ Network capacity: Design peak flow is 2.1m^3/s. The penstock channel is assumed to be 1.8mx1.8m and collects tidal flows without impacting the 100-year ARIflows within the proposed drainage network. 100-yearARI Sydney Harbour still water level of 1.435m AHD has been considered in the design. ▪ Scour: No issues with scour as the proposed drainage network discharges into the concretepenstock channel. ▪ Flooding: the network does not discharge to anyfloodplain or floodway. No impact. ▪ Water quality: Water quality treatment device could not be provided due to space constraints. A 500mm sump has been provided in the pit immediately upstream of the connection point to collect any accidental spill. However, water quality treatment devices have been provided at all other outlets to reduce overall pollutant load discharge into Rozelle Bay. The overall pollutant loads that discharge into Rozelle Bay are predicted to reduce compared to existing conditions by 28% for TSS, 46% for GP, 24%for TP and 14% for TN ▪ Aquatic ecology: with the control of the pollutant loadlisted above, the downstream aquatic ecology is predicted not to be affected. ▪ Riparian vegetation: there is no riparian vegetation at CWL No impact. ▪ Property: the network discharges into Rozelle Bay,there are no properties affected downstream of thenetwork. No impact	Mitigation / timeframe ▪ pit with 500mm deep sump

Potential impacts on the receiving environment andcapacity of council or Sydney Water drainage infrastructure	Mitigation measures
■ Network capacity: Design peak flow is 1.16m^3/s. Drainage discharges directly into Rozelle Bay, therefore, no network capacity issues. 100-year ARISydney Harbour still water level of 1.435m AHD hasbeen considered in the design. ■ Scour: No issues with scour as the proposed drainage network discharges into scour protectionprovided for the channel under CWL. ■ Flooding: the network does not discharge to anyfloodplain or floodway. No impact. ■ Water quality: A single Class 3, SPEL Ecoceptor is proposed at the outlet as part of the overall operational system controls the pollutant load. Section 5.1.7 of RIC-WAJ-RPT-20-DR-060-0001 lists the performance of the water quality treatment device, showing that overall pollutant load discharges to the environment are predicted to reduce compared to existing conditions, by 28% for TSS, 46% for GP, 24%for TP and 14% for TN ■ Aquatic ecology: with the control of the pollutant loadlisted above, the downstream aquatic ecology is predicted not to be affected. ■ Riparian vegetation: there is no riparian vegetation atCWL No impact. ■ Property: the network discharges into Rozelle Bay, there are no properties affected downstream of thenetwork. No impact.	Mitigation / timeframe ■ Class 3 SPEL Ecoceptor provided immediately upstreamof the outlet point into Rozelle Bay. ■ Scour protection provided for the channel under CWL
■ Network capacity: Design peak flow is 1.1m^3/s. Drainage discharges directly into Rozelle Bay, therefore, no network capacity issues. 100-year ARISydney Harbour still water level of 1.435m AHD hasbeen considered in the design. ■ Scour: No issues with scour as the proposed drainage network discharges into concrete linedWhites Creek. ■ Flooding: the network does not discharge to anyfloodplain or floodway. No impact. ■ Water quality: A single Class 3, SPEL Ecoceptor is proposed at the outlet as part of the overall operational system controls the pollutant load. Section 5.1.7 of RIC-WAJ-RPT-20-DR-060-0001 lists the performance of the water quality treatment device, showing that overall pollutant load discharges to the environment are predicted to reduce compared to existing conditions, by 28% for TSS, 46% for GP, 24%for TP and 14% for TN ■ Aquatic ecology: with the control of the pollutant loadlisted above, the downstream aquatic ecology is predicted not to be affected.	Mitigation / timeframe ■ Class 3 SPEL Ecoceptor provided immediately upstreamof the outlet point intoRozelle Bay. ■ Scour protection provided by the upgraded Whites Creek channel

Potential impacts on the receiving environment andcapacity of council or Sydney Water drainage infrastructure	Mitigation measures
■ Riparian vegetation: there is no riparian vegetation at CWL No impact. ■ Property: the network discharges into Rozelle Bay, there are no properties affected downstream of thenetwork. No impact.	
■ Network capacity: Design peak flow is 0.67m^3/s. Drainage discharges directly into Rozelle Bay, therefore, no network capacity issues. 100-year ARISydney Harbour still water level of 1.435m AHD hasbeen considered in the design. ■ Scour: No issues with scour as the proposed drainage network discharges into Whites Creek scourprotection. ■ Flooding: the network does not discharge to anyfloodplain or floodway. No impact. ■ Water quality: A single Class 3, SPEL Ecoceptor is proposed at the outlet as part of the overall operational system controls the pollutant load. Section 5.1.7 of RIC-WAJ-RPT-20-DR-060-0001 lists the performance of the water quality treatment device, showing that overall pollutant load discharges to the environment are predicted to reduce compared to existing conditions, by 28% for TSS, 46% for GP, 24%for TP and 14% for TN ■ Aquatic ecology: with the control of the pollutant loadlisted above, the downstream aquatic ecology is predicted not to be affected. ■ Riparian vegetation: there is no riparian vegetation atCWL No impact. ■ Property: the network discharges into Rozelle Bay, there are no properties affected downstream of thenetwork. No impact.	Mitigation / timeframe ■ Class 3 SPEL Ecoceptor provided immediately upstreamof the outlet point intoRozelle Bay.
■ Network capacity: Design peak flow is 2.07m^3/s. Drainage discharges directly into Rozelle Bay, therefore, no network capacity issues. 100-year ARISydney Harbour still water level of 1.435m AHD hasbeen considered in the design. ■ Scour: Downstream scour protection provided:Rip rap D50 = 300mm Thickness = 600mmLength = 9.6m Start width = 1.8mEnd Width = 5.6m ■ Flooding: the network does not discharge to anyfloodplain or floodway. No impact. ■ Water quality: Two Class 3, SPEL Ecoceptor units areproposed at the outlet as part of the overall operational system controls the pollutant load. Section 5.1.7 of RIC-WAJ-RPT-20-DR-060-0001 lists the performance of the water quality treatment device, showing that overall pollutant load discharges to the environment are predicted to reduce compared to existing conditions, by 28% for TSS, 46% for GP, 24%for TP and 14% for TN ■ Aquatic ecology: with the control of the pollutant loadlisted above, the downstream aquatic ecology is predicted not to be affected. ■ Riparian vegetation: there is no riparian vegetation atCWL No impact. Property: the network discharges into Rozelle Bay,there are no properties affected downstream of thenetwork. No impact.	Mitigation / timeframe ■ Two Class 3 SPEL Ecoceptor provided immediately upstreamof the outlet point intoRozelle Bay. ■ Outlet scour protection

7.5. Management measures

Steps that will be implemented to plan, manage, monitor and/or review environmental impacts are identified in Table 8.

Table 8: Environmental controls

Soil and water management controls	Responsibility
Acid sulfate soils	
Manage acid sulfate soils in accordance with: • Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils,Acid Sulphate Rock and Monosulphidic Black Ooze (Roads and Maritime, 2005) • Acid Sulfate Soils Assessment Guidelines (Acid Sulfate Soil ManagementAdvisory Committee, 1998) • Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee,1998) • Waste Classification Guidelines Part 4: Acid Sulfate Soils (EPA. 2014).	O&M Contractor
Develop a standard operating procedure (SOP) for acid sulfate soil management thatwill: • Describe the acid sulfate material aspects and impacts • Map all acid sulfate soil risk areas • Define activities that are deemed of high risk in terms of acid sulfate soils • Describe the acid sulfate material handling and management controls • Describe the acid sulfate material treatment methods controls and managementstrategies that will be employed as per section 7.4 of the Guidelines for the Management of Acid Sulfate Soils (Roads and Maritime, 2011) • Describe the contingency measures that will be implemented in the event of afailure or non-conformance • Describe the sampling and testing regime to validate acid sulfate material before (and if required) during the work activity. Ensure the SOP includes procedures to manage the unexpected discovery of potential or actual acid sulfate soils. This contingency plan will be prepared in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998).	O&M Contractor
Encountering and handling contaminants	
General provisions	
Prepare and implement an SOP for managing and handling contaminated materialsthat accords with the Guideline for The Management of Contamination (Roads and Maritime, 2013), RMS Quality Assurance Specification G36: Environmental Protection, and National Environment Protection Measure (NEPM) guidelines on contaminated land management. The SOP will provide detail on: • areas of known contamination; • the management of unexpected contamination finds; • actions to be taken for any land contamination caused by the O&M Contractor.	O&M Contractor
Encountering unexpected contamination finds	
Prepare and implement an SOP for dealing with unexpected contaminated materials(or include in a combined contaminated materials SOP, referenced above). This will include a stop-work procedure and the need to notify the Project Company Representative within 24-hours of encountering any suspected or potential contamination.	O&M Contractor

Soil and water management controls	Responsibility
Groundwater quality monitoring and auditing	
After a major spill or accident, implement the Emergency Response Plan	O&M Contractor / ProjectCompany
Ensure that all monitoring is undertaken in accordance with the Water Quality Monitoring Programs.	O&M Contractor
Record any exceedances of the water quality parameters as a non-conformance and report this directly to the Project Company Representative. Implement the response action process nominated in the Water Quality Monitoring Programs.	O&M Contractor
Incident and emergency response: road traffic incidents	
Follow the Emergency Response Plan 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.	O&M Contractor
Shut down the stormwater system and stormwater / deluge pump in the sump at the tunnel low-point and stop discharging offsite as soon as it is safe and feasible to do so.	O&M Contractor
O&M personnel will work with emergency authorities (when authorities have attended the incident) to clean-up spills and prevent them migrating to the stormwater drainageor 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 • Install containment measures comprising sandbags and booms to preventmigration 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.	O&M Contractor
Notify NSW EPA and relevant authorities in accordance with OEMP (RMS Environmental Incident Classification and Reporting Procedure).	O&M Contractor
In the event that post-event water quality monitoring identified any exceedances, implement the response action process in the Water Quality Monitoring Program.	O&M Contractor
Spill prevention: general provisions	
Ensure all O&M personnel are trained in spill management, including the use of materials and their deployment.	O&M Contractor
Retain all necessary personal protective equipment (PPE) onsite.	O&M Contractor
Stocktake and check the use-by date of all spill containment kit and PPE once every quarter.	O&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. • Retain safety data sheets (SDS) onsite. Also ensure they are available via a 24-hour contact number.	O&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, andin all O&M Contractor site vehicles and within the maintenance depot and water treatment plant.	O&M Contractor

Soil and water management controls	Responsibility
Protect all stormwater and surface drains before starting any site activities requiring the use of chemicals or fuels, or involving ground clearance or excavation work.	O&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 ofthe largest single stored materials. 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 toprevent any offsite migration.	O&M Contractor
Spill prevention: refuelling	
Ensure that as much as possible chemical and fuel transfer activities take place within a bunded and contained area.	O&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. A maximum of 5L of petrol is provided for out of fuel vehicles.	O&M Contractor
Spill prevention: vehicle and equipment servicing	
Use spill containment controls when vehicles are serviced.	O&M Contractor
Inspect vehicles, plant and equipment on a fortnightly basis for leaks.	O&M Contractor
Spill prevention: vehicle washing	
Ensure that no vehicles will be washed to allow runoff to the stormwater system.	O&M Contractor
Spill management	
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 forward it to the Project Company Representative.	O&M Contractor
• Remove the absorbent materials for disposal (as hazardous waste, if required). • Alternatively, classify the waste and dispose of it accordingly to a licensed facility.	O&M Contractor
• Manage major fuel or chemical spills through the incident response procedure(refer to Section 8 and Annexure E of the OEMP). • Clean up all spillages immediately, providing there is no risk to human health so as to prevent its spread offsite or into the stormwater system, surface waters or groundwater sources.	O&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).	O&M Contractor
Erosion and sedimentation control, including post-construction monitoring of vegetation	
General provisions: all relevant activities	
Erect and maintain effective sediment control barriers down gradient of all areas where soil disturbance will be undertaken.	O&M Contractor

Soil and water management controls	Responsibility
Construct diversion banks upslope of activities where sediment loss may occur tomanage surface water runoff away from the exposed areas, where appropriate.	O&M Contractor

Soil and water management controls	Responsibility
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.	O&M Contractor
Excavate and transport soil offsite for disposal at a licensed facility that has become contaminated as a result of fuel, oil, or chemical spills.	O&M Contractor
• Sweep road surfaces monthly to prevent the build-up of sediment • Transfer the collected sediment offsite for disposal 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.	O&M Contractor
Stabilise exposed areas and earthworks during the maintenance period.	O&M Contractor
• Where necessary, protect stormwater drainage to prevent the discharge of sediment by using gravel bags, sand filters or other geotextile fabrics. • Routinely replace sediment control devices and remove the old devices offsite forstorage, waste classification and disposal.	O&M Contractor
Batter slopes and embankment management	
Undertake visual inspections of the batter slopes and embankments and implement management actions if there is evidence of loose or unstable rock.	O&M Contractor
Land clearance	
Implement soil protection controls to prevent erosion including but not limited to: • Staged clearance and progressive rehabilitation of exposed areas • Retain vegetation within drainage lines • Minimise exposed areas to the required amount needed for the operation or maintenance activity.	O&M Contractor
Erosion and sediment control devices maintenance and management	
Remove sediment from control devices following a major rainfall event and/or when required.	O&M Contractor
Ensure that the collected water contained in control devices and excavations is only discharged after testing. Where required, contain, test and subsequently treat the water to confirm its suitability for discharge in accordance with the triggers identified in the Water Quality Monitoring Programs.	O&M Contractor
Road sweeping and cleaning	
Sweep road surfaces monthly to prevent the build-up of sediment and kept clear ofdebris including; vehicle waste, solid waste, sediment, sand, soil, clay or stones.	O&M Contractor
Monitor and clean all sediment traps and pits when they are 60 per cent full.	O&M Contractor
Stockpile management	
Install erosion and sediment control measures at stockpile areas based on the provisions included the Management of Urban Stormwater: Soils and Construction (Landcom, 2004). Install and manage all stockpiles in accordance with RMS QualityAssurance Specification G38: Soil and Water Management.	O&M Contractor

Soil and water management controls	Responsibility
Vegetation establishment	

Soil and water management controls	Responsibility
• Inspect the areas of landscaping and vegetation cove 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 oferosion in the first year until a point in time where the area is established.	O&M Contractor
Adopt above control where land will be cleared in the future. This will ensure the effectiveness of any associated landscaping and vegetation cover introduced toremediate the cleared area.	O&M Contractor
Stormwater drainage system maintenance and repair, including water quality infrastructure, water sensitive urban design measures and outfall points	
General provisions: all relevant activities	
Keep and maintain an Asset drawing of the stormwater system, its respective catchments, collection points, and discharge points.	O&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.	O&M Contractor
Routine and regular maintenance of the stormwater system including water quality features and water sensitive urban design	
Visually inspect drainage 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.	O&M Contractor
Ensure that an inspection takes place immediately following an incident, spill or adverse heavy rainfall.	O&M Contractor
Remove sediment from control devices following a major rainfall event and/or whenthe 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).	O&M Contractor
If required, obtain consent from Sydney Water to discharge the collected water to the trunk sewer main.	O&M Contractor
Flood immunity protection	
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.	O&M Contractor
Water consumption	
Develop and implement water efficient practices including water reuse, and recycling for irrigation.	O&M Contractor
Adopt the following conservation management hierarchy for water: • **Avoid** water consumption, prevent and fix leaks • **Reduce** water consumption by using water efficient equipment and processes • **Re-use** stormwater without treatment where fit for purpose • **Treat / recycle** dirty and grey water, where fit for purpose • Use **potable water** when non-potable sources are unavailable or not fit forpurpose.	O&M Contractor
Wetland Maintenance	

Soil and water management controls	Responsibility
Ensure the wetland operation and maintenance plan is followed and the following monitoring conducted: Monitoring Parameters: - Vegetation - Weeds - Mosquitos - Water Birds - Water Level - Flow - Post -flood inspections - Drought management - Inlet and outlet inspections - Photographic monitoring	O&M Contractor
Ensure all maintenance measures are followed as per the wetland operation and maintenance plan.	O&M Contractor

8. Compliance management

8.1. Roles and responsibilities

The O&M contractors are responsible for specific responsibilities for the implementation of environmental controls are detailed in Table 8 of this Plan.

8.2. Monitoring

A Operational GWMP and SWMP has been developed to describe how the O&M contractor proposes to monitor potential impacts to groundwater during construction of the Project (refer Annexure A and Annexure B.

8.3. Licenses and permits

The Asset operations will be regulated by an EPL issued by the EPA. The EPL typically prescribes water quality parameters to be measured and associated discharge criteria from licensed discharge points. They also detail the monitoring and analytical requirements by reference to authority publications (e.g. Methods for Sampling and Analysis of Water Pollutants in NSW (EPA 2004)).

Other relevant licences or permits will be obtained in the lead up to and during construction as required.

8.4. 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.

8.5. Reporting

Reporting requirements relevant to this OWMP are outlined in Table 9 as well as data provision requirements.

Additional reporting requirements for the Asset are outlined in Section 9.7 of the OEMP.

Table 9: Reporting requirements

Schedule (during construction)	Requirements	Recipient (relevant authority)
Reporting		
Water monitoring reports (every six months)	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period. Surface water quality results will be presented, and performance criteria exceedances will be highlighted. Applicable management responses will be documented.	TfNSW, EPA, DPE, DPE Water, Sydney Water
EPL Monitoring Reports and Annual Returns	EPL monitoring data reports will be prepared in accordance with the requirements of the EPL. An EPL Annual Return will be prepared in respect of each EPL reporting period (typically 12 months).	TfNSW, EPA
Data provision		
Quarterly (every 3 months)	WTP discharge water quality and flow data (raw data collated and tabulated in Excel) To demonstrate compliance with the CoA (D11(f)), Project discharge criteria and if applicable, trade waste licence.	TfNSW, Sydney Water
Quarterly (every 3 months)	Monthly volume of groundwater discharged from each water treatment plant to DPI Water for a minimum period of five (5) years, consistent with Condition D12; To demonstrate compliance with the CoA (D11(g)).	TfNSW, DPE Water (formerly DoI Water)

9. Review and improvement

9.1. Continuous improvement

Continuous improvement of this Plan 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.

9.2. OWMP update and amendment

The processes described in Section 10.1 of the OEMP may result in the need to update or revise this Plan. Plan updates will occur on an as needed basis.

Only the Environment and Sustainability Manager, or delegate, has the authority to change any of the environmental management documentation. All amendments to environmental management documentation require endorsement from the Environmental Representative. Minor updates may be approved by the Environmental Representative.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 10.3 of the OEMP.

10. References

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AECOM, 2018. M4-M5 Link Rozelle Rail Yards - Tranche 5: Groundwater Contamination Sampling, April 2018

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC), 2000.Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Bureau of Meteorology (BoM) 2012. National Atlas of Groundwater Dependent Ecosystems

Department of Land and Water Conservation (DLWC), 2002. NSW Groundwater Dependent Ecosystems Policy.

DLWC, 1998. NSW Groundwater Policy Framework Document. DLWC, 1998. NSW Groundwater Quality Protection Policy.

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Department of Water and Energy (DWE), 2007. NSW Water Extraction Monitoring Policy.

Environment Protection Authority (EPA), 2004. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW.

Lendlease, Samsung C&T and Bouygues Construction Australia Joint Venture (LSBJV), 2018. Appendix B6 Groundwater Management Sub-plan, M4-M5 Link Mainline Tunnels, November 2018.

McKibbin D & Smith PC 2000, 'Sandstone Hydrogeology of the Sydney Region', proceedings of the 15th Australian Geological Convention, Sandstone City – Sydney's Dimension Stone and other Sandstone Geomaterials, in EEHSG Geological Society of Australia. Monograph No. 5, GH McNally & BJ Franklin (eds).

NSW Office of Water (NoW), 2011. Water Sharing Plan, Greater Metropolitan Regional Groundwater Sources Background Document, Sydney.

NSW Roads and Maritime Services, 2017. M4-M5 Link Environmental Impact Statement, August 2017.

NoW, 2012. NSW Aquifer Interference Policy.

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Annexure A Operational Ground Water Monitoring Program

Refer to Rozelle Interchange Operational Environment Management Plan RIC-JHC-PLN-00-PL-400-001 Annexure G

Annexure B Operational Surface Water Monitoring Program

Refer to Rozelle Interchange Operational Environment Management Plan RIC-JHC-PLN-00-PL-400-001 Annexure H

Annexure C Dangerous Good Strategy

Dangerous goods management strategy
Purpose / Objectives
Operation and maintenance of the Asset has the potential to cause: • inappropriate storage or handling of dangerous goods and hazardous materials resulting in spillage and potential for pollution or contamination of water, air or soil • inadequate pre-works survey resulting in exposure to hazards (e.g. petrol stations or live services).
The objectives of this Dangerous Goods Strategy are: • safe storage handling and disposal of dangerous goods and hazardous materials • compliance with relevant regulations and legislation and minimise the risk of spill and occupational health and safety (OH&S) incident.
This Dangerous Goods Strategy has been developed to support the Operational Water Management Plan (OWMP) to satisfy **CoA E26h(vi)** and **(vii)**. For further information regarding the environmental obligations relevant to the management of water and soil, refer to Section 1.2 of the OWMP.

Management measures	Responsibility
General maintenance and repair work	
The project must obtain a licence where storage of dangerous goods for operations andmaintenance is in licensable quantities.	O&M Contractor
During site induction, advise all O&M personnel of the following: • **The location of bunded storage areas, liquid absorbent materials and other spillcontainment materials and kits.** • **The response actions to take in the event of a spill.** • **Storage of large quantities of fuel for O&M vehicles and plant is not permitted. Licensedfuel trucks carrying emergency fuel spill kits must be used to service plant and equipment.** • **All drums and decanted containers must be labelled and stored within bunded areaswhenever they are not in use. Whenever practical, all unattended drums/containers must be returned to the bunded storage area.**	O&M Contractor
O&M personnel to receive training, relevant to their responsibilities, via toolbox talks orawareness training, regarding the requirements (OH&S and environmental) related to handling, storage and disposal of dangerous goods and spill training.	O&M Contractor
Where possible and practicable, give priority to non-hazardous products when orderingmaterials.	O&M Contractor
Safety Data Sheets (SDS) for dangerous and hazardous substances will be obtained beforematerials arrive on site.	O&M Contractor
An SDS and Hazardous Products Register will be maintained and copies of all SDS documents will be retained in designated location(s) within the Asset.	O&M Contractor
Dangerous goods, as defined by the Australian Dangerous Goods Code, must be storedand handled strictly in accordance with: • **all relevant Australian Standards** • **for liquids, a minimum bund volume requirement of 110% of the volume of the largestsingle stored volume, within the bund** • **the Environment Protection Manual for Authorised Officers: Bunding and SpillManagement, technical bulletin (EPA, 1997).** **In the event of an inconsistency between the requirements listed above, the most stringentrequirement must prevail to the extent of the inconsistency.**	O&M Contractor

Management measures	Responsibility
Storage of goods must also consider: • ***Work Health and Safety Act 2011*** **(NSW)** • **Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW 2005)** • **Supplier's instructions**	O&M Contractor

Dangerous goods management strategy	
• Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (Environment Protection Authority 1997).	
Clearly label, use and handle liquid and dry chemicals (including pesticides, oils and fuels) in accordance with the instructions provided in its SDS document.	O&M Contractor
Liquid chemicals (including pesticides) and fuels will be stored in bunded storage areas or sheds that have the capacity to contain 110% of the volume of the largest single stored volume.	O&M Contractor
Signage indicating emergency contact numbers and fire extinguishers are to be provided at all fuel storage areas.	O&M Contractor
Spill kits will be provided at each storage area and at areas of the worksite where handling and use of dangerous goods occur. O&M personnel will be provided with appropriate training in spill response.	O&M Contractor
Hazardous waste will be managed by the appropriately qualified and licensed contractors, in accordance with the requirements of the *Environmentally Hazardous Chemicals Act 1985* and the EPA waste disposal guidelines.	O&M Contractor
Any fuel, lubricant or hydraulic fluid spills will be cleaned-up immediately using absorbent material and the contaminated material disposed of at a licensed waste facility.	O&M Contractor
Liquid and chemical wastes shall be handled and transported for disposal at an appropriate EPA licensed treatment or waste facility.	O&M Contractor
Transport of dangerous goods and hazardous substances will be conducted in accordance with relevant legislation and codes, including the *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW), *Dangerous Goods (Road and Rail Transport) Regulation 2014* (NSW) and the Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission 2008).	O&M Contractor
Water Treatment Plant	
In the event of an emergency at the water treatment plant, implement the management measures in the O&M Worksite Emergency Management Plan.	O&M Contractor
Water treatment plant chemicals to be stored in an appropriate bunded area at the water treatment plant.	O&M Contractor
Pesticides	
Use of pesticides (including herbicides) must be in accordance with the *Pesticides Act 1999* and RMS Specification G36 Environmental Protection.	O&M Contractor
Notify the public prior to and while applying pesticides.	O&M Contractor
Check licencing controls governing pesticide management to ensure that pesticides are not used without licencing authorisation.	O&M Contractor
Clearly label, use and handle pesticides in accordance with the instructions provided in its SDS document.	O&M Contractor
Only pesticides registered for use near water may be used near water.	O&M Contractor
Pesticide management training will form part of the induction, toolbox talks and/or environmental awareness training, as appropriate.	O&M Contractor
Monitoring	
Periodic site inspections, as described in Chapter 9 of the OEMP, will also be used to review environmental performance as will periodic inspections in the event that there is a concern about implementation or performance.	O&M Contractor
Auditing and review	
All environmental auditing of the Asset will be undertaken in accordance with Section 9.3 of the OEMP.	O&M Contractor / Project Company

Dangerous goods management strategy	
Notification and reporting	
Incidents and emergencies to be managed in accordance with OEMP Section 8.2.	O&M Contractor / Project Company
Reporting to DP&E to be managed in accordance with OEMP Section 9.6	Project Company

Annexure G Groundwater Monitoring Program

WestConnex Rozelle Interchange

Operational Groundwater Monitoring Program

Project:	Rozelle Interchange
Document Number:	RIC-JHC-PLN-00-PL-000-008
Revision Date:	27/07/2022

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
A	07/10/2022	JHCPB JV	JHCPB ESA Manager	Draft for internal review
B	29/11/2022	JHCPB JV	JHCPB ESA Manager	Issued to TfNSW
00	31/03/2023	JHCPB JV	JHCPB E&S Manager	Addressing TfNSW Comments for submission to DPE
01	27/07/2022	JHCPB JV	JHCPB ESA Manager	Addressing DPE comments

Contents

Annexures

Glossary / Abbreviations

Abbreviations	Definition
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
Bi-monthly	Every two months
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
CFU	Colony Forming Unit
DPIE	NSW Department of Planning, Industry and Environment
DoI Water	NSW Department of Industry Water (formerly DPI Water)
DPI Water	NSW Department of Primary Industries - Water
DPIE Water	NSW Department of Planning, Industry and Environment – Water (formerly DoI Water)
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative
GMP	Groundwater Management Sub-Plan
GMR	Groundwater Modelling Report
GWMP	Groundwater Monitoring Program
GWL	Groundwater level
GWQ	Groundwater quality
HSS	Hawkesbury Sandstone
JHCPB	John Holland CPB Contractors Joint Venture
mAHD	elevation in metres with respect to the Australian Height Datum
mBGL	metres below ground level
mTOC	metres below top of casing
m/day	metres per day
NRAR	Natural Resources Access Regulator
POEO Act	*Protection of the Environment Operations Act 1997*
µS/cm	micro-Siemens per centimetre

Abbreviations	Definition
REMM	Revised Environmental Management Measures
Roads and Maritime	Roads and Maritime Services (now Transport for NSW)
SP	Standpipe piezometer
SPIR	Submissions and Preferred Infrastructure Report
SSTV	Site Specific Trigger Value
TfNSW	Transport for NSW
VWP	Vibrating Wire Piezometer
WTP	Water Treatment Plant

1. Introduction

This Operational Groundwater Monitoring Program (OpGWMP or Program) has been prepared for the operation of the M4-M5 Link Rozelle Interchange (the Asset). This OpGWMP addresses the requirements of the Minister's Conditions of Approval (CoA), Project Approvals and all applicable guidance and legislation. This OpGWMP is based on baseline studies developed for the Project EIS (AECOM 2017) and continued baseline monitoring reports (AECOM 2018).

This Program provides details of the groundwater monitoring network, frequency of monitoring, and test parameters. This OpGWMP supplements the Operational Water Management Sub-plan (OpWMP), which itself is an appendix of the OEMP.

The scope of this OpGWMP is to describe how the operation and maintenance contractor propose to monitor the extent and nature of potential impacts to groundwater quality during operation of the Asset. Monitoring of groundwater will be undertaken to identify potential impacts and ensure a comprehensive management regime can be implemented to address those impacts and manage local groundwater quality

The Operational Monitoring Programs must be endorsed by the Environmental Representative (ER) and then submitted to the Secretary for approval at least one (1) month prior to commencement of Operation.

Operation will not commence until the Secretary has approved all required Operational Monitoring Programs.

The OpGWMP, as approved by the Secretary will be implemented for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, a review will be undertaken of future monitoring requirements in consultation with DPI Water. The review will determine if additional monitoring is required, and the time period for continued monitoring.

2. Objectives

This OpGWMP has been prepared to ensure all CoA, REMM, and licence/permit requirements relevant to groundwater monitoring are described, scheduled, and assigned responsibility as outlined in:

- All documents listed in CoA A1,
- Conditions of Approval: SSI-7485,
- Revised Environmental Measures (REMM)
- Roads and Maritime specifications G36, G38 and G40
- The Assets Operation Environment Protection Licence (EPL)
- All relevant legislation and other requirements

Table 1 CoA and REMM Compliance

<table>
<tr><th>CoA/ REMM No.</th><th>Condition Requirement</th><th>Doc Reference</th></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 operational performance against predicted performance.
<table>
<tr><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>(b) Groundwater Monitoring Program</td><td>DPI Water, relevant council(s), EPA and Sydney Water</td></tr>
</table></td><td>Section 3</td></tr>
<tr><td rowspan="10">D9</td><td>Each operational monitoring program must include:</td><td></td></tr>
<tr><td>(a) details of baseline data;</td><td>Section 4.1</td></tr>
<tr><td>(b) details of all monitoring of the project to be undertaken;</td><td>Section 5</td></tr>
<tr><td>(c) the parameters of the project to be monitored;</td><td>Section 5.1</td></tr>
<tr><td>(d) the frequency of monitoring to be undertaken;</td><td>Section 5.1.2 and 5.1.3</td></tr>
<tr><td>(e) the location of monitoring;</td><td>Sections 5.1.2.1 and 5.1.3.1</td></tr>
<tr><td>(f) the reporting of monitoring and analysis results against relevant criteria</td><td>Sections 6.1.1 and 6.1.3</td></tr>
<tr><td>(g) details of the methods that will be employed to analyse the monitoring data;</td><td>Sections 6.1.1</td></tr>
<tr><td>(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and</td><td>Sections 5.1.2.1 and 5.1.3.1</td></tr>
<tr><td>(i) any consultation to be undertaken in relation to the monitoring programs</td><td>Section 3</td></tr>
<tr><td>D11</td><td>The Operational Groundwater Monitoring Program must include:</td><td></td></tr>
<tr><td></td><td>(a) daily measurement of the amount of water discharged from all water treatment plants;</td><td>Section 5.2.1</td></tr>
</table>

	(b) water quality testing results of the water discharged from all water treatment plants;	Section 5.2.2.2
	(c) monitoring of groundwater pore pressures in the Hawkesbury Sandstone aquifers adjacent to the tunnel alignment, in consultation with DPI Water;	Section 5.1.2
	(d) monitoring of groundwater electrical conductivity in key locations between saline water bodies and the tunnel as identified by the project groundwater model including: (i) in the Haberfield / Lilyfield area to the south of Iron Cove, (ii) in the Rozelle area to the north of Rozelle Bay, (iii) in the Annandale area to the west of Rozelle Bay, (iv) in the Rozelle area to the south east of Iron Cove ……	Section 5.1.3.2
	(e) measures to record or otherwise estimate and report groundwater inflows into the tunnels;	Section 5.1.4
	(f) a method for providing the data collected in (a) and (b) to Sydney Water every three (3) months to demonstrate the project's compliance with the discharge criteria and, if applicable, the Proponent's trade waste licence;	Section 6.1.3
	(g) a process for annually forwarding data on the monthly volume of groundwater discharged from each water treatment plant to DPI Water for a minimum period of five (5) years, consistent with **Condition D12**;	Section 6.1.3
	(h) the installation of a minimum of two (2) groundwater open hole monitoring wells in the north Rozelle / Lilyfield area to the west of the ventilation tunnel at Iron Cove to monitor groundwater quality and groundwater levels, in consultation with DPI Water.	Section 5.1.3.2
D12	Groundwater monitoring must continue for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, the Proponent must undertake a review of future monitoring requirements in consultation with DPI Water. The review must determine if additional monitoring is required, and the time period for continued monitoring. The Proponent must notify the Secretary within two (2) weeks of the review as to the outcomes of the review and any requirements for future monitoring.	Section 7
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
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
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.	Section 1, Section 7
D17	The results of the **Operational Monitoring Programs** must be submitted to the Secretary, and relevant regulatory authorities, for information in the form of an **Operational Monitoring Report** at the frequency identified in the relevant **Operational Monitoring Program**.	Section 6.1.3

OGW10	• The groundwater monitoring program prepared and implemented during construction will be augmented and continued during the operational phase. • Groundwater will be monitored during the operations phase for three years or as otherwise required by the project conditions of approval and • will include trigger levels for response or remedial action based on monitoring results and relevant performance criteria. • At least three monitoring wells and vibrating wire piezometers (VWPs) should be constructed as close as possible to the tunnel centrelines to allow for the comparison of pore pressures and standing water levels. The wells could be constructed about 5-10 metres above the top of the tunnel crown to allow for groundwater drawdown monitoring in the Hawkesbury Sandstone. • The program will include procedures for **monitoring and reporting of extracted groundwater volumes to DPI-Water annually for the duration of construction and operation, unless otherwise agreed to or directed by the Secretary.** • The operational groundwater monitoring program will be developed in consultation with the NSW EPA, DPI-Fisheries, DPI-Water and the Inner West and City of Sydney **relevant** councils and documented in the OEMP or EMS.	• Section 1 • Section 7 • Section 5.1.2.1 and 5.1.3.1 • Section 5.1.2 • Section 6.1.3 • Section 3

3. Consultation

This program will be provided to DPI Water, Sydney Water, City of Sydney Council, Inner West Council in accordance with CoA D8(b). In addition, the document will also be offered to the EPA and NSW Fisheries for review and comment in accordance with REMM OGW9. Refer to Section 1.5 of the OEMP for consultation requirements relating to the OEMP and all sub-plans.

The Program is proposing to utilise bores from the existing construction monitoring network. This network was developed in consultation with DPI Water with the objective of providing coverage along the alignment and to be located near sensitive environmental features or potentially contaminated areas.

A summary of consultation undertaken during the development of the OpWMP and OpGWMP is included in the OpWMP.

Community feedback and complaints relating to groundwater will be managed in accordance with Section 7 of the OEMP.

4. Groundwater monitoring

4.1. Baseline monitoring

4.1.1. Monitoring network

Baseline groundwater level and groundwater quality monitoring data has been collected from the Asset groundwater monitoring network since June 2016. This baseline dataset is augmented by baseline data and construction data collected since October 2015 for the adjacent M4 East and New M5 projects. The purpose of the baseline groundwater level and quality monitoring was to establish pre-construction levels and flow conditions across the Asset area to inform groundwater modelling

and the EIS (AECOM 2017) and subsequently the construction groundwater monitoring program and plan.

The Project baseline monitoring network was installed between May 2016 and May 2017 and consists of 34 monitoring bores, located within the confines of the Project construction works, intersecting groundwater within the alluvium and Hawkesbury Sandstone. Monitoring bores were designed and constructed to target the expected tunnel zone and allow the assessment of potential impacts to groundwater. At one location where alluvium was present, nested monitoring bores were constructed.

Monitoring bores have been designed to target the following hydrogeological formations:

- Alluvium
  - 5 at the Crescent
  - 4 at Rozelle
- Hawkesbury Sandstone
  - 18 at Rozelle
  - 3 at the Crescent
  - 2 at Iron Cove
  - 2 at Easton Park

In addition to the collection of groundwater quality and groundwater level data, baseline studies to inform the Project EIS (AECOM 2017) included the collection of hydraulic data for the local aquifer systems (including packer tests). This data is not discussed further in this document as it has no relevance to the ongoing monitoring program.

The baseline monitoring bore network is shown in Table 3 and Figure 1. Baseline monitoring results are found in Annexure A and B.

The following sections summarise the factors influencing groundwater within the Project. The Project transects a highly urbanised environment that consists of established industrial, commercial, recreational, and residential areas. The alignment encompasses the Rozelle interchange network that is situated within Rozelle and Easton Park and extends from the proposed Iron Cove Link joining Victoria Road at Parramatta River to the north, the intersection of Victoria Road and the Crescent at Rozelle Bay to the east, and through to Lilyfield in the south, before linking with the Mainline Tunnel at Leichardt.

The key reference document is Chapter 19, Groundwater, of the EIS (AECOM 2017).

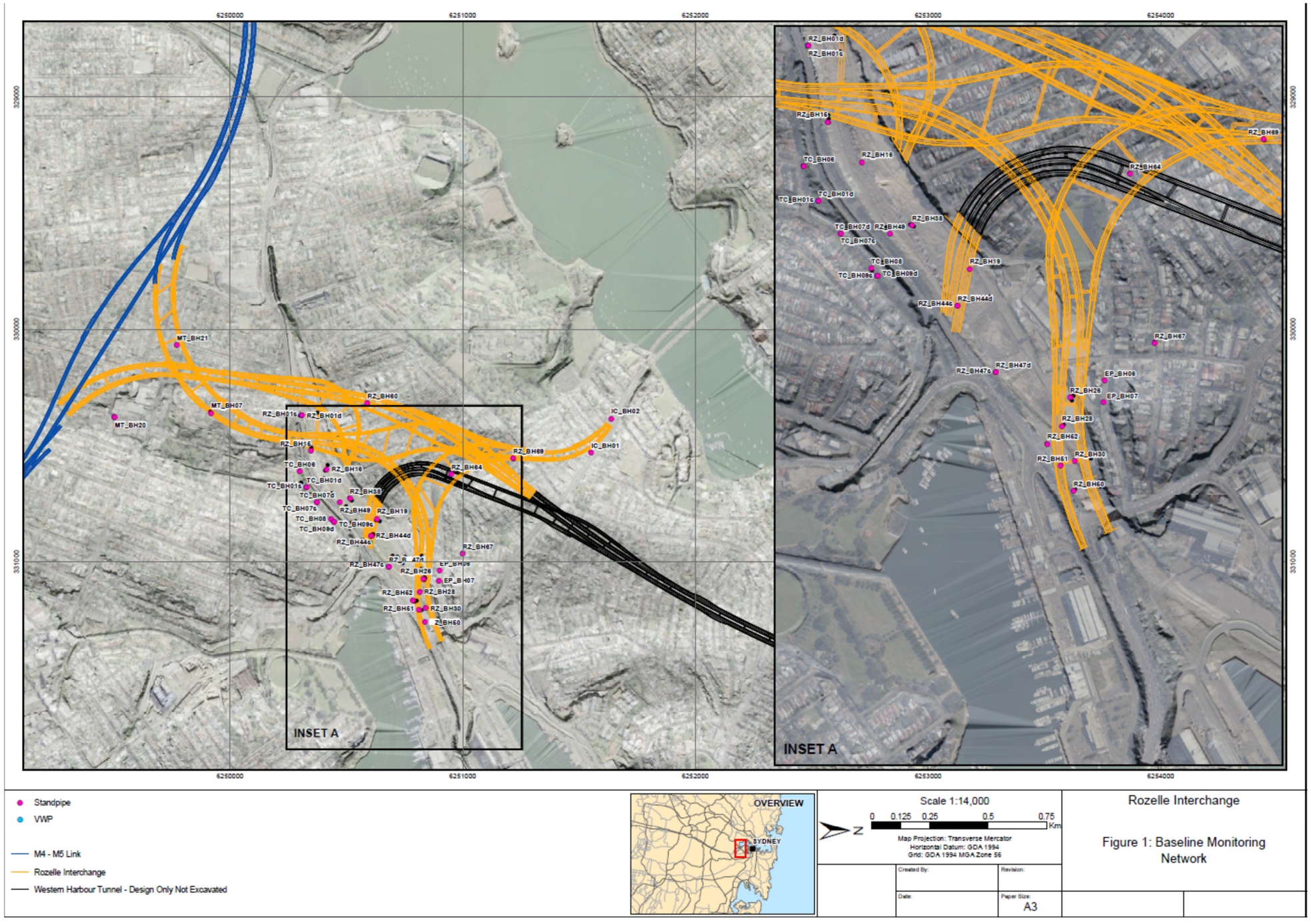
Table 2: Baseline groundwater monitoring network

Bore ID	Location	Easting	Northing	Screened interval (mBGL)	Lithology	Used in EIS for baseline groundwater level monitoring	Number of water quality samples analysed during baseline monitoring
Rozelle							
RZ_BH01d	Rozelle Rail Yard	330608.87	6250381.26	22-25	HSS	Yes	22
RZ_BH01s	Rozelle Rail Yard	330611.47	6250381.61	7-10	Alluvium	Yes	22
RZ_BH15	Rozelle Rail Yard	330522.59	6250349.91	18-21	HSS	Yes	22
RZ_BH16	Rozelle Rail Yard	330609.43	6250409.41	17-20	HSS	Yes	22
RZ_BH19	Rozelle Rail Yard	330822.45	6250626.95	19-22	HSS	Yes	20
RZ_BH26	East of RRY	331066.28	6250835.05	20-23	HSS	Yes	22

Bore ID	Location	Easting	Northing	Screened interval (mBGL)	Lithology	Used in EIS for baseline groundwater level monitoring	Number of water quality samples analysed during baseline monitoring
RZ_BH28d	Rozelle Rail Yard	331126.56	6250818.78	27-30	HSS	Yes	19
RZ_BH30	Rozelle Rail Yard	331192.90	6250834.96	16-19	HSS	Yes	18
RZ_BH38	Rozelle Rail Yard	330726.61	6250812.07	28-31	HSS	Yes	21
RZ_BH44d	Rozelle Rail Yard	330885.77	6250613.96	25-28	HSS	Yes	20
RZ_BH44s	Rozelle Rail Yard	330884.43	6250613.29	12-15	Alluvium	Yes	21
RZ_BH47d	Rozelle Rail Yard - RZ Bay	331025.23	6250701.67	27-30	HSS	No	21
RZ_BH47s	Rozelle Rail Yard - RZ Bay	331027.87	6250703.96	15-18	Alluvium	Yes	21
RZ_BH49s	Rozelle Rail Yard	330730.38	6250461.58	13-16	Alluvium	No	20
RZ_BH50	Rozelle Rail Yard	331255.63	6250841.07	22-25	HSS	Yes	19
RZ_BH51	Rozelle Rail Yard	331206.58	6250813.32	19-22	HSS	Yes	18
RZ_BH52	Rozelle Rail Yard	331163.77	6250784.58	32-35	HSS	Yes	20
RZ_BH53	SHFA	331100.88	6250738.06	18-21	HSS	No	0
RZ_BH60	Opposite 46 Justin St, Lilyfield	330317.83	6250589.57	56-59	HSS	Yes	13
RZ_BH64	Brockley Street, Rozelle	330623.50	6250949.00	46-49	HSS	Yes	13
RZ_BH67	Alfred St, Rozelle	330961.48	6250999.73	46-49	HSS	No	10
RZ_BH69	Albion St, Rozelle	330558.20	6251218	38-41	HSS	No	4
The Crescent							
TC_BH01d	RailCorp, Lilyfield	330661.99	6250305.25	25-28	HSS	No	23
TC_BH01s	RailCorp, Lilyfield	330660.57	6250304.92	3-6	Alluvium	Yes	22
TC_BH06s	Railway Pde, Annandale	330610.16	6250298.14	4.5-7.5	Alluvium	Yes	19
TC_BH07d	Railway Pde, Annandale	330746.03	6250373.53	19-22	HSS	Yes	16
TC_BH07s	Railway Pde, Annandale	330747.41	6250374.95	3-6	Alluvium	Yes	22
TC_BH08s	Railway Pde, Annandale	330818.34	6250435.89	5-8	Alluvium	Yes	22

Bore ID	Location	Easting	Northing	Screened interval (mBGL)	Lithology	Used in EIS for baseline groundwater level monitoring	Number of water quality samples analysed during baseline monitoring
TC_BH09d	Railway Pde, Annandale	330830.31	6250444.46	21-24	HSS	Yes	22
TC_BH09s	Railway Pde, Annandale	330830.70	6250445.81	2-5	Alluvium	No	11
Iron Cove							
IC_BH01	Waterloo St, Rozelle	330514.22	6251504.54	23-26	HSS	Yes	15
IC_BH02	Toelle St, Rozelle	330334.97	6251646.37	8-11	HSS	No	9
Easton Park							
EP_BH06	Lilyfield Rd, Rozelle	331025.39	6250903.92	10-13	HSS	Yes	18
EP_BH07	Starling St, Lilyfield	331082.28	6250898.80	10-13	HSS	Yes	18
Main Tunnel							
MT_BH07	White Creek Reserve, Lilyfield	330355.81	6249914.91	43-46	HSS	Yes	16
MT_BH20	John Street, Leichhardt	330379.4	6246735.87	41-44	HSS	No	6
MT_BH21	Ainsworth St, Lilyfield	330066.72	6249771	47-50	HSS	Yes	7
Rozelle Rail Yard once off contamination sampling							
RZ_BH081	Rozelle Rail Yard	330831.19	6250767.25	2.5-3.2	Alluvium	N/A	N/A
RZ_BH101	Rozelle Rail Yard	330871.54	6250706.63	1.0-4.0	Alluvium	N/A	N/A
RZ_BH103	Rozelle Rail Yard	330943.03	6250752.15	0.7-2.7	Alluvium	N/A	N/A
RZ_BH105	Rozelle Rail Yard	331013.16	6250752.15	1.5-4.5	Alluvium	N/A	N/A
RZ_BH107	Rozelle Rail Yard	330888.30	6250817.43	2.5-4.5	Alluvium	N/A	N/A
RZ_BH109	Rozelle Rail Yard	330898.71	6250716.34	0.9-3.1	Alluvium	N/A	N/A
RZ_BH111	Rozelle Rail Yard	330946.47	6250745.17	1.1-3.4	Alluvium	N/A	N/A
BH57	Rozelle Rail Yard	330945.60	6250740.73	2.0-5.0	Alluvium	N/A	N/A
BH60	Rozelle Rail Yard	330995.16	6250763.70	1.0-4.0	Alluvium	N/A	N/A

Figure 1: Baseline Monitoring Network



4.1.2. Baseline Groundwater quality

Baseline monthly groundwater quality monitoring commenced in June 2016 or later as each monitoring location became operational. The objectives for the baseline groundwater quality monitoring program included:

- Characterise the existing hydrogeochemistry in the three main hydrogeological units (alluvium, Ashfield Shale (note: this unit is absent in the current Asset area), and Hawkesbury Sandstone)
- Establish the environmental value and beneficial use of groundwater under existing (pre-construction) conditions
- Develop a groundwater quality baseline dataset to inform the EIS
- Characterise the potential aggressiveness of the native groundwater to the building material used to construct the Asset infrastructure
- Obtain a preliminary understanding of the groundwater treatment requirements prior to discharge during the construction and operation phases.

A summary of the groundwater quality samples collected from June 2016 for each hydrogeological unit within the confines of the Project is shown in Table 4.

Table 3: Baseline groundwater quality sampling program

	Alluvium	Hawkesbury Sandstone	Total
# of samples	180	406	586

The baseline groundwater quality sampling program included the following analytes:

- Physico-chemical field parameters (temperature, dissolved oxygen, electrical conductivity (EC), pH, and redox potential)
- Major ions (calcium, magnesium, sodium, potassium, chloride, sulphate, carbonate and bicarbonate)
- Dissolved metals (arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc)
- Nutrients (nitrite as N, nitrate as N, reactive phosphorus and ammonia)
- Benzene, toluene, ethylbenzene, xylene, and naphthalene (BTEXN)
- Total recoverable hydrocarbons (TRHs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Organochlorine pesticides (OCPs)
- Organophosphate pesticides (OPPs)
- Semi-volatile organic hydrocarbons (SVOCs)
- Volatile organic compounds (VOCs)
- Sulphate reducing bacteria.

Interpretation of the baseline groundwater monitoring data is included in the EIS (AECOM 2017) and is summarised in Table 5.

Table 4: Summary of baseline groundwater quality

Parameter	Alluvium	Hawkesbury Sandstone
EC	Range: 328 to 74,800 µS/cm	Range: 149 to 9,910 µS/cm
pH	Weakly acidic to weakly basic Range: 5.96 to 8.06	Slightly acidic to strongly basic Range: 5.77 to 12.69
Major ions	Dominated by sodium, magnesium, chloride and bicarbonate. The dominance of sodium and chloride is attributed to tidal influences.	Dominated by sodium and chloride, which may be in part due to the influence of saline water intrusion.

Parameter	Alluvium	Hawkesbury Sandstone
Metals	Maximum levels exceeded guideline concentration values for all but cadmium and nickel. In most cases the exceedance is marginal, indicating that background levels are already elevated.	Maximum levels exceeded guideline concentration values for chromium, copper, iron, lead, manganese, nickel, and zinc. Consistently elevated iron and manganese, which is typical for Hawkesbury Sandstone (McKibbon and Smith 2000).
Nutrients	Nitrite and nitrate concentrations indicate that background nutrient levels are low. Reactive phosphorous levels are also low. Ammonia values exceeded guideline[1] concentration values.	Nitrite and nitrate concentrations indicate that background nutrient levels are low. Reactive phosphorous levels are very low. Ammonia values marginally exceeded guideline[1] concentration value.
Sulfate reducing bacteria[2]	Not assessed	No pattern was assessed for sulfate reducing bacteria because many samples were above the measurement limit (500,000 CFU/mL). Groundwater from the Hawkesbury Sandstone has high sulfate concentrations. When reducing conditions are present, SRB flourish in the absence of oxygen.
Groundwater aggressivity	Not assessed	Mildly aggressive towards concrete piles for average concentrations of chloride, pH, and sulfate. Mildly aggressive towards steel piles for average concentrations of chloride and pH. Severely aggressive towards steel piles for groundwater with low conductivity.

EC = electrical conductivity; µS/cm = micro-Siemens per centimetre
[1] Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000)
[2] measured as a colony forming unit (CFU) per 100 mL

5. Operational monitoring

5.1.1. Overview

As identified in baseline monitoring and the EIS, potential impacts on groundwater during construction and operations were identified as:

- Groundwater level decrease in the vicinity of the Asset tunnels (groundwater drawdown)
- Intrusion of saline water in tidal zones

Groundwater level and groundwater quality (salinity) monitoring will be carried out during operations utilising background monitoring wells from construction phase, where functional, for consistency. Groundwater inflows within the Asset tunnels, and subsequent discharge via the Operational WTP, will also be monitored as per CoA D11.

The operational monitoring includes:

- Groundwater level
- Groundwater quality (EC) at key bores
- Groundwater inflow to the tunnels
- Water Treatment Plant Discharge

The locations of the monitoring wells for Operation have been determined in consultation with DPI Water and a qualified hydrologist during the construction phase to allow consistency across monitoring, bores used for monitoring during construction, that are still intact, will also be used for operation.

Throughout the operational phase, It may be necessary to construct additional monitoring bores if some of the operational bores are inaccessible or damaged or as a possible management action as

part of an investigation into discrepancies in monitoring data, if required. Should any well become inoperable or damaged the position of the replacement well has a 100 metre buffer to facilitate re-positioning, where necessary, to avoid potential utility clashes, minimise vegetation clearance, avoid heritage impacts and reduce impacts to traffic and pedestrians where possible.

5.1.2. Groundwater level Monitoring

Groundwater level dataloggers have been maintained, where possible, from the baseline and construction monitoring phase to provide continuous data collection during operation.

Dataloggers will be programmed to record at hourly intervals. Vibrating wire piezometers (VWPs) will be used to validate drawdown predictions from the groundwater model. More than three VWPs are installed in accordance with REMM OGW10 as close as possible to the tunnel centrelines to allow for the comparison of pore pressure (recorded by the VWPs) and standing water level (recorded by standpipe groundwater monitoring bore). As stated in REMM OGW10, all the wells for operational monitoring have been constructed about five to ten meters above the top of the tunnel crown to allow for groundwater drawdown during monitoring within the Hawkesbury sandstone. The location of these VWPs has been undertaken in consultation with DPI Water during construction phase. The details and location of the VWPs are included in Table 6 and Figure 2 below.

To supplement the above continuous monitoring, manual measurements will be collected every two months (bi-monthly), pending access, at each bore in the operational monitoring network in Table 6. Measurements will be recorded in metres below top of casing (mbTOC) and converted to metres below ground level (mBGL) and metres Australian Height Datum (mAHD).

Recorded data will be compensated for barometric pressure and converted to a groundwater level measurement. Manual monitoring data will be used to verify continuous data.

Groundwater level data will be compared to local rainfall records to assess trends.

5.1.2.1. Performance criteria

Seasonal fluctuation considered within the EIS groundwater model (AECOM 2017) will facilitate the assessment and comparison between groundwater level decrease and the predicted drawdown from the Asset. See Annexure B for the baseline groundwater level monitoring summary. The assessment will determine whether the observed decrease is attributable to the Asset and, if so, whether it aligns with predictions. Data analysis is described in Section 5.1.2 and water monitoring reports will be produced every six months to assess this which will include data summary reports presenting tabulated groundwater monitoring data collected during the reporting period.

If drawdown is identified outside of model predictions, management actions will be initiated including (but not limited to) a review of baseline groundwater level and quality data in the relevant and surrounding monitoring bores as well as a review of groundwater inflow rates into the tunnel.

Refer to Annexure G of the Hydrological Interpretation Report-Groundwater Predictive Modelling and Sensitivity Analysis for model predictions.

Table 5: Operational phase groundwater Level monitoring bores

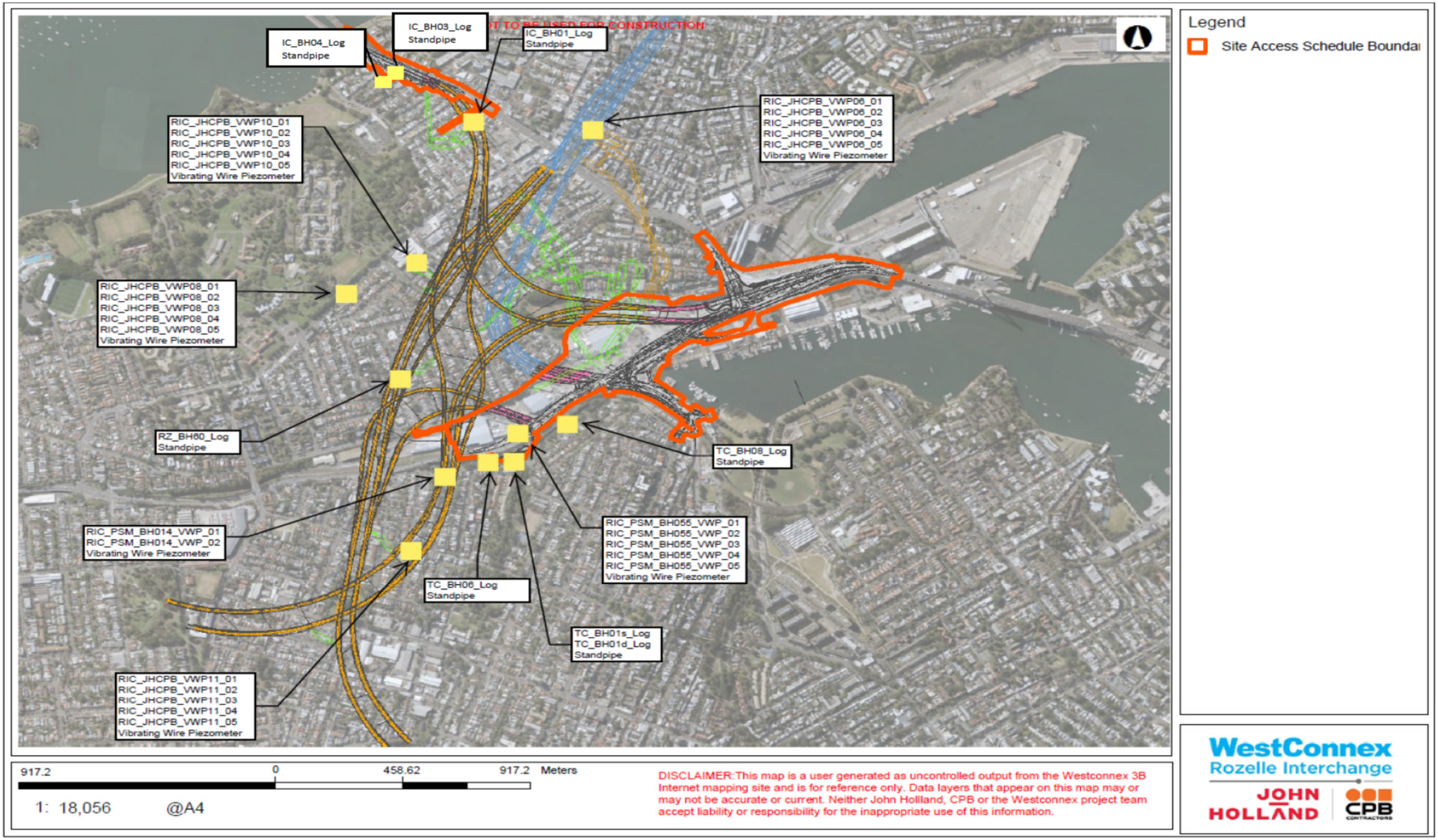
Bore ID	Location	Easting	Northing	Elevation (mAHD)	Lithology	Type	Parameters

RIC_PSM_BH008_VMP_011	Street between Justin St and Lamb St, Lilyfield	330338.3	6250772	-5.54	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH008_VMP_021	Street between Justin St and Lamb St, Lilyfield	330338.3	6250772	-26.54	Hawkesbury Sandstone	VWP	Pore pressure/ GWL
RIC_PSM_BH008_VMP_031	Street between Justin St and Lamb St, Lilyfield	330338.3	6250772	-47.54	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
TC_BH01d Log	RailCorp, Lilyfield	330660.6	6250304.9	2.54	Hawkesbury Sandstone	*SP*	GWL, GWQ (EC)
TC_BH01s Log	RailCorp, Lilyfield	330660.6	6250304.9	2.55	Alluvium	*SP*	GWL, GWQ (EC)
TC_BH06_Log	Railway Pde, Annandale	330611.4	6250298.3	2.65	Alluvium	*SP*	GWL, GWQ (EC)
TC_BH08_Log	Railway Pde, Annandale	330818.3	6250435.9	2.24	Alluvium	*SP*	GWL, GWQ (EC)
IC_BH01 Log	Waterloo St, Rozelle	330514.2	6251505	26.77	Hawkesbury Sandstone	*SP*	GWL, GWQ (EC)
RIC_JHCPB_V WP06_01	National St, Rozelle	330875.4	6251485	10.03	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP06_02	National St, Rozelle	330875.4	6251485	0.03	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP06_03	National St, Rozelle	330875.4	6251485	-9.97	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP06_04	National St, Rozelle	330875.4	6251485	-39.97	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP06_05	National St, Rozelle	330875.4	6251485	-79.97	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP8_01	Balmain Rd, Lilyfield	330150.8	6250888	10.04	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP8_02	Balmain Rd, Lilyfield	330150.8	6250888	-9.9593	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP8_03	Balmain Rd, Lilyfield	330150.8	6250888	-29.9593	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP8_04	Balmain Rd, Lilyfield	330150.8	6250888	-49.9593	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP8_05	Balmain Rd, Lilyfield	330150.8	6250888	-79.9593	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL

RIC_JHCPB_V WP10_01	Fred St, Lilyfield	330357.2	6250996	10	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP10_02	Fred St, Lilyfield	330357.2	6250996	-10	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP10_03	Fred St, Lilyfield	330357.2	6250996	-30	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP10_04	Fred St, Lilyfield	330357.2	6250996	-50	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL
RIC_JHCPB_V WP10_05	Fred St, Lilyfield	*330357.2*	*6250996*	*-80*	Hawkesbury Sandstone	*VWP*	Pore pressure/ GWL

HSS = Hawkesbury Sandstone; GWL = Groundwater level; GWQ = Groundwater quality; SP = Standpipe piezometer; VWP = Vibrating Wire Piezometer

Figure 2: Operational Groundwater Level Monitoring Network– standpipe and vibrating wire piezometers



5.1.3. Groundwater salinity

Dedicated dataloggers with specification allowing the measurement of electrical conductivity (EC) will be installed at the key monitoring bores between the tunnel alignment and saline water bodies. The dataloggers will be programmed to record data on an hourly basis.

Dataloggers will be downloaded bi-monthly (every two months). Electrical conductivity (EC) results will be assessed to detect changes in water quality that may indicate the intrusion of saline water towards the tunnel in accordance with CoA D11 (d).

5.1.3.1. Performance criteria

Baseline monitoring shows that some groundwater quality parameters exceed the default ANZECC (2000) water quality trigger values for slightly to moderately disturbed ecosystems. This is not unexpected given the highly disturbed and urbanised Asset area.

Site-specific trigger values (SSTV), inTable 6, for EC have been developed for each water quality monitoring bore for operation using the baseline data used to inform the EIS (AECOM 2017). The SSTVs were derived by calculating the 80th percentile values of the baseline EC data (using ANZECC 2000 and 2018 methodology). A percentile is the value below which a given percentage of observations fall. The 80th percentile is therefore the value below which 80% of observations are found. Using these percentiles removes anomalous data that is outside of the normal range (defined here as 0 – 80 % of values). These were the same SSTVs used during the construction phase.

The SSTVs provide an easily identifiable indication of a potential change in salinity. A management response would be initiated if any of the following occurs:

- The EC data continuously exceeds the SSTV over a period of three months and depicts a rising trend
- The EC data exceeds the SSTV at any time by more than 100%

If one or both above EC triggers are observed a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess the historical and surrounding monitoring bore data, and modelling predictions.

If the exceedance is determined to be attributable to the operation of the Asset and outside of approved model predictions for saline intrusion the groundwater model will be reviewed and updated. The updated model will be used to assess potential impacts and inform potential mitigation measures.

Table 6: Salinity (EC) trigger values

Region	Baseline Monitoring bore[1]	Lithology	SSTV[2] (µS/cm)
Rozelle			
	LR_BH01[3]	Hawkesbury Sandstone	TBC
Annandale	TC_BH06s	Alluvium	2,400
	TC_BH01d	Hawkesbury Sandstone	3,900
	TC_BH01s	Alluvium	30,100
	TC_BH08	Alluvium	13,500
Iron Cove	IC_BH01	Hawkesbury Sandstone	2,100
	IC_BH03	Hawkesbury Sandstone	710

Region	Baseline Monitoring bore[1]	Lithology	SSTV[2] (µS/cm)
	IC_BH04	Hawkesbury Sandstone	590

EC = electrical conductivity; µS/cm = micro-Siemens per centimetre
[1] Key monitoring locations.
[2] SSTV = site specific trigger value (80th percentile of baseline data, rounded to nearest 100)
[3] Bore was installed during construction. No baseline data available to. Prior to operation a SSTV can be established based on (80th percentile of construction data, rounded to nearest 100)

5.1.3.2. Operational Salinity Logger Locations

In line with MCoA D11 (d) see below corresponding bore ID for each key location identified :

(i) in the Haberfield / Lilyfield area to the south of Iron Cove, (LR_BH01)

(ii) in the Rozelle area to the north of Rozelle Bay, (LR_BH01)

(iii) in the Annandale area to the west of Rozelle Bay, (TC_BH06, TC_01d)

(iv) in the Rozelle area to the south-east of Iron Cove (IC_BH01)

In line with MCoA D11 (h)a minimum of two (2) groundwater open hole monitoring wells in the north Rozelle / Lilyfield area to the west of the ventilation tunnel at Iron Cove are located at IC_BH03 and IC_BH04, referenced in Table 6 below and Figure 4 below. These wells have been installed in consult during construction phase in consultation with DPIE Water

If any operational monitoring bore is damaged or become unavailable any relocated bore is to be as local to the original position as constraints allow, as well as having an equivalent screened interval. This is to allow future EC values to be compared against those in this table. Relocation to be conducted in consultation with a suitably qualified hydrogeologist.

Locations of all salinity loggers for operational monitoring are in Figure 3 and Figure 4.

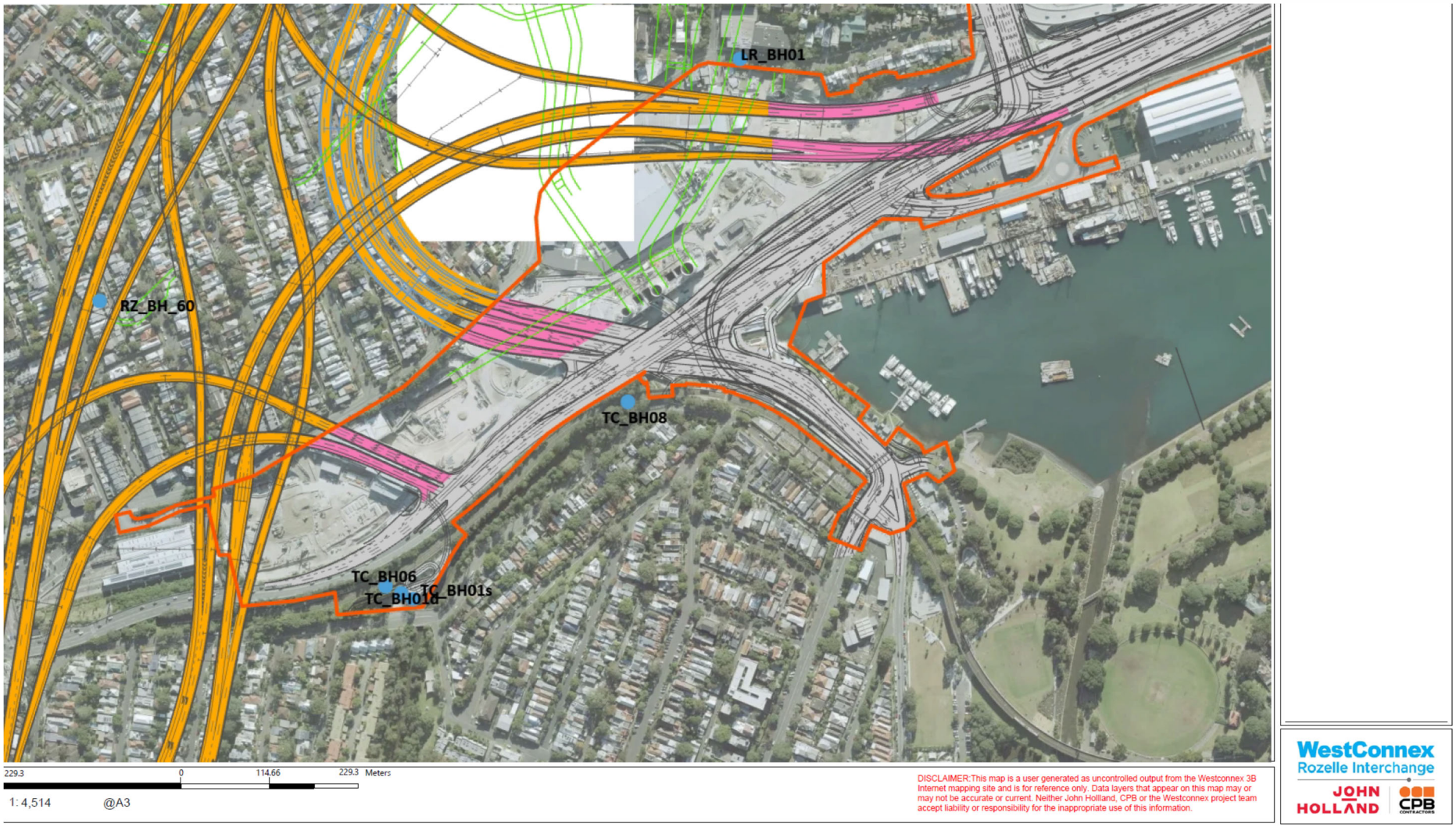


Figure 3 Operational phase groundwater monitoring network – salinity logger locations (Rozelle)

Figure 4 Operational phase groundwater monitoring network – salinity logger locations (Iron Cove)

5.1.4. Tunnel inflow Monitoring

During operations, groundwater will be intersected and managed by capturing the water that enters the tunnels through drainage and sumps. In accordance with CoA E190

The Proponent must take all practicable measures to limit operational groundwater inflows into each tunnel to no greater than one litre per second across any given kilometre (1L/s/km). Compliance with this condition is measured per 120m and per 1000mas per the Hydrological Interpretation Report (HIR).

A simple water balance approach will be used to estimate groundwater inflows to the tunnel during Operations:

Groundwater inflow = WTP discharge – Project water inputs

5.2. Water treatment plant monitoring

Groundwater captured during operation of the Asset will be treated at one water treatment plant at the operational maintenance yard. The water from the treatment plant will be tested and either reused where possible or discharged in accordance with this the Operational EPL and MCoA.

5.2.1. Tunnel discharge volume

Discharge volumes will be continuously monitored at the WTPs via calibrated flow meters, which will enable the daily measurement of the amount of water discharged from the WTPs.

5.2.2. Discharge water quality

5.2.2.1. Water treatment plant commissioning

The main objectives of the commissioning testing will be to determine:

- If the OpWTP performs to meet the proposed discharge criteria
- If any design or operational modifications may be required to the OpWTP for it to meet the required specifications, and
- The relationship between TSS and turbidity to allow turbidity to be measured as a proxy for TSS — this will require more samples than for the other parameters and may continue into the post-commissioning phase.

The OpWTP will not be deemed commissioned until two rounds of testing confirm compliance with the criteria. If monitoring results exceed, the commissioning process will be continued, and adjustments made, if necessary, until two subsequent rounds of testing are compliant.

5.2.2.2. Water treatment plant post-commissioning

Treated water shall be tested as detailed in Section 5.2.2.3.

The results will be reviewed by trained personnel to ensure that the discharged water meets discharge criteria and to ensure that the WTP continues to meet design specifications. Where in-line sensors (typically pH and turbidity) or monitoring identify OpWTP performance drift outside of the required criteria measures will be implemented to return the OpWTP performance back into the required range. In these instances, water will be either retreated to achieve the WTP performance criteria, discharged to trade waste (where permitted), re-used on site or disposed offsite at an appropriate licenced liquid waste facility. Water quality will be monitored via in-line sensors calibrated pH and turbidity sensors with appropriate alerts set to inform management of any drift in OpWTP performance.

Water quality results will be analysed monthly, and along with an overview of corrective actions will be reported in the six-monthly water monitoring report.

5.2.2.3. Performance criteria

In accordance with CoA E187 water to be discharged from the operational water treatment plant must comply with ANZECC (2000) guidelines trigger values for 95% species protection level and a 99% protection levels for contaminants the bioaccumulate unless other discharge criteria are agreed in consultation with relevant stakeholders including EPA, DPI Water and Sydney. In accordance with CoA E187 Discharge criteria for iron during operation must comply with the ANZECC (2000) recreational water quality criteria of 0.3 mg/LREMM OSW16 which specifies 1.9 mg/L for Manganese.

Grab samples will be collected manually from the OpWTP locations and sent to a NATA accredited laboratory for analysis for the analytes specified in Table 2.

Discharge from the water treatment plant shall be laboratory tested monthly for compliance with condition of approval E187. If an agreement with EPA, DPI – Water and Sydney Water is in place the terms of the agreement shall be the WTP performance criteria.

Table 2 Treated water testing and discharge criteria

Parameter	Unit	WTP performance criteria
pH	pH	6.5-8.5
Suspended solids	mg/L	50
Cadmium	mg/L	0.0007
Chromium (hexavalent)	mg/L	0.0044
Chromium (trivalent)	mg/L	0.0274
Copper	mg/L	0.0013
Iron[4]	mg/L	0.3
Lead	mg/L	0.0044
Mercury	mg/L	0.0001
Nickel	mg/L	0.07
Zinc	mg/L	0.015

Field physico-chemical parameters including temperature, EC, pH, DO, TDS, ORP, and turbidity will be measured at the OpWTP monthly using a fully calibrated water quality meter. Other observations including odour and colour will also be recorded.

The water quality meters will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling. Calibration records will be maintained in accordance with the appropriate standard.

5.2.3. Quality Assurance and documentation

Quality assurance and control protocols during sampling and recording of physico-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. These are to include:

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

Samples are to be transported to a NATA-accredited laboratory under documented 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 initiated if required.

All monitoring and sampling will be documented and transferred to a central electronic database under the responsibility of the O&M Environment Manager. This data will be reviewed and assessed against the specific performance criteria.

Results will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date, location, and sampler details.

The field sheet will detail:

- Prevailing weather conditions
- Prevailing tidal movement (where applicable)
- Name of sampler

Time and date of sampling.

6. Compliance management

6.1. Roles, responsibility and training

The O&M overall roles and responsibilities are outlined in Section 5.17 of the OEMP. Specific responsibilities for the implementation of environmental controls are detailed in the GMP.

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

Further details regarding staff induction and training are outlined in Section 6 of the OEMP.

6.1.1. Data analysis

Results from the operational monitoring program will be compared with the SSTVs and flow rates following each bi-monthly sampling event for ground water salinity, monthly for water quality, and in-line continuous monitoring.

Monitoring results of groundwater level will involve recorded data being compensated for barometric pressure and converted to a groundwater level measurement. Manual monitoring data will be used to verify continuous groundwater level data. Groundwater level data will be compared to local rainfall records to assess trends.

Water quality results from the WTP will be analysed monthly, and along with an overview of corrective actions will be reported in the six-monthly water monitoring report. The monitoring results will be compared against the requirements for discharge in the operational EPL.

Monitoring results for EC will be compared against SSTVs bi-monthly and reported in the water monitoring reports. If results trigger a response, management actions will be implemented, as required, should an initial review determine a potential impact outside of approved predictions.

6.1.2. 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.

6.1.3. Reporting

During operations, groundwater level and EC will be collected, tabulated and assessed against performance criteria. Monitoring reports will be submitted to DPE, DPI Water, Sydney Water and Port Authority of NSW within 60 days of the reporting period unless otherwise agreed with DPI.

Data provision and reporting requirements associated with the Program for the operational phase of the Project are presented in Table 9.

Table 7: Reporting requirements

Schedule (during construction)	Requirements	Recipient (relevant authority)
Reporting		
Water monitoring reports (every six months)	Data summary reports presenting tabulated groundwater monitoring data collected during the reporting period. Groundwater level hydrographs (including rainfall) and water quality (EC) results will be presented and SSTV exceedances will be highlighted. Applicable management responses will be documented. Compliance against discharge criteria will also be presented.	DPE, DPI Water Water, Sydney Water, Port Authority of NSW
EPL Monitoring Reports and Annual Returns	EPL monitoring reports will be prepared in accordance with the requirements of the EPL. An EPL Annual Return will be prepared in respect of each EPL reporting period (typically 12 months).	EPA
Data provision		
Quarterly (every 3 months)	WTP discharge water quality and flow data (raw data collated and tabulated in Excel) To demonstrate compliance with the CoA (D11(f)), Project discharge criteria and if applicable, trade waste licence.	Sydney Water
Annually	Monthly volume of groundwater discharged from each water treatment plant to DPI Water for a minimum period of five (5) years, consistent with Condition D12; To demonstrate compliance with the CoA (D11(g)).	DPI Water

7. Review and improvement

Monitoring data will be reviewed throughout the operational period to provide validation of the groundwater model and potential requirements to increase, or decrease, the number of sampling locations and/or the analytical suites.

In accordance with CoA D 12 groundwater monitoring will continue for a period of at least five years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one month prior to the end of the five year monitoring period, a review will be undertaken of future monitoring requirements in consultation with DPI Water. The review will determine if additional monitoring is required, and the time period for continued monitoring.

Any need to update or revise this Program will be done in line with Section 1.4 of the OEMP.

8. References

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NSW Roads and Maritime Services, 2017. M4-M5 Link Environmental Impact Statement, August 2017.

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Annexure A Baseline Groundwater Quality Sampling Program Summary

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
RZ_BH01D	27/07/2016	19.4	1.17	1373	7.04	-117.3
	30/08/2016	20.4	1.79	1491	6.63	-116.1
	29/09/2016	18.6	1.43	1261	9.88	-167.6
	24/10/2016	20.7	1.21	1979	6.01	-6.1
	25/10/2016	21.1	0.38	2146	6.0	-14.5
	28/11/2016	22.4	1.25	1987	6.78	-81.9
	12/12/2016	22.7	2.75	1408	6.65	-72.0
	12/01/2017	23.1	2.85	1817	6.74	-22.0
	14/02/2017	20.4	0.60	1869	6.43	-68.0
	13/03/2017	22.1	1.24	1646	6.92	-114.6
	26/04/2017	22.7	2.54	1876	6.79	-69.2
	24/05/2017	20.3	3.35	1489	6.37	19.3
	15/06/2017	19.4	0.93	1246	6.92	19.4
	18/07/2017	18.9	3.65	892	7.12	-126.0
	11/08/2017	20.7	1.56	1339	8.52	-123.4
	19/10/2017	25.4	2.95	1932	7.75	-73.3
	21/11/2017	21.8	4.13	452	8.65	119.7
	11/01/2018	22.5	2.93	742	7.3	-129.5
	15/02/2008	24.0	2.66	1644	7.25	-125.0
	15/03/2018	24.3	6.25	307	11.3	-95.0
	16/04/2018	22.7	2.03	3650	9.74	162.0
	16/05/2018	17.6	9.05	2186	10.8	-93.0
	13/06/2018	20.5	7.58	930	7.6	-38.1
RZ_BH01S	27/07/2016	20.0	1.72	456	6.96	-95.5
	30/08/2016	19.9	1.61	397	6.95	-109.0
	27/09/2016	19.8	0.09	528	7.02	-163.6
	25/10/2016	25.0	1.44	627	6.69	-65.0
	28/11/2016	22.6	2.75	426	7.29	-53.9
	12/12/2016	21.3	3.37	540	7.12	-66.0
	12/01/2017	22.8	3.82	517	7.07	-25.0
	14/02/2017	21.3	1.78	560	6.66	-90.0
	13/03/2017	21.9	0.87	527	6.77	-88.9
	26/04/2017	21.7	3.78	523	6.85	-109.4
	24/05/2017	21.0	3.25	448	6.75	-4.6
	15/06/2017	20.0	0.69	419	7.06	-76.9
	18/07/2017	20.1	6.02	399	7.18	-120.0
	11/08/2017	23.0	2.11	417	9.69	-149.5
	19/10/2017	22.6	4.67	507	8.08	506.6
	21/11/2017	20.5	3.44	445	8.79	-47.5
	12/01/2018	23.8	3.34	450	7.46	-85.5
	16/02/2018	23.9	2.89	584	7.1	-112.8
	16/03/2018	21.0	1.71	493	7.13	-118.0
	17/04/2018	21.6	1.92	1250	7.18	-117.0
	17/05/2018	17.9	6.16	787	7.15	-55.7

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	14/06/2018	20.2	7.12	2174	10.34	-93.6
RZ_BH15	27/07/2016	18.7	1.56	611	9.35	-132.3
	30/08/2016	20.7	1.47	368	7.7	-76.0
	29/09/2016	19.1	0.58	1248	7.14	-141.0
	25/10/2016	20.8	0.09	1048	6.55	-58.1
	28/11/2016	22.7	1.94	698	7.48	-93.2
	12/12/2016	22.7	1.87	995	6.65	18.0
	12/01/2017	23.8	0.66	694	6.86	-55.0
	14/02/2017	21.2	1.76	984	6.65	-90.1
	13/03/2017	21.9	1.23	880	6.99	-93.4
	26/04/2017	21.6	1.99	1067	7.04	-82.8
	24/05/2017	22.4	2.19	890	6.2	17.9
	15/06/2017	19.7	0.90	921	6.8	-40.3
	18/07/2017	19.7	2.87	877	6.95	-140.0
	11/08/2017	20.3	1.55	977	11.39	-238.8
	19/10/2017	21.7	4.61	1010	7.63	-41.5
	21/11/2017	20.8	3.85	955	7.79	-14.3
	11/01/2018	23.8	4.65	954	7.72	-118.0
	15/02/2008	24.4	3.51	1080	7.03	-107.1
	15/03/2018	21.0	0.81	499	6.85	-73.0
	16/04/2018	20.7	2.20	754	7.13	-99.0
	16/05/2018	15.6	6.67	1086	6.86	-10.5
	13/06/2018	22.5	6.54	1470	7.37	-66.0
RZ_BH16	14/07/2016	20.5	1.17	1310	7.24	27.1
	27/07/2016	19.0	1.24	690	10.3	-158.8
	30/08/2016	19.4	1.87	672	10.02	-54.1
	29/09/2016	18.9	0.11	782	8.93	-170.4
	24/10/2016	20.2	1.69	1225	6.09	-17.2
	25/10/2016	23.8	1.75	768	7.32	-41.2
	28/11/2016	22.3	1.46	969	7.51	-75.3
	12/12/2016	20.2	1.53	993	8.96	9.0
	12/01/2017	22.2	2.06	925	8.38	-9.0
	14/02/2017	19.9	2.26	969	7.35	-45.3
	13/03/2017	21.9	0.31	1065	7.51	-134.3
	26/04/2017	21.3	4.34	945	7.11	-118.9
	24/05/2017	19.7	0.55	830	9.22	10.5
	15/06/2017	18.4	4.75	202	7.48	22.0
	18/07/2017	19.1	2.14	466	8.62	-125.0
	11/08/2017	20.6	2.01	563	9.72	-129.4
	15/09/2017	20.6	4.16	339	7.7	23.9
	19/10/2017	24.9	1.03	946	7.99	-6.2
	21/11/2017	23.9	2.35	551	8.52	-43.5
	12/01/2018	23.6	6.72	839	7.64	-43.3
	16/02/2018	24.9	3.85	639	7.17	-114.4
	16/03/2018	23.6	3.42	496	7.31	-93.0
	17/04/2018	22.0	1.00	344	7.74	-174.0
	17/05/2018	17.3	6.45	1460	9.22	-182.0
	14/06/2018	21.9	4.74	1874	8.44	-141.3

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
RZ_BH19	10/08/2016	20.0	0.36	1112	7.34	155.9
	29/09/2016	18.6	0.10	1199	8.11	-132.1
	24/10/2016	21.0	1.44	1245	6.07	-20.4
	27/10/2016	19.8	0.06	1270	7.04	-135.8
	28/11/2016	21.1	1.50	1227	8.34	-158.7
	12/12/2016	21.8	1.15	1245	9.82	-154.0
	13/01/2017	21.4	0.66	1190	6.7	124.0
	14/02/2017	20.4	0.10	1240	8.5	-203.0
	13/03/2017	23.0	0.14	1340	6.69	-230.0
	26/04/2017	21.4	4.50	918	7.68	-152.9
	24/05/2017	20.1	2.57	1052	7.83	13.5
	15/06/2017	21.4	3.14	963	7.5	-112.9
	18/07/2017	19.1	3.38	919	8.47	-123.0
	11/08/2017	19.9	0.53	957	8.11	-117.4
	15/09/2017	20.8	3.38	1190	8.03	-88.0
	19/10/2017	25.5	1.85	1242	7.86	-89.7
	21/11/2017	20.5	0.20	955	8.11	-141.8
	12/01/2018	26.8	2.46	1149	8.18	-78.5
	16/02/2018	22.1	2.43	1090	7.19	-64.7
	16/03/2018	22.9	2.90	1175	7.52	-124.0
	17/04/2018	22.1	2.32	431	7.71	-173.0
	17/05/2018	17.8	6.65	2269	7.44	-74.3
	14/06/2018	20.0	4.97	2386	7.45	-72.2
RZ_BH26	14/07/2016	18.7	1.24	445	6.65	60.0
	27/07/2016	17.4	1.82	449	10.29	-107.2
	30/08/2016	19.8	1.60	4547	9.16	54.3
	29/09/2016	18.9	0.30	560	7.35	-149.5
	24/10/2016	20.6	0.64	547	5.73	-7.0
	25/10/2016	20.3	3.98	488	9.29	-112.6
	28/11/2016	21.2	0.80	611	7.02	-115.0
	12/12/2016	21.3	1.56	469	6.97	-133.0
	13/01/2017	23.7	1.44	604	6.83	-29.0
	14/02/2017	19.8	2.51	617	6.79	-126.9
	13/03/2017	21.3	0.55	712	6.4	-113.2
	26/04/2017	22.6	4.03	601	7.09	-66.7
	24/05/2017	18.7	0.24	549	6.68	-39.7
	15/06/2017	19.2	0.51	577	6.73	-86.1
	18/07/2017	18.8	2.88	459	6.81	-114.0
	11/08/2017	20.5	3.02	472	7.65	-20.6
	15/09/2017	19.3	2.99	501	6.97	-47.9
	19/10/2017	23.4	3.11	545	7.43	-16.9
	21/11/2017	22.7	8.57	123	10.45	-30.6
	12/01/2018	25.2	2.24	587	8.66	-110.8
	16/02/2018	26.1	1.95	672	6.95	-97.8
	16/03/2018	23.7	3.52	644	6.77	-88.0
	17/04/2018	22.8	2.43	223	6.71	-111.0
	17/05/2018	19.5	4.34	1226	6.72	-36.4
	14/06/2018	18.8	7.06	1508	6.54	-7.6

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
RZ_BH28	10/08/2016	18.9	1.08	833	6.09	-7.9
	29/09/2016	18.8	0.95	835	6.79	-88.8
	25/10/2016	20.7	0.17	849	5.96	-97.2
	28/11/2016	21.4	1.57	887	6.64	-35.4
	12/12/2016	21.2	2.85	935	6.8	-72.0
	13/01/2017	23.3	2.27	868	6.42	-17.0
	14/02/2017	19.7	2.43	862	6.4	-61.3
	13/03/2017	21.1	0.85	963	6.19	-51.0
	26/04/2017	23.6	3.10	814	6.89	-43.2
	24/05/2017	19.6	3.03	725	6.34	52.9
	15/06/2017	20.0	1.98	753	6.15	21.5
	18/07/2017	18.4	3.62	612	6.52	-83.0
	11/08/2017	21.0	3.60	695	7.34	110.3
	12/01/2018	24.6	3.03	778	7.61	-42.9
	16/02/2018	22.3	3.10	885	6.69	-31.8
	16/03/2018	21.6	2.84	441	6.11	-6.0
	17/04/2018	25.5	4.46	3041	6.88	-60.0
	17/05/2018	19.7	7.31	1489	6.32	33.6
	14/06/2018	18.1	7.52	363	6.88	39.6
RZ_BH30	27/07/2016	20.0	0.60	1452	6.75	-67.5
	31/08/2016	20.3	2.54	1347	6.7	-87.7
	28/09/2016	21.7	1.20	1598	6.84	-109.8
	16/01/2017	21.1	5.26	951	6.13	95.0
	26/04/2017	20.1	3.69	1422	6.75	-39.2
	24/05/2017	19.6	2.91	1094	6.74	52.8
	15/06/2017	20.2	3.59	415	7.06	-31.0
	18/07/2017	18.2	2.50	#	6.69	-76.0
	11/08/2017	19.9	1.68	1098	7.23	-11.9
	15/09/2017	21.1	3.68	1248	7.33	237.7
	19/10/2017	24.5	1.29	1535	7.46	-49.8
	12/01/2018	25.7	2.18	1424	7.28	-35.2
	16/02/2018	25.1	1.78	1680	6.82	-42.1
	16/03/2018	21.2	3.59	206	3.9	142.0
	17/04/2018	22.1	2.58	259	7.18	-70.0
	17/05/2018	19.4	6.84	1957	6.78	15.1
	14/06/2018	17.6	6.87	2758	7.6	-55.6
RZ_BH38	10/08/2016	20.1	1.18	1136	9.72	-281.1
	29/09/2016	18.4	0.64	1350	8.57	-178.3
	26/10/2016	20.4	0.81	1682	7.86	-94.9
	27/10/2016	21.1	0.89	1276	10.45	-139.2
	28/11/2016	22.1	1.29	1946	8.24	-148.2
	12/12/2016	-	3.02	1971	7.99	-96.0
	12/01/2017	24.2	2.50	1933	8.0	-56.0
	14/02/2017	20.6	1.29	2056	7.3	-164.0
	13/03/2017	22.1	0.28	2193	7.51	22.1
	26/04/2017	20.6	6.22	1467	7.35	-94.6
	24/05/2017	20.0	1.54	1543	7.43	28.3
	15/06/2017	19.4	2.11	1484	7.22	-57.9

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	18/07/2017	18.8	2.88	1400	8.28	-117.0
	11/08/2017	19.5	2.71	1211	9.14	-97.9
	15/09/2017	21.3	2.85	1300	7.95	-24.5
	19/10/2017	25.8	4.45	1565	7.54	-29.5
	21/11/2017	21.9	1.39	1344	8.04	-97.6
	12/01/2018	23.4	1.97	1476	8.06	-75.4
	16/02/2018	27.7	0.52	1509	7.26	-78.2
	16/03/2018	18.2	3.48	1175	6.87	-51.0
	17/04/2018	21.7	2.60	534	8.09	-190.0
	17/05/2018	18.1	7.34	1934	7.97	-79.2
	14/06/2018	19.9	6.23	2315	7.52	-11.3
RZ_BH44S	10/08/2016	21.8	0.99	6681	6.49	-62.5
	29/09/2016	18.3	0.26	3713	5.79	-28.9
	27/10/2016	19.1	0.21	2706	6.28	-70.8
	28/11/2016	22.3	1.06	2844	6.67	-18.8
	12/12/2016	21.3	3.57	2610	5.84	-6.0
	13/01/2017	21.5	4.20	2390	6.78	-38.0
	14/02/2017	20.4	2.38	2685	6.17	-19.8
	13/03/2017	21.4	1.66	2934	6.7	-91.0
	26/04/2017	22.5	3.68	2430	7.2	-44.9
	24/05/2017	21.0	3.22	2248	6.3	50.2
	15/06/2017	21.3	4.84	1880	6.22	37.0
	18/07/2017	19.5	3.65	1425	6.77	-123.0
	11/08/2017	21.0	2.56	2000	7.59	-96.8
	15/09/2017	19.6	4.93	702	7.46	59.2
	19/10/2017	23.1	-	2264	7.3	10.9
	21/11/2017	23.0	2.15	2095	8.1	-77.1
	12/01/2018	23.6	0.58	1559	6.91	-20.9
	16/02/2018	22.8	2.26	1918	6.22	48.7
	16/03/2018	26.2	5.38	242	6.9	-22.0
	17/04/2018	22.5	3.24	566	6.69	-87.0
	17/05/2018	18.3	5.62	4540	6.67	39.9
	14/06/2018	20.0	8.82	3071	6.91	44.3
RZ_BH44D	10/08/2016	20.9	0.53	715	6.95	-84.5
	29/09/2016	18.7	0.94	1168	7.04	-124.3
	27/10/2016	20.6	2.65	1304	7.04	-106.1
	28/11/2016	22.0	2.56	1401	7.89	-117.0
	12/12/2016	22.6	0.93	1199	6.77	-117.0
	13/01/2017	22.3	3.08	1344	7.42	11.0
	14/02/2017	20.9	0.43	1470	7.01	-133.8
	13/03/2017	21.4	1.82	1332	6.89	-123.0
	26/04/2017	24.0	2.85	1403	7.62	-128.1
	24/05/2017	20.6	2.32	1071	7.02	2.4
	15/06/2017	21.4	3.07	481	7.0	-1.9
	18/07/2017	19.1	4.66	347	7.81	-108.0
	11/08/2017	20.0	1.11	590	7.79	-83.1
	15/09/2017	20.3	3.65	571	8.07	-71.1
	19/10/2017	21.4	3.32	820	7.4	-45.6

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	21/11/2017	21.4	2.93	1007	8.2	-75.8
	12/01/2018	22.7	1.22	795	7.07	-59.0
	16/02/2018	24.1	1.61	565	7.2	-77.8
	16/03/2018	23.6	3.91	161	7.41	-133.0
	17/04/2018	22.1	2.32	1925	7.06	-126.0
	17/05/2018	19.1	8.76	910	6.94	-14.4
	14/06/2018	19.4	8.29	1201	7.16	-12.1
RZ_BH47S	31/08/2016	23.0	1.75	1216	6.27	-57.2
	29/09/2016	18.7	0.22	1393	5.56	10.8
	25/10/2016	19.9	5.22	328	9.64	-129.4
	28/11/2016	23.1	0.69	1271	6.65	4.2
	12/12/2016	23.4	4.22	932	6.39	-14.0
	13/01/2017	24.8	2.36	1203	6.41	-24.0
	14/02/2017	21.1	0.88	1120	6.25	-22.5
	13/03/2017	22.3	0.99	1202	6.14	-27.0
	26/04/2017	22.6	3.16	1193	7.26	-21.8
	24/05/2017	20.5	3.03	1003	6.06	64.3
	15/06/2017	20.5	1.77	1085	5.95	41.5
	18/07/2017	19.9	1.83	857	6.53	-101.0
	11/08/2017	23.3	1.67	993	7.46	-56.5
	15/09/2017	19.7	5.30	904	7.22	142.1
	19/10/2017	24.4	1.74	1271	8.18	-8.5
	21/11/2017	22.4	4.51	845	9.08	-59.0
	12/01/2018	23.1	0.12	1255	7.83	-40.5
	16/02/2018	26.3	1.05	1307	6.23	-29.2
	16/03/2018	27.3	3.38	1234	5.91	39.0
	17/04/2018	19.3	1.68	6780	7.13	-124.0
	17/05/2018	20.1	6.26	2319	6.16	56.7
	14/06/2018	21.1	6.23	3508	6.41	34.8
RZ_BH47D	31/08/2016	22.5	2.26	829	6.51	-62.3
	29/09/2016	19.1	0.13	1031	6.34	-63.0
	25/10/2016	21.7	4.30	338	8.72	-132.9
	28/11/2016	21.9	1.20	900	6.7	-60.5
	12/12/2016	23.3	2.08	921	6.58	-73.0
	13/01/2017	25.4	3.35	931	6.49	-16.0
	14/02/2017	20.8	1.00	946	6.58	-104.3
	13/03/2017	21.9	0.60	1007	6.65	-104.0
	26/04/2017	21.4	4.82	926	6.98	-70.8
	24/05/2017	19.9	1.20	845	6.4	29.7
	15/06/2017	20.3	2.75	894	6.5	6.6
	18/07/2017	19.6	1.39	753	6.72	-87.0
	11/08/2017	21.3	3.14	858	7.27	-35.0
	15/09/2017	20.1	2.35	881	7	-6.0
	19/10/2017	23.2	2.03	1068	7.52	-51.7
	21/11/2017	21.9	4.43	957	8.75	-83.4
	12/01/2018	23.1	3.01	881	7.65	-33.8
	16/02/2018	25.1	3.36	1001	6.71	-60.2
	16/03/2018	29.0	2.78	967	6.55	-41.0

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	17/04/2018	25.1	2.30	5280	7.04	-85.0
	17/05/2018	19.2	5.97	2585	6.06	56.8
	14/06/2018	18.0	7.56	2546	6.51	66.6
RZ_BH49	14/07/2016	19.1	0.67	9258	7.57	33.7
	27/07/2016	18.0	3.46	3017	9.95	-168.8
	30/08/2016	20.0	1.96	7900	6.69	-55.6
	29/09/2016	18.1	0.41	10778	6.49	-64.2
	26/10/2016	20.8	2.28	5419	7.56	-87.1
	28/11/2016	22.2	2.82	4416	8.46	-49.7
	12/12/2016	20.0	4.25	3580	7.82	-3.0
	12/01/2017	22.6	4.16	646	7.35	38.0
	14/02/2017	19.9	0.80	9348	6.45	-53.2
	13/03/2017	21.4	1.05	9869	6.82	-75.7
	26/04/2017	21.1	5.36	1995	7	-19.4
	24/05/2017	19.7	3.69	6453	7.31	53.5
	15/06/2017	18.9	5.03	4483	6.89	13.2
	18/07/2017	18.7	4.07	3840	7.34	-42.0
	11/08/2017	19.5	7.29	655	9.62	6.8
	15/09/2017	20.0	7.73	1174	7.73	207.9
	19/10/2017	26.3	2.26	9693	6.84	1.5
	12/01/2018	24.9	2.61	9329	7.23	-75.5
	16/02/2018	24.1	1.32	8263	6.75	-62.7
	16/03/2018	24.3	2.04	3040	7.31	-65.0
	17/04/2018	25.9	2.20	1427	7.06	-48.0
	17/05/2018	19.5	7.39	9784	6.61	29.9
	14/06/2018	20.7	6.81	21550	6.89	19.3
RZ_BH50	31/08/2016	20.9	1.44	338	7.47	-120.3
	28/09/2016	22.0	0.82	678	6.05	-37.9
	25/10/2016	22.4	0.20	594	5.76	-111.6
	28/11/2016	21.4	0.79	598	6.79	-37.2
	12/12/2016	23.0	2.41	422	6.2	-33.0
	16/01/2017	20.9	5.78	423	6.5	-10.0
	14/02/2017	20.5	6.10	6600	6.74	-54.7
	15/03/2017	22.8	2.58	531	6.56	-20.6
	26/04/2017	23.1	4.07	550	7.26	-1.4
	24/05/2017	20.1	2.75	550	6.22	34.9
	15/06/2017	20.3	1.27	541	6.17	-26.3
	18/07/2017	19.6	4.06	505	6.55	-87.0
	11/08/2017	19.8	3.27	520	7.47	-46.2
	15/09/2017	21.5	3.42	499	7.07	44.1
	19/10/2017	23.1	1.96	686	7.64	-34.6
	16/02/2018	23.0	2.44	646	6.35	-49.8
	16/03/2018	21.1	3.00	224	4.12	-4.0
	17/04/2018	21.3	2.81	211	6.65	-76.0
	17/05/2018	20.3	3.86	1064	6.35	26.7
	14/06/2018	15.8	8.13	1692	7.16	-35.1
RZ_BH51	10/08/2016	24.9	1.52	4100	11.92	-190.6
	28/09/2016	20.0	0.23	1770	6.62	-84.8

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	25/10/2016	26.5	2.26	1801	6.37	-107.1
	28/11/2016	21.8	0.90	1580	7.16	-123.5
	12/12/2016	22.0	3.04	1645	6.71	-30.0
	16/01/2017	21.5	1.30	1440	6.57	63.0
	14/02/2017	21.0	1.46	1533	6.74	-77.0
	26/04/2017	20.9	5.40	1161	6.88	-18.4
	24/05/2017	20.6	3.55	1467	6.48	43.9
	15/06/2017	21.0	2.53	824	6.98	-48.3
	18/07/2017	19.8	5.51	1101	6.67	-69.0
	11/08/2017	21.1	3.25	1265	6.81	-11.7
	15/09/2017	22.5	5.30	996	6.98	68.3
	12/01/2018	26.1	2.36	1375	8.42	-130.4
	16/02/2018	26.5	1.63	1155	7.93	-148.1
	16/03/2018	24.8	1.87	1422	6.91	-91.0
	17/04/2018	21.3	2.65	239	7.03	-137.0
	17/05/2018	20.1	6.33	1081	6.81	-16.1
	14/06/2018	17.3	3.41	1766	7.82	-102.6
RZ_BH52	10/08/2016	22.0	1.23	526	10.15	154.3
	28/09/2016	21.0	1.08	1256	6.59	-74.1
	25/10/2016	21.3	0.17	1004	5.6	-106.2
	28/11/2016	22.2	2.50	1033	7.44	-48.5
	12/12/2016	22.2	2.42	775	6.44	-77.0
	14/02/2017	21.2	0.27	1087	6.66	-72.8
	15/03/2017	25.3	0.32	920	6.68	16.0
	26/04/2017	20.5	3.78	818	7.05	-64.6
	24/05/2017	20.7	1.38	873	6.45	20.6
	15/06/2017	20.7	2.13	980	6.41	-37.4
	18/07/2017	18.9	6.32	724	6.73	-85.0
	11/08/2017	20.5	0.87	853	7.03	-8.2
	15/09/2017	22.2	2.73	831	6.67	44.9
	19/10/2017	25.7	2.62	986	6.82	9.4
	21/11/2017	23.4	4.64	659	9.63	23.4
	12/01/2018	24.6	2.15	873	9.05	-89.4
	16/02/2018	26.1	4.01	937	7.02	-92.9
	16/03/2018	21.2	3.01	854	11.56	-22.0
	17/04/2018	23.8	4.72	923	6.82	-78.0
	15/05/2018	21.4	5.60	1317	6.63	34.5
	14/06/2018	16.9	6.89	926	7.62	33.8
RZ_BH60	16/01/2017	22.5	9.63	4910	11.76	-95.0
	17/02/2017	20.9	0.79	4291	11.43	-294.1
	15/03/2017	21.2	0.93	3393	12.37	-93.2
	27/04/2017	18.5	2.76	3764	11.86	-184.9
	26/05/2017	19.0	2.88	3303	12.19	64.4
	16/06/2017	17.6	1.12	3081	12.45	-144.6
	17/07/2017	19.0	9.29	172	11.81	-248.0
	10/08/2017	22.0	2.46	3262	12.95	-89.7
	14/09/2017	17.9	2.94	3542	11.22	-51.8
	20/10/2017	17.9	3.03	3284	11.83	-66.9

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	20/11/2017	24.1	2.00	2615	10.63	-76.4
	15/02/2018	21.4	2.92	3422	12.11	-46.6
	15/03/2018	25.9	2.74	2570	11.86	25.0
RZ_BH64	26/05/2017	19.3	1.59	572	9.16	562.0
	15/06/2017	17.8	2.10	605	8.56	-122.3
	18/07/2017	18.6	1.54	545	8.63	-149.0
	10/08/2017	19.8	1.34	602	7.6	-135.6
	14/09/2017	17.3	3.03	675	7.52	-44.8
	20/10/2017	17.8	3.54	672	10.52	-160.5
	20/11/2017	22.8	2.76	581	8.29	-65.9
	12/01/2018	24.5	2.46	745	7.83	-112.6
	16/02/2018	24.0	2.46	762	7.62	-96.1
	15/03/2018	27.4	2.46	259	7.03	-92.0
	16/04/2018	20.9	2.21	256	6.63	-193.0
	16/05/2018	17.3	2.43	1358	7.73	-124.6
	13/06/2018	16.0	8.76	1806	7.45	-141.6
RZ_BH67	17/02/2017	21.4	0.03	773	8.96	-316.8
	15/03/2017	22.2	0.78	602	7.06	-61.7
	27/04/2017	17.5	5.20	507	6.73	-20.9
	26/05/2017	20.2	3.11	523	6.42	19.2
	16/06/2017	18.3	1.01	518	6.88	-90.6
	14/09/2017	17.9	4.83	573	8.3	-104.7
	20/10/2017	19.9	1.23	588	7.43	-32.6
	20/11/2017	21.7	1.94	532	8.86	-98.9
	16/03/2018	20.3	3.71	642	11.65	-4.0
RZ_BH69	16/02/2017	20.4	1.13	424	5.79	-168.1
	15/03/2017	20.1	2.98	2469	12.28	-80.8
	18/07/2017	17.6	2.11	974	11.82	-19.5
	14/09/2017	19.0	1.54	453	8.35	103.9
	20/10/2017	19.9	1.72	1349	9.37	-157.8
	16/04/2018	21.3	2.91	138	7.12	173.0
TC_BH01D	8/07/2016	18.2	1.85	1126	8.66	30.7
	27/07/2016	17.4	2.20	3883	12.06	-183.4
	30/08/2016	18.5	0.84	3267	11.86	-293.2
	27/09/2016	21.9	1.34	3817	11.53	-242.5
	26/10/2016	20.7	0.48	3855	10.3	-118.5
	29/11/2016	21.6	2.61	1696	7.61	-99.6
	13/12/2016	25.0	2.06	3230	11.59	-289.0
	16/01/2017	23.6	4.94	2450	10.88	-117.0
	16/02/2017	23.1	0.04	4004	10.52	-297.1
	14/03/2017	22.0	1.95	2962	9.42	-112.7
	27/04/2017	19.7	4.06	3077	9.26	-184.7
	25/05/2017	18.9	2.07	2724	7.35	20.5
	15/06/2017	20.2	0.37	2789	11.28	-115.0
	17/07/2017	17.6	3.10	#	11.05	-123.0
	10/08/2017	17.7	9.29	2857	11.7	-127.9
	20/10/2017	19.0	4.41	3054	8.94	-82.8
	20/11/2017	21.3	1.82	2912	7.39	82.0

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	12/01/2018	21.7	1.79	2763	8.17	78.1
	15/02/2018	22.0	2.08	3515	10.66	-127.0
	15/03/2018	24.8	2.01	3910	9.97	-136.0
	16/04/2018	29.6	2.02	1127	9.21	-222.0
	16/05/2018	19.8	6.97	8040	7.52	26.8
	13/06/2018	16.8	6.61	9910	7.57	122.0
TC_BH01S	8/07/2016	19.5	3.59	11084	6.97	-219.8
	21/07/2016	17.1	3.70	17511	6.87	-64.7
	30/08/2016	17.4	4.25	6899	7.05	-52.0
	27/09/2016	19.3	0.16	34922	6.63	-81.4
	26/10/2016	21.6	1.77	24313	6.68	-110.6
	29/11/2016	21.7	2.67	9665	7.03	-14.6
	13/12/2016	21.9	3.93	19850	7.37	-109.0
	16/01/2017	23.2	5.50	14240	8.25	-71.0
	16/02/2017	23.8	0.89	29747	6.82	-168.0
	14/03/2017	23.2	2.04	27564	7.03	130.6
	27/04/2017	20.6	2.85	29460	8.3	-100.4
	25/05/2017	19.2	6.36	11554	6.87	46.7
	15/06/2017	20.2	3.11	18544	6.96	-48.7
	17/07/2017	17.6	1.01	#	6.84	-44.0
	10/08/2017	17.8	1.36	25188	7.93	-83.1
	20/10/2017	18.7	6.02	24371	7.83	-75.6
	20/11/2017	20.8	4.52	22954	6.7	-55.2
	12/01/2018	21.7	3.98	22885	7.1	-92.2
	15/02/2018	22.7	2.81	30912	6.81	-37.5
	15/03/2018	23.9	3.54	30600	6.77	-67.0
	16/04/2018	29.1	1.51	8860	6.9	-69.0
	16/05/2018	20.4	7.10	17430	6.82	31.5
	13/06/2018	19.8	5.99	74800	6.83	15.3
TC_BH06	8/07/2016	17.4	3.55	1966	6.54	-40.7
	27/07/2016	18.9	1.02	1993	7.14	-113.0
	30/08/2016	17.3	3.06	1424	6.84	-83.0
	27/09/2016	18.9	0.22	1677	6.33	-55.7
	26/10/2016	19.9	1.01	1672	7.5	-112.7
	29/11/2016	20.2	2.39	3530	7.88	-45.4
	13/12/2016	22.5	7.65	1628	6.84	-65.0
	16/01/2017	22.8	5.47	1935	7.76	-135.0
	17/02/2017	21.9	1.98	2236	7.31	-216.1
	14/03/2017	21.9	2.03	1464	6.71	3.9
	27/04/2017	20.5	3.41	1504	10.25	-188.8
	25/05/2017	19.7	3.15	1500	6.57	18.4
	15/06/2017	19.5	1.57	1959	6.64	-65.8
	17/07/2017	16.0	1.04	#	6.88	-69.0
	10/08/2017	16.0	4.45	1492	8.36	-73.2
	15/09/2017	20.3	3.17	1175	6.51	-2.6
	20/10/2017	18.1	4.23	1485	8.89	-69.3
	20/11/2017	20.8	3.81	1839	7.73	-56.5
	12/01/2018	21.9	3.21	1861	8.42	-117.2

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	15/02/2018	22.9	3.90	2241	6.66	-73.0
	15/03/2018	24.9	7.53	2480	6.73	-86.0
	16/04/2018	27.2	2.69	2321	6.8	-98.0
	16/05/2018	19.5	3.47	3473	6.57	21.5
	13/06/2018	15.7	6.74	4723	6.68	13.9
TC_BH07D	8/07/2016	18.7	5.41	4202	11.84	-132.7
	27/07/2016	17.3	1.56	1762	7.63	-91.2
	31/08/2016	19.5	1.07	1713	8.55	-18.9
	26/10/2016	24.2	0.66	2640	6.84	-101.7
	16/01/2017	22.8	9.48	1547	7.4	-79.0
	16/02/2017	23.4	1.90	3123	6.49	-183.0
	14/03/2017	23.9	3.72	2416	7.18	-40.2
	27/04/2017	19.7	3.91	2045	9.01	-96.7
	16/06/2017	17.8	2.77	1846	6.8	-67.0
	17/07/2017	15.6	1.06	940	6.71	-57.0
	10/08/2017	18.2	0.91	1862	7.56	-70.4
	21/11/2017	20.2	6.20	1606	8.6	-61.6
	15/03/2018	26.3	2.54	845	6.78	-69.0
	17/04/2018	20.3	2.49	774	7.76	-151.0
	13/06/2018	16.9	5.51	4316	6.53	61.6
TC_BH07S	8/07/2016	18.1	3.33	30018	7.78	-117.9
	27/07/2016	17.6	1.24	23684	6.98	-160.2
	30/08/2016	18.2	1.68	24493	6.81	-71.2
	27/09/2016	18.6	0.06	31947	6.82	-260.0
	26/10/2016	21.9	1.70	28266	6.71	-107.4
	13/12/2016	22.7	3.51	373	6.93	-62.0
	16/01/2017	22.6	8.20	16700	6.9	-44.0
	16/02/2017	23.7	2.04	26816	6.2	-179.0
	14/03/2017	24.3	2.52	30388	6.89	-66.2
	28/04/2017	17.2	4.63	29619	6.91	-113.6
	25/05/2017	20.1	2.35	28938	6.72	27.5
	15/06/2017	19.8	3.49	27338	6.86	-46.2
	17/07/2017	15.9	1.08	#	6.87	-170.0
	10/08/2017	17.9	6.37	26990	6.73	-56.3
	15/09/2017	20.1	3.04	27541	6.12	22.6
	20/10/2017	18.8	2.08	29311	7.58	-38.5
	20/11/2017	23.5	4.29	16383	6.47	-35.8
	12/01/2018	22.0	1.39	29029	6.74	-130.9
	15/02/2018	23.6	3.41	26914	6.94	-93.3
	15/03/2018	29.0	1.45	3180	6.95	-81.0
	17/04/2018	20.2	3.25	6770	7.14	-148.0
	16/05/2018	18.8	4.73	128000	6.71	-2.1
	13/06/2018	17.5	8.49	40480	7.03	-113.4
TC_BH08	27/07/2016	19.0	1.23	7575	9.71	14.8
	30/08/2016	17.6	5.45	7104	8.1	20.7
	27/09/2016	19.2	0.06	13379	6.85	-121.0
	26/10/2016	21.0	2.36	10250	6.97	-88.6
	29/11/2016	20.2	2.01	12491	7.25	-95.0

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	13/12/2016	24.0	3.24	10940	7.08	-102.0
	16/01/2017	22.3	6.06	10250	7.23	-46.0
	16/02/2017	22.5	5.39	11702	7.19	-182.3
	14/03/2017	22.6	2.28	13552	7.21	40.3
	27/04/2017	20.5	3.76	7203	8.46	-128.6
	25/05/2017	20.4	1.49	9735	6.95	10.5
	15/06/2017	20.0	3.62	3170	7.52	-67.6
	17/07/2017	15.6	1.07	#	7.06	-119.0
	10/08/2017	18.5	6.51	4050	6.93	-14.2
	15/09/2017	19.6	6.43	5599	7.76	32.8
	20/10/2017	19.0	3.65	10212	8.11	-71.4
	20/11/2017	21.4	3.37	11368	6.66	-61.9
	12/01/2018	21.7	4.61	13051	6.84	-82.3
	15/02/2018	24.8	3.42	14898	7.32	-96.8
	15/03/2018	29.6	3.78	12810	7.18	-9.7
	17/04/2018	20.0	2.35	16520	7.01	-97.0
	16/05/2018	18.9	3.33	8467	6.92	-20.1
	13/06/2018	17.7	7.23	42730	7.05	-15.9
TC_BH09D	27/07/2016	18.8	1.00	1761	6.25	2.3
	30/08/2016	17.3	1.32	1385	6.62	-41.5
	28/09/2016	17.5	4.94	1917	6.5	-67.5
	26/10/2016	22.5	1.44	2012	6.95	-86.3
	29/11/2016	-	2.84	1794	8.13	84.7
	13/12/2016	24.4	1.01	2020	7.96	-129.0
	16/01/2017	23.6	8.01	2050	7.92	-110.0
	16/02/2017	23.6	1.57	1995	7.51	-232.0
	14/03/2017	23.1	0.37	1870	7.46	-56.2
	27/04/2017	20.2	4.40	1910	9.59	-102.2
	25/05/2017	19.7	1.52	1907	7.53	-9.0
	15/06/2017	19.9	2.19	2336	7.02	-65.4
	17/07/2017	15.5	7.10	#	7.07	-71.0
	10/08/2017	18.6	3.85	1836	7.99	-41.5
	20/10/2017	19.3	0.77	1752	9.27	-101.5
	20/11/2017	22.8	1.14	1555	8.13	-77.1
	12/01/2018	22.7	2.52	1724	8.02	-84.2
	15/02/2018	24.0	2.94	2153	6.78	-57.2
	15/03/2018	28.5	2.22	2311	6.73	-67.0
	17/04/2018	20.7	2.37	1205	6.91	-99.0
	16/05/2018	19.8	3.53	4898	7.11	-6.9
	13/06/2018	18.1	7.14	6103	6.54	61.9
TC_BH09S	27/07/2016	18.4	0.35	2601	6.73	17.4
	30/08/2016	16.1	2.05	1255	6.59	143.7
	26/10/2016	21.4	1.95	4699	6.48	-73.8
	29/11/2016	20.4	2.04	5114	7.54	-43.6
	13/12/2016	23.0	3.83	2830	7.16	-111.0
	17/01/2017	23.0	2.38	2780	6.25	21.0
	17/02/2017	23.4	1.55	3955	6.93	-204.5
	28/04/2017	18.2	3.57	2997	8.63	-107.4

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	26/05/2017	18.4	0.78	3195	7.1	24.8
	16/06/2017	18.1	4.37	1673	6.86	-18.7
	21/11/2017	20.6	4.30	2974	8.76	-87.9
EP_BH07	27/10/2016	20.4	7.29	429	7.97	-81.2
	30/11/2016	19.8	2.96	416	7.28	160.3
	13/12/2016	20.9	8.10	245	5.25	169.0
	12/01/2017	21.5	3.22	261	5.89	136.0
	16/02/2017	20.5	1.92	330	6.54	-137.1
	14/03/2017	21.2	3.51	336	4.48	127.5
	27/04/2017	16.8	4.99	314	7.64	130.7
	26/05/2017	19.8	5.63	287	8.68	77.6
	16/06/2017	20.0	2.57	326	5.19	176.2
	18/07/2017	15.6	3.70	390	6.92	-59.0
	11/08/2017	19.8	1.26	299	8.35	-14.1
	15/09/2017	18.5	2.22	333	7.05	199.5
	20/10/2017	20.3	4.66	616	8.35	61.3
	21/11/2017	19.9	6.33	302	8.98	61.5
	12/01/2018	21.3	2.70	300	9.74	-26.8
	16/02/2018	20.6	7.37	334	6.74	112.3
	16/03/2018	21.1	2.41	257	10.81	172.0
	17/04/2018	21.1	1.57	149	6.96	-98.0
	17/05/2018	15.3	7.81	403	7.25	72.6
	14/06/2018	14.7	6.34	490	6.45	127.8
EP_BH06	27/10/2016	21.5	5.08	547	7.59	-102.6
	30/11/2016	20.7	2.41	1274	8.08	-10.4
	13/12/2016	22.2	1.88	851	5.53	129.0
	12/01/2017	21.2	1.29	659	5.63	72.0
	16/02/2017	21.1	0.95	509	5.91	-165.0
	14/03/2017	21.8	1.48	469	5.7	85.9
	27/04/2017	18.1	2.72	421	6.99	42.3
	26/05/2017	20.9	2.73	398	7.21	68.3
	16/06/2017	19.3	3.64	425	5.59	109.7
	18/07/2017	16.2	3.41	358	6.15	-74.0
	11/08/2017	18.9	2.42	355	7.75	-21.3
	15/09/2017	18.3	3.54	431	6.81	174.3
	20/10/2017	20.1	3.01	401	7.7	117.0
	21/11/2017	19.3	5.53	382	8.51	43.6
	12/01/2018	21.6	4.59	394	9.16	-59.4
	16/02/2018	22.4	5.76	487	6.61	110.0
	16/03/2018	20.5	5.01	541	11.79	184.0
	17/04/2018	20.7	2.41	174	6.09	-17.0
	17/05/2018	14.6	8.79	713	7.22	91.0
	14/06/2018	17.5	6.73	1302	5.73	155.1
IC_BH01	27/10/2016	20.8	0.42	2852	11.65	-98.4
	30/11/2016	21.0	0.19	1300	8.65	-95.6
	13/12/2016	23.2	4.33	873	6.54	63.0
	17/01/2017	22.7	1.05	723	6.02	32.0
	14/03/2017	22.0	0.75	7980	6.11	81.5

Monitoring Well	Date	Temperature (° C)	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	pH	Redox Potential (mV)
	28/08/2017	20.8	1.12	784	11.2	-244.0
	15/06/2017	20.0	0.11	766	6.51	-64.4
	17/07/2017	18.8	1.07	#	6.36	-135.0
	11/08/2017	19.9	1.31	545	7.82	-40.8
	20/10/2017	20.4	1.20	622	6.79	32.2
	20/11/2017	22.3	1.76	516	9.45	-179.0
	11/01/2018	22.7	3.09	553	10.69	16.3
	16/04/2018	25.9	1.24	689	5.94	25.0
	16/05/2018	17.9	6.18	1518	8.41	162.8
	13/06/2018	14.6	7.82	2122	5.96	180.2
IC_BH02	14/03/2017	22.1	2.72	160	5.31	84.3
	28/04/2017	16.7	3.75	191	9.26	34.5
	26/05/2017	18.5	6.06	259	7.44	51.2
	15/06/2017	19.8	4.20	255	8.58	5.5
	17/07/2017	18.8	4.10	#	7.91	-18.0
	20/10/2017	20.4	3.88	158	7.16	122.5
	15/02/2018	21.5	1.89	644	5.74	71.5
MT_BH07	17/02/2017	20.4	1.13	2880	10.8	-295.1
	14/03/2017	22.0	1.93	2362	12.13	42.3
	27/04/2017	17.0	6.12	2140	11.73	-40.7
	26/05/2017	20.2	3.48	1738	11.22	51.3
	15/06/2017	19.1	2.68	1633	11.49	-72.4
	17/07/2017	19.9	7.37	#	10.82	-77.0
	11/08/2017	18.5	6.45	1423	11.02	-87.0
	14/09/2017	17.6	9.36	1690	11.09	70.1
	20/10/2017	18.2	4.33	1718	11.38	-38.2
	20/11/2017	21.7	2.71	1467	9.28	-164.7
	15/02/2018	23.3	4.51	1702	11.13	119.5
	16/03/2018	25.0	3.93	1409	10.92	64.0
	16/04/2018	29.3	2.13	451	10.91	-78.0
	16/05/2018	16.6	8.33	2825	9.86	-49.5
	13/06/2018	19.7	7.16	4598	11.58	-138.1
	13/06/2018	19.2	5.98	10920	11.48	-115.4
MT_BH21	17/02/2017	20.6	1.76	2797	11.18	-246.3
	14/03/2017	22.3	3.69	1985	8.22	194.9
	15/06/2017	21.3	2.90	2065	6.69	2.8
	11/08/2017	18.4	0.80	1828	9.17	-177.5
	14/09/2017	18.2	3.43	2073	9.31	-109.0
	21/11/2017	20.5	5.06	1762	7.77	10.9
	16/04/2018	23.8	3.19	730	10.64	-31.0
BH60	29/09/2016	18.1	0.05	3912	7.35	-200.2

Annexure B Baseline Groundwater Level Monitoring Program Summary

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Jun-16		Jul-16		Aug-16		Sep-16		Oct-16	
RZ_BH01d	Hawkesbury Sandstone	22-25	6.30	3.91	2.39	4.31	1.99	4.74	1.56	4.71	1.59	5.11	1.20
RZ_BH01s	alluvium	7-10	6.39	4.39	2.00	4.36	2.03	4.35	2.04	4.422	1.97	4.56	1.83
RZ_BH15	Hawkesbury Sandstone	18-21	6.02	3.55	2.47	4	2.02	4.45	1.57	4.38	1.64	4.57	1.45
RZ_BH16d	Hawkesbury Sandstone	17-20	5.82			4.11	1.71	4.26	1.56	4.257	1.56	4.37	1.45
RZ_BH19	Hawkesbury Sandstone	19-22	2.46					1.00	1.46	0.956	1.50	1.02	1.44
RZ_BH26	Hawkesbury Sandstone	20 - 23	2.84			1.1	1.74	1.32	1.52	1.335	1.51	1.60	1.24
RZ_BH28d	Hawkesbury Sandstone	27-30	2.83					0.93	1.90	1.06	1.77	1.64	1.19
RZ_BH30	Hawkesbury Sandstone	16 - 19	2.04			0.02	2.02	0.54	1.50	0.473	1.57		
RZ_BH38	Hawkesbury Sandstone	28 - 31	2.27					0.55	1.72	0.69	1.58	0.71	1.57
RZ_BH44d	Hawkesbury Sandstone	25 - 28	2.29					0.42	1.87	0.67	1.62	0.76	1.53
RZ_BH44s	Alluvium	12-15	2.25					1.14	1.11	1.298	0.95	1.36	0.89
RZ_BH47d	Hawkesbury Sandstone	27 - 30	2.30					0.75	1.55	0.783	1.52	1.67	0.63
RZ_BH47s	Alluvium	15 - 18	2.50					1.34	1.16	1.393	1.11	1.38	1.12
RZ_BH49s	alluvium	13-16	5.99			4.64	1.35	4.65	1.34	4.694	1.30	4.81	1.19
RZ_BH50	Hawkesbury Sandstone	22-25	1.92					0.05	1.87	0.455	1.47	0.60	1.32
RZ_BH51	Hawkesbury Sandstone	19-22	2.15					0.01	2.14	0.704	1.45	0.60	1.55
RZ_BH52	Hawkesbury Sandstone	32 - 35	2.53					1.01	1.52	1.304	1.23	1.12	1.41
RZ_BH60	Hawkesbury Sandstone	56-59	24.96										
RZ_BH64	Hawkesbury Sandstone	46-49	10.38										
RZ_BH67	Hawkesbury Sandstone	46-49	12.84										
RZ_BH69	Hawkesbury Sandstone	38-41	30.29										
TC_BH01d	Hawkesbury Sandstone	25-28	2.54			0.77	1.77	0.89	1.65	0.994	1.55	1.06	1.48
TC_BH01s	alluvium	3-6	2.55			1.53	1.02	1.55	1.00	1.637	0.91	1.78	0.77
TC_BH06s	alluvium	4.5-7.5	2.65					1.29	1.36	1.57	1.08	1.50	1.15
TC_BH07d	Hawkesbury Sandstone	19-22	2.03			1.06	0.97	0.40	1.63				
TC_BH07s	Alluvium	3-6	2.06			1.06	1.00	1.59	0.47	1.655	0.41	1.72	0.34
TC_BH08s	Alluvium	5-8	2.24			1.58	0.66	1.59	0.65	1.655	0.59	1.76	0.48

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Jun-16		Jul-16		Aug-16		Sep-16		Oct-16	
TC_BH09d	Hawkesbury Sandstone	21-24	2.25			0.61	1.64	0.64	1.61	0.675	1.58	0.80	1.45
TC_BH09s	alluvium	2-5	2.29			1.61	0.68	1.60	0.69			1.75	0.54
IC_BH01	Hawkesbury Sandstone	23-26	26.77									7.51	19.26
IC_BH02	Hawkesbury Sandstone	8-11	20.77										
EP_BH06	Hawkesbury Sandstone	10-13	7.60									3.48	4.12
EP_BH07	Hawkesbury Sandstone	10-13	10.48									7.02	3.46
MT_BH07	Hawkesbury Sandstone	43-46	24.41										
MT_BH20	Hawkesbury Sandstone	41-44	12.27										
MT_BH21	Hawkesbury Sandstone	47-50	25.05										

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Nov-16		Dec-16		Jan-17		Feb-17		Mar-17	
RZ_BH01d	Hawkesbury Sandstone	22-25	6.30	4.745	1.56	4.91	1.39	4.86	1.44	4.71	1.59	4.573	1.73
RZ_BH01s	alluvium	7-10	6.39	4.669	1.72	4.72	1.67	4.76	1.64	4.50	1.89	4.421	1.97
RZ_BH15	Hawkesbury Sandstone	18-21	6.02	4.439	1.58	4.46	1.56	4.55	1.47	4.45	1.57	4.243	1.78
RZ_BH16d	Hawkesbury Sandstone	17-20	5.82	4.223	1.60	3.29	2.53	4.39	1.43	4.22	1.60	4.102	1.72
RZ_BH19	Hawkesbury Sandstone	19-22	2.46	1.083	1.38	1.01	1.45	0.84	1.62	0.81	1.65	0.853	1.61
RZ_BH26	Hawkesbury Sandstone	20 - 23	2.84	1.443	1.40	1.42	1.42	1.20	1.64	1.52	1.32	1.314	1.53
RZ_BH28d	Hawkesbury Sandstone	27-30	2.83	1.194	1.64	1.20	1.63	1.08	1.75	1.07	1.76	1.059	1.77
RZ_BH30	Hawkesbury Sandstone	16 - 19	2.04					0.57	1.47	#			
RZ_BH38	Hawkesbury Sandstone	28 - 31	2.27	1.49	0.78	0.79	1.48	0.92	1.35	0.65	1.62	0.638	1.63
RZ_BH44d	Hawkesbury Sandstone	25 - 28	2.29	0.78	1.51	0.90	1.39	0.56	1.73	0.56	1.73	0.602	1.69
RZ_BH44s	Alluvium	12-15	2.25	1.431	0.82	1.49	0.76	1.44	0.81	1.35	0.90	1.214	1.04
RZ_BH47d	Hawkesbury Sandstone	27 - 30	2.30	0.891	1.41	0.99	1.31	0.62	1.69	0.61	1.69	0.751	1.55
RZ_BH47s	Alluvium	15 - 18	2.50	1.434	1.07	1.49	1.01	1.36	1.14	1.32	1.19	1.294	1.21
RZ_BH49s	alluvium	13-16	5.99	4.73	1.26	4.95	1.04	4.91	1.08	4.79	1.20	4.534	1.46
RZ_BH50	Hawkesbury Sandstone	22-25	1.92	0.914	1.01	0.53	1.39	0.47	1.45	0.62	1.30	0.662	1.26
RZ_BH51	Hawkesbury Sandstone	19-22	2.15	0.766	1.38	0.80	1.35	0.69	1.46	0.49	1.66	0.504	1.65
RZ_BH52	Hawkesbury Sandstone	32 - 35	2.53	1.523	1.01	1.11	1.42			0.97	1.56	0.989	1.54
RZ_BH60	Hawkesbury Sandstone	56-59	24.96							12.50	12.46	12.391	12.57
RZ_BH64	Hawkesbury Sandstone	46-49	10.38							15.24	-4.86		
RZ_BH67	Hawkesbury Sandstone	46-49	12.84							4.03	8.81	5.049	7.79

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Nov-16		Dec-16		Jan-17		Feb-17		Mar-17	
RZ_BH69	Hawkesbury Sandstone	38-41	30.29							15.236	15.05	15.023	15.27
TC_BH01d	Hawkesbury Sandstone	25-28	2.54	0.73	1.81	1.02	1.52	1.05	1.49	0.97	1.57	1.821	0.72
TC_BH01s	alluvium	3-6	2.55	1.915	0.64	1.93	0.62	1.94	0.61	1.83	0.72	1.727	0.823
TC_BH06s	alluvium	4.5-7.5	2.65	1.62	1.03	1.63	1.02	1.69	0.96	1.50	1.15	1.421	1.229
TC_BH07d	Hawkesbury Sandstone	19-22	2.03					0.68	1.35	0.40	1.63	0.304	1.726
TC_BH07s	Alluvium	3-6	2.06	0.744	1.32	1.75	0.31	1.70	0.36	1.57	0.49	1.634	0.426
TC_BH08s	Alluvium	5-8	2.24	0.785	1.46	1.80	0.44	1.74	0.51	1.66	0.58	1.639	0.601
TC_BH09d	Hawkesbury Sandstone	21-24	2.25	0.69	1.56	0.84	1.41	0.74	1.51	0.67	1.58	0.559	1.691
TC_BH09s	alluvium	2-5	2.29	0.85	1.44	1.78	0.51	1.75	0.54	1.71	0.58		2.29
IC_BH01	Hawkesbury Sandstone	23-26	26.77	7.54	19.23	7.86	18.91	7.80	18.97			8.029	18.74
IC_BH02	Hawkesbury Sandstone	8-11	20.77			4.03	16.74					3.342	17.43
EP_BH06	Hawkesbury Sandstone	10-13	7.60	3.77	3.83	3.80	3.80	3.78	3.82	3.754	3.85	3.555	4.046
EP_BH07	Hawkesbury Sandstone	10-13	10.48	7.46	3.02	7.08	3.40	7.57	2.91	7.726	2.75	7.704	2.774
MT_BH07	Hawkesbury Sandstone	43-46	24.41							19.01	5.40	18.837	5.573
MT_BH20	Hawkesbury Sandstone	41-44	12.27									1.956	10.31
MT_BH21	Hawkesbury Sandstone	47-50	25.05							10.51	14.54	10.26	14.79

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Apr-17		May-17		Jun-17		Jul-17		Aug-17	
RZ_BH01d	Hawkesbury Sandstone	22-25	6.30	4.56	1.75	4.771	1.53	4.555	1.75	4.674	1.63	4.878	1.42
RZ_BH01s	alluvium	7-10	6.39	4.39	2.00	4.537	1.85	4.353	2.04	4.502	1.89	4.622	1.77
RZ_BH15	Hawkesbury Sandstone	18-21	6.02	4.27	1.75	4.483	1.54	4.264	1.76	4.392	1.63	4.384	1.64
RZ_BH16d	Hawkesbury Sandstone	17-20	5.82	4.05	1.77	4.335	1.49	4.506	1.31	4.175	1.65	4.191	1.63
RZ_BH19	Hawkesbury Sandstone	19-22	2.46	0.76	1.70	1.021	1.44	0.709	1.75	0.804	1.66	0.879	1.58
RZ_BH26	Hawkesbury Sandstone	20 - 23	2.84	0.22	2.62	1.328	1.51	0.989	1.85	1.123	1.72	1.285	1.56
RZ_BH28d	Hawkesbury Sandstone	27-30	2.83	0.95	1.88	1.15	1.68	1.069	1.76	1.038	1.79	1.114	1.72
RZ_BH30	Hawkesbury Sandstone	16 - 19	2.04	0.46	1.59	0.555	1.49	0.265	1.78	0.307	1.73	0.501	1.54
RZ_BH38	Hawkesbury Sandstone	28 - 31	2.27	0.54	1.73	0.793	1.48	0.581	1.69	0.827	1.44	0.665	1.61
RZ_BH44d	Hawkesbury Sandstone	25 - 28	2.29	0.53	1.76	1.267	1.02	0.444	1.85	0.545	1.75	0.651	1.64
RZ_BH44s	Alluvium	12-15	2.25	1.18	1.07	1.331	0.92	1.197	1.05	1.345	0.91	1.371	0.88
RZ_BH47d	Hawkesbury Sandstone	27 - 30	2.30	0.64	1.66	0.831	1.47	0.509	1.79	0.600	1.70	0.734	1.57
RZ_BH47s	Alluvium	15 - 18	2.50	1.23	1.27	1.382	1.12	1.271	1.23	1.354	1.15	1.365	1.14
RZ_BH49s	alluvium	13-16	5.99	4.57	1.42	4.763	1.23	4.585	1.41	4.751	1.24	4.814	1.18
RZ_BH50	Hawkesbury Sandstone	22-25	1.92	0.68	1.24	0.969	0.95	1.109	0.81	1.212	0.71	1.228	0.69
RZ_BH51	Hawkesbury Sandstone	19-22	2.15	0.59	1.57	0.671	1.48	0.409	1.74	0.429	1.72	0.775	1.38
RZ_BH52	Hawkesbury Sandstone	32 - 35	2.53	0.87	1.66	1.057	1.47	0.806	1.72	0.967	1.56	0.987	1.54
RZ_BH60	Hawkesbury Sandstone	56-59	24.96	12.22	12.74	12.395	12.57	12.424	12.54	12.430	12.53	12.466	12.49
RZ_BH64	Hawkesbury Sandstone	46-49	10.38			1.318	9.06	1.194	9.19	1.204	9.18	1.317	9.06
RZ_BH67	Hawkesbury Sandstone	46-49	12.84	4.20	8.64	4.392	8.45	4.486	8.35				
RZ_BH69	Hawkesbury Sandstone	38-41	30.29							14.311	15.98		
TC_BH01d	Hawkesbury Sandstone	25-28	2.54	0.55	1.99	1.026	1.51	0.765	1.78	0.992	1.55	0.955	1.59
TC_BH01s	alluvium	3-6	2.55	1.61	0.94	1.745	0.81	1.527	1.02	1.691	0.86	1.761	0.79
TC_BH06s	alluvium	4.5-7.5	2.65	1.46	1.19	1.476	1.17	1.298	1.35	1.820	0.83	1.805	0.85
TC_BH07d	Hawkesbury Sandstone	19-22	2.03	0.38	1.65	0.529	1.50	0.321	1.71	0.498	1.53	0.422	1.608
TC_BH07s	Alluvium	3-6	2.06	1.60	0.46	1.724	0.34	1.589	0.47	1.892	0.17	1.670	0.390
TC_BH08s	Alluvium	5-8	2.24	1.65	0.59	1.738	0.50	1.424	0.82	1.623	0.62	1.711	0.53
TC_BH09d	Hawkesbury Sandstone	21-24	2.25	0.65	1.60	0.836	1.41	0.571	1.68	0.756	1.49	0.697	1.553
TC_BH09s	alluvium	2-5	2.29	1.66	0.63	1.724	0.57	1.579	0.71			1.725	0.565

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Apr-17		May-17		Jun-17		Jul-17		Aug-17	
IC_BH01	Hawkesbury Sandstone	23-26	26.77	7.91	18.86			7.934	18.83	8.002	18.77	7.845	18.92
IC_BH02	Hawkesbury Sandstone	8-11	20.77	2.91	17.86	3.32	17.45	3.791	16.98	3.504	17.27		
EP_BH06	Hawkesbury Sandstone	10-13	7.60	3.56	4.04	3.763	3.84	3.535	4.07	3.771	3.83	3.869	3.73
EP_BH07	Hawkesbury Sandstone	10-13	10.48	7.44	3.03	7.613	2.87	7.416	3.06	7.587	2.89	7.773	2.71
MT_BH07	Hawkesbury Sandstone	43-46	24.41	18.78	5.63	17.918	6.49	16.279	8.13	14.136	10.27	17.306	7.10
MT_BH20	Hawkesbury Sandstone	41-44	12.27										
MT_BH21	Hawkesbury Sandstone	47-50	25.05					8.556	16.494			11.788	13.26

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Sep-17		Oct-17		Nov-17		Dec-17		Jan-18	
RZ_BH01d	Hawkesbury Sandstone	22-25	6.30			4.858	1.442	4.832	1.468			4.803	1.497
RZ_BH01s	alluvium	7-10	6.39			4.558	1.832	4.581	1.809			5.704	0.686
RZ_BH15	Hawkesbury Sandstone	18-21	6.02			4.868	1.152	4.568	1.452			4.520	1.500
RZ_BH16d	Hawkesbury Sandstone	17-20	5.82	4.382	1.44	4.366	1.454	4.354	1.466			4.316	1.504
RZ_BH19	Hawkesbury Sandstone	19-22	2.46	1.059	1.40	1.112	1.348	1.012	1.448			1.072	1.388
RZ_BH26	Hawkesbury Sandstone	20 - 23	2.84	1.372	1.47	1.567	1.273	1.267	1.573			1.443	1.397
RZ_BH28d	Hawkesbury Sandstone	27-30	2.83									1.250	1.580
RZ_BH30	Hawkesbury Sandstone	16 - 19	2.04	0.601	1.44	0.741	1.299					0.574	1.466
RZ_BH38	Hawkesbury Sandstone	28 - 31	2.27	0.854	1.42	0.856	1.414	0.821	1.449			0.841	1.429
RZ_BH44d	Hawkesbury Sandstone	25 - 28	2.29	0.804	1.49	0.867	1.423	0.743	1.547			0.745	1.545
RZ_BH44s	Alluvium	12-15	2.25	1.432	0.82	1.565	0.685	1.474	0.776			1.454	0.796
RZ_BH47d	Hawkesbury Sandstone	27 - 30	2.30	0.869	1.43	0.917	1.383	0.809	1.491			0.851	1.449
RZ_BH47s	Alluvium	15 - 18	2.50	1.447	1.05	1.509	0.991	1.442	1.058			1.405	1.095
RZ_BH49s	alluvium	13-16	5.99	4.935	1.06	5.074	0.916					4.956	1.034
RZ_BH50	Hawkesbury Sandstone	22-25	1.92	1.216	0.70	1.316	0.604						
RZ_BH51	Hawkesbury Sandstone	19-22	2.15	0.693	1.46							0.761	1.389
RZ_BH52	Hawkesbury Sandstone	32 - 35	2.53	1.06	1.47	1.134	1.396	0.999	1.531			0.988	1.542
RZ_BH60	Hawkesbury Sandstone	56-59	24.96	12.54	12.42	12.461	12.499	13.78	11.178				
RZ_BH64	Hawkesbury Sandstone	46-49	10.38	1.853	8.53	1.604	8.776	1.7	8.680			3.746	6.634
RZ_BH67	Hawkesbury Sandstone	46-49	12.84	4.819	8.02	5.179	7.661	5.112	7.728				
RZ_BH69	Hawkesbury Sandstone	38-41	30.29	14.37	15.92	14.526	15.764						
TC_BH01d	Hawkesbury Sandstone	25-28	2.54			1.112	1.428	1.006	1.534			1.037	1.503
TC_BH01s	alluvium	3-6	2.55			1.998	0.552	2.929	-0.379			1.903	0.647
TC_BH06s	alluvium	4.5-7.5	2.65	1.653	1.00	1.741	0.909	1.587	1.063			1.614	1.036
TC_BH07d	Hawkesbury Sandstone	19-22	2.03					0.548	1.482				
TC_BH07s	Alluvium	3-6	2.06	1.751	0.31	1.801	0.259	1.724	0.336			1.683	0.377
TC_BH08s	Alluvium	5-8	2.24	1.799	0.44	1.789	0.451	1.817	0.423			1.724	0.516
TC_BH09d	Hawkesbury Sandstone	21-24	2.25			0.837	1.413	0.746	1.504			0.825	1.425
TC_BH09s	alluvium	2-5	2.29					1.819	0.471				

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Sep-17		Oct-17		Nov-17		Dec-17		Jan-18	
IC_BH01	Hawkesbury Sandstone	23-26	26.77			8.313	18.455	8.507	18.261			8.484	18.284
IC_BH02	Hawkesbury Sandstone	8-11	20.77			4.287	16.486						
EP_BH06	Hawkesbury Sandstone	10-13	7.60	4.041	3.56	4.072	3.529	3.854	3.747			3.943	3.658
EP_BH07	Hawkesbury Sandstone	10-13	10.48	7.988	2.49	8.109	2.369	7.983	2.495			8.078	2.400
MT_BH07	Hawkesbury Sandstone	43-46	24.41	18.07	6.34	19.152	5.258	19.19	5.218			19.17	5.241
MT_BH20	Hawkesbury Sandstone	41-44	12.27									2.331	9.94
MT_BH21	Hawkesbury Sandstone	47-50	25.05	11.29	13.756			12.07	12.978				

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Feb-18		Mar-18		Apr-18		May-18		Jun-18	
RZ_BH01d	Hawkesbury Sandstone	22-25	6.30	4.775	1.525	4.494	1.806	4.752	1.548	4.847	1.453	4.824	1.476
RZ_BH01s	alluvium	7-10	6.39	4.721	1.669	4.417	1.973	4.653	1.737	4.756	1.634	4.533	1.857
RZ_BH15	Hawkesbury Sandstone	18-21	6.02	4.475	1.545	4.19	1.830	4.463	1.557	4.56	1.460	4.545	1.475
RZ_BH16d	Hawkesbury Sandstone	17-20	5.82	4.283	1.537	4.066	1.754	4.272	1.548	4.366	1.454	4.352	1.468
RZ_BH19	Hawkesbury Sandstone	19-22	2.46	1.123	1.337	0.734	1.726	0.94	1.520	1.037	1.423	0.970	1.490
RZ_BH26	Hawkesbury Sandstone	20 - 23	2.84	1.351	1.489	1.19	1.650	1.352	1.488	1.431	1.409	1.327	1.513
RZ_BH28d	Hawkesbury Sandstone	27-30	2.83	1.262	1.568	0.925	1.905	1.219	1.611	1.316	1.514	1.154	1.676
RZ_BH30	Hawkesbury Sandstone	16 - 19	2.04	0.572	1.468	0.209	1.831	0.567	1.473	0.647	1.393	0.459	1.581
RZ_BH38	Hawkesbury Sandstone	28 - 31	2.27	0.746	1.524	0.52	1.750	0.728	1.542	0.824	1.446	0.773	1.497
RZ_BH44d	Hawkesbury Sandstone	25 - 28	2.29	0.837	1.453	0.521	1.769			0.797	1.493	0.698	1.592
RZ_BH44s	Alluvium	12-15	2.25	1.483	0.767	1.342	0.908	1.375	0.875	1.473	0.777	1.336	0.914
RZ_BH47d	Hawkesbury Sandstone	27 - 30	2.30	0.884	1.416	0.715	1.585	0.815	1.485	1.071	1.229	0.861	1.439
RZ_BH47s	Alluvium	15 - 18	2.50	1.430	1.070	1.232	1.268	1.445	1.055	1.464	1.036	1.337	1.163
RZ_BH49s	alluvium	13-16	5.99	5.044	0.946	4.709	1.281	4.887	1.103	4.901	1.089	4.779	1.211
RZ_BH50	Hawkesbury Sandstone	22-25	1.92	1.154	0.766	1.203	0.717	1.13	0.790	1.150	0.770	1.119	0.801
RZ_BH51	Hawkesbury Sandstone	19-22	2.15	0.705	1.445	0.525	1.625	0.715	1.435	0.777	1.373	0.600	1.550
RZ_BH52	Hawkesbury Sandstone	32 - 35	2.53	0.937	1.593	0.67	1.860	0.905	1.625	1.006	1.524	0.878	1.652
RZ_BH60	Hawkesbury Sandstone	56-59	24.96	12.74	12.224	12.77	12.193	12.81	12.153			12.94	12.017
RZ_BH64	Hawkesbury Sandstone	46-49	10.38		1.816	8.564	1.782	8.598	1.883	8.497	1.893	8.487	
RZ_BH67	Hawkesbury Sandstone	46-49	12.84		5.145	7.695			5.162	7.678			
RZ_BH69	Hawkesbury Sandstone	38-41	30.29				14.43	15.864					
TC_BH01d	Hawkesbury Sandstone	25-28	2.54	1.032	1.508	0.501	2.039	1.033	1.507	1.162	1.378	0.954	1.586
TC_BH01s	alluvium	3-6	2.55	1.971	0.579	1.821	0.729	1.973	0.577	1.957	0.593	1.830	0.720
TC_BH06s	alluvium	4.5-7.5	2.65	1.442	1.208	1.37	1.280	1.62	1.030	1.819	0.831	1.531	1.119
TC_BH07d	Hawkesbury Sandstone	19-22	2.03		0.08	1.950	0.642	1.388			0.456	1.574	
TC_BH07s	Alluvium	3-6	2.06	1.636	0.424	1.816	0.244	1.749	0.311	1.772	0.288	1.669	0.391
TC_BH08s	Alluvium	5-8	2.24	1.734	0.506	1.709	0.531	1.802	0.438	1.793	0.447	1.721	0.519
TC_BH09d	Hawkesbury Sandstone	21-24	2.25	0.808	1.442	0.348	1.902	0.934	1.316	0.963	1.287	0.765	1.485
TC_BH09s	alluvium	2-5	2.29										

Monitoring Well	Lithology Screened	screen interval (m)	RL toc mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD	SWL mbtoc	SWL mAHD
				Feb-18		Mar-18		Apr-18		May-18		Jun-18	
IC_BH01	Hawkesbury Sandstone	23-26	26.77				8.513	18.255	8.537	18.231	8.463	18.305	
IC_BH02	Hawkesbury Sandstone	8-11	20.77	8.287	12.486								
EP_BH06	Hawkesbury Sandstone	10-13	7.60	4.01	3.591	4.022	3.579	4.014	3.587	4.136	3.465	4.001	3.600
EP_BH07	Hawkesbury Sandstone	10-13	10.48	8.204	2.274	8.094	2.384	8.326	2.152	8.390	2.088	8.373	2.105
MT_BH07	Hawkesbury Sandstone	43-46	24.41	19.27	5.139	19.24	5.170	19.31	5.102	19.35	5.057	#####	4.982
MT_BH20	Hawkesbury Sandstone	41-44	12.27	2.369	9.90	2.403	9.87	2.404	9.87			2.477	9.79
MT_BH21	Hawkesbury Sandstone	47-50	25.05				12.89	12.159					

Annexure H Surface Water Monitoring Program

WestConnex Rozelle Interchange

Operational Surface Water Quality Monitoring Program

Project:	Rozelle Interchange
Document Number:	RIC-JHC-PLN-00-PL-000-009
Revision Date:	20/08/2023

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
A	12/10/2022	JHCPB JV	JHCPB ESA Manager	Draft for internal review
B	29/11/2022	JHCPB JV	JHCPB ESA Manager	Issued to TfNSW
Rev 00	31/03/2023	JHCPB JV	JHCPB ESA Manager	Issued to DPE
Rev 01	20/08/2023	JHCPB JV	JHCPB ESA Manager	Addressing DPE comments

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Glossary/ Abbreviations

Abbreviations	Expanded text
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
DoI Water	Department of Industry – Water (formerly DPI Water)
EC	Electrical Conductivity
EIS	WestConnex M4-M5 Link Environmental Impact Statement
EPL	Environment Protection Licence
GMP	Groundwater Management Sub-plan
JHCPB	John Holland CPB Contractors Joint Venture
REMM	Revised Environmental Management Measures
Roads and Maritime	Roads and Maritime Services
SPIR	WestConnex M4-M5 Link Submissions and Preferred Infrastructure Report
SSTV	Site Specific Trigger Values
SSWMP	Soil and Water Management Plan
SWQMP	Surface Water Quality Monitoring Program
TDS	Total Dissolved Solids
WTP	Water Treatment Plant

1. Introduction

1.1. Context

This Operational Surface Water Monitoring Program (OpSWMP or Program) has been prepared for the operation of the M4-M5 Link Rozelle Interchange (the Asset). This OpSWMP addresses the requirements of the Minister's Conditions of Approval (CoA), Project Approvals and all applicable guidance and legislation. This OpSWMP is based on baseline studies developed for the Project EIS (AECOM 2017) and continued baseline monitoring reports (AECOM 2018).

This Program provides details of the surface water monitoring network, frequency of monitoring, test parameters and wetlands montioring. This OpSWMP supplements the Operational Water Management Sub-plan (OpWMP), which itself is an appendix of the OEMP.

1.2. Scope of the OSWQMP

The scope of this Program is to describe how to monitor potential impacts to surface water during operational of the Project. Construction phase monitoring does not fall within the scope of the operational phase and therefore are not included within the processes contained within this Program.

The Operational Monitoring Programs must be endorsed by the Environmental Representative (ER) and then submitted to the Secretary for approval at least one (1) month prior to commencement of Operation.

Operation will not commence until the Secretary has approved all required Operational Monitoring Programs.

The OpSWMP, as approved by the Secretary will be implemented for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, a review will be undertaken of future monitoring requirements in consultation with DPI Water. The review will determine if additional monitoring is required, and the time period for continued monitoring.

2. Purpose and objectives

2.1. Objectives

The key objectives of this Program are to ensure all CoAs, REMMs, and licence/permit requirements relating to surface water monitoring are described, scheduled, and assigned responsibility as outlined in:

- The EIS prepared for WestConnex M4-M5 Link,
- The SPIR prepared for WestConnex M4-M5 Link,
- The Modification Report and Response to Submissions Report prepared for the Mainline Tunnel Modification,
- Conditions of Approval (CoA)granted to the project on 17 April 2018 and as subsequently modified,
- RMS specifications G36, G38 and G40,
- The Assets Operation Environment Protection Licence (EPL)
- All relevant legislation and other requirements.

Table 1 CoA Compliance

<table>
<tr><th>CoA No.</th><th>Condition Requirement</th><th>Doc Reference</th></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 operational performance against predicted performance.

<table><tr><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)Surface Water Quality Plan & Monitoring Program</td><td>EPA; DPI Water; OEH; Sydney Water; and relevant council(s)</td></tr></table></td><td>Section 2.2</td></tr>
<tr><td rowspan="10">D9</td><td colspan="2">Each operational monitoring program must include:</td></tr>
<tr><td>(a) details of baseline data;</td><td>Section 3</td></tr>
<tr><td>(b) details of all monitoring of the project to be undertaken;</td><td>Section 4, Section 7</td></tr>
<tr><td>(c) the parameters of the project to be monitored;</td><td>Section 4.3.3, Section 7</td></tr>
<tr><td>(d) the frequency of monitoring to be undertaken;</td><td>Section 4.3.1, Section 7</td></tr>
<tr><td>(e) the location of monitoring;</td><td>Sections 4.3</td></tr>
<tr><td>(f) the reporting of monitoring and analysis results against relevant criteria</td><td>Sections 6.1</td></tr>
<tr><td>(g) details of the methods that will be employed to analyse the monitoring data;</td><td>Sections 6.3</td></tr>
<tr><td>(h) procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and</td><td>Sections 6.1</td></tr>
<tr><td>(i) any consultation to be undertaken in relation to the monitoring programs</td><td>Section 2.2</td></tr>
<tr><td>D10</td><td>The Operational Surface Water Quality Plan and Monitoring Program must address wetland and mosquito management.</td><td>Section 7, Annexure B</td></tr>
<tr><td>D14</td><td>The Operational Monitoring Programs must be submitted to the Secretary for approval at least one (1) month prior to the commencement of operation.</td><td>Section 1.2</td></tr>
</table>

CoA No.	Condition Requirement	Doc Reference
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 1.2
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.	Section 1.2 and Section 6.3
D17	The results of the Operational Monitoring Programs must be submitted to the Secretary, and relevant regulatory authorities, for information in the form of an Operational Monitoring Report at the frequency identified in the relevant Operational Monitoring Program.	Section 6.3

2.2. Consultation

This program will be provided to DPI Water, Sydney Water, EPA, City of Sydney Council, Inner West Council in accordance with CoA D8(a). Refer to Section 1.5 of the OEMP for consultation requirements relating to the OEMP and all sub-plans.

A summary of consultation undertaken during the development of the OpWMP and OpSWMP is included in the OpWMP.

Community feedback and complaints relating to groundwater will be managed in accordance with Section 7 of the OEMP.

3. Surface Water Baseline monitoring

3.1. Overview

In July 2016 a baseline surface water monitoring program was implemented as part of the project EIS (AECOM, 2017). The program was based on a desktop assessment involving a review of the existing surface water environment across the project area, including:

- Information obtained from geotechnical investigations and assessments carried out as part of the project,
- Information and water quality monitoring data from the M4 East EIS and the New M5 EIS relevant to surface water within the project area, and
- Data relevant to the existing surface water conditions in the study area from sources including the Inner West Council and the City of Sydney Council, WestConnex (formerly Sydney Motorway Corporation, and NSW Government agencies including Sydney Water and the RMS.

The baseline surface water monitoring program was implemented to:

- Evaluate the existing surface water quality at key locations in the project area,
- Identify potential pathways of pollutants to surface water receivers, and
- Monitor and assess the surface water quality in the project area to form a baseline of environmental conditions, to measure the environmental performance of the project during the construction and operation of the project.

3.2. Monitoring network

Baseline water quality monitoring locations were located upstream and downstream of the Asset as shown in Figure 1, Figure 2 and listed in Table 2. Monitoring locations SW03 and SW04 shown on Figure 1 are associated with the M4-M5 Link Mainline Tunnels Project and are not included in the monitoring program established by this Program. The monitoring locations were chosen to provide general characterisation of the waterways in the vicinity of the Project and include water quality monitoring locations established for the Project.

Table 2 Baseline surface water monitoring locations

Sample ID	Sample Location	Waterway
SW01	Whites Creek outlet at City West Link/ The Crescent, Rozelle	Rozelle Bay (downstream of Asset)
SW02	Whites Creek Valley Park, Railway Parade, Annandale	Whites Creek (downstream of Asset) *
SW07	Adjacent to 88-90 Lilyfield Road, Lilyfield	Easton Park drain (upstream of Asset)
SW11	Under Iron Cove Bridge, Rozelle	Iron Cove (downstream of Asset)
SW12	King George Park, Rozelle	Iron Cove (downstream of Asset)

* SW02 is listed as downstream of the M4-M5 link construction compounds in the EIS (AECOM, 2017). However, SW02 is upstream of the Rozelle Interchange Asset.

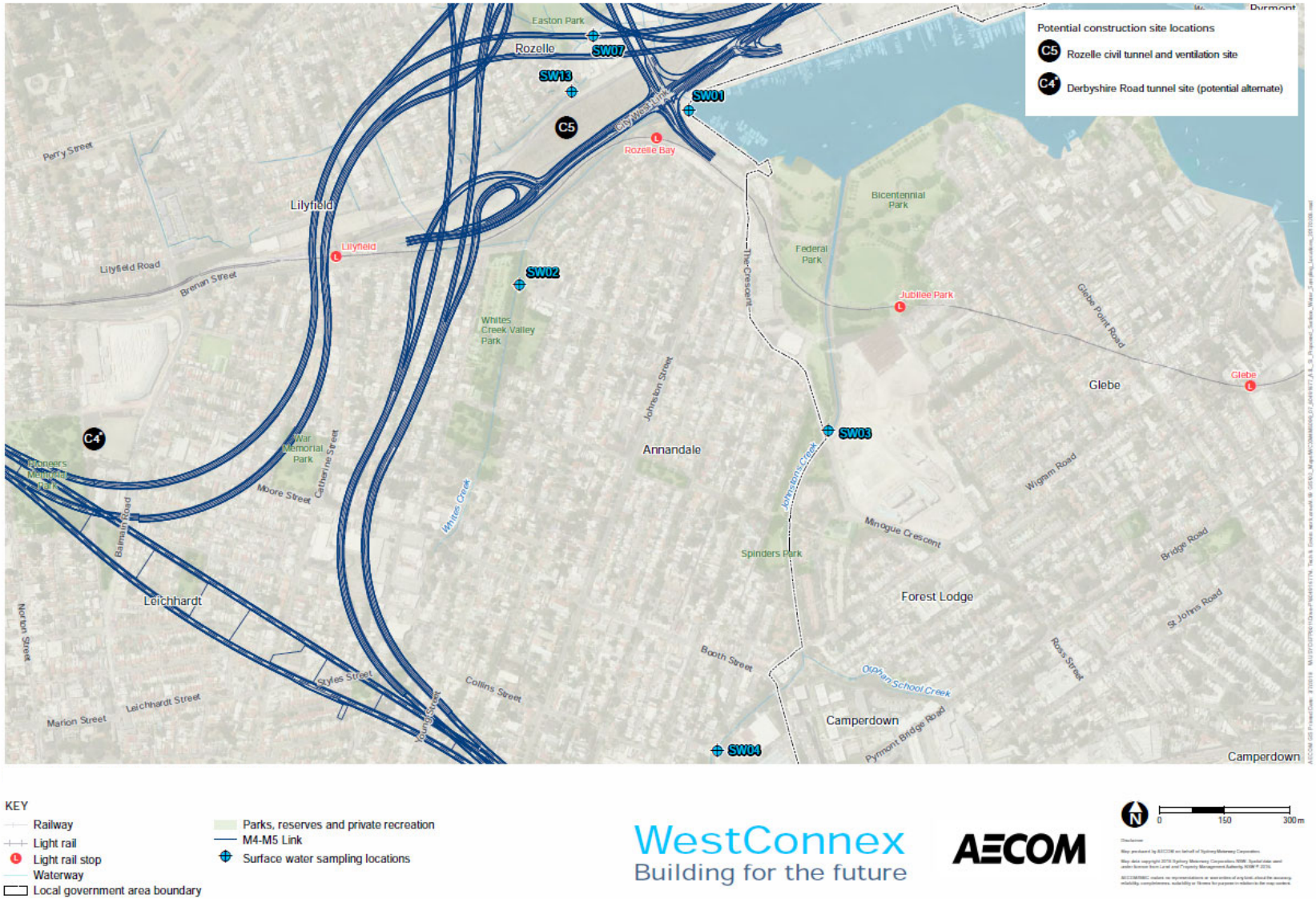

Figure 1 Rozelle Interchange showing sampling locations (SW03 and SW04 will not be monitored for this project and are associated with the Mainline Tunnels Project)

Figure 2 Iron Cove Link showing sampling locations

3.3. Baseline Surface Water Quality

The baseline surface water quality sampling program (Table 3) included the following analytes:

- 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).

Summary tables of the baseline water quality data are included in Annexure A. Interpretation of the baseline surface water monitoring data is included in the EIS (AECOM, 2017) and summarised in Table 4. The results are compared against the ANZECC (2000a) water quality guidelines. It should be noted that these guidelines are not to be used as a mandatory standard; rather they provide a guideline for the environmental values of water resources.

Table 3 Baseline surface water quality sampling program

Sample ID	Number of samples	Start of baseline monitoring	Minimum frequency
SW01	37	July 2016	Monthly
SW02	37	July 2016	Monthly
SW07	37	July 2016	Monthly
SW11	31	November 2016	Monthly
SW12	31	November 2016	Monthly

Table 4 Baseline water quality conditions in the Project area

Waterway	Baseline data obtained	Description of water quality
Rozelle Bay	Samples collected at SW01. Samples collected by The University of Sydney on behalf of UrbanGrowth NSW at BW1 as part of The Bays Precinct transformation project between July 2016 and June 2018.	Elevated concentrations of heavy metals (copper, chromium, lead and zinc), nitrogen, phosphorous, nitrate, oxides of nitrogen, ammonia and chlorophyll have been recorded. On some occasions the pH is outside guideline levels and the turbidity exceeds guideline levels.
Whites Creek	Samples collected at SW02. Samples collected by The University of Sydney on behalf of UrbanGrowth NSW within a tidally influenced location (at SW02) as part of The Bays Precinct transformation project between June and September 2016.	Elevated concentrations of heavy metals (chromium, copper, lead and zinc), phosphorus, nitrogen, nitrate and oxides of nitrogen were recorded. On some occasions the pH was outside guideline levels and the turbidity exceeds guideline levels.
Easton Park drain	Samples collected at SW07.	Elevated concentrations of heavy metals (copper, lead, and zinc) and nutrients (nitrogen phosphorus and nitrate) were recorded. On some occasions, the pH was outside guideline levels and the turbidity exceeded guideline levels.
Iron Cove	Samples collected at SW11 and SW12.	Elevated concentrations of metals (copper, chromium, lead, mercury and zinc), nitrogen, nitrate and phosphorous have been recorded. Turbidity exceeds guideline values.

Waterway	Baseline data obtained	Description of water quality
		The pH was outside guideline levels on occasions.
Open stormwater drain - Rozelle Rail Yards	Samples collected at SW13.	Elevated concentrations of metals (copper, chromium, lead, mercury and zinc), nitrogen, nitrate and phosphorous have been recorded. Turbidity exceeds guideline levels.

4. Surface Water Operational Monitoring

4.1. Overview

The mobilisation of sediments and pollutants during operation was identified as a potential impact on surface water within the highly urbanised and disturbed catchments and waterways.

Table 6 contains the parameters that have tested as part of the construction monitoring program. Site specific trigger values (SSTVs) are identified in Table 7 and will be used to assess potential impacts on sensitive receiving environments.

Groundwater inflows intercepted during tunnelling will be discharged via the Asset WTP. The Operational EPL. Discharged water quality will be monitored as detailed in the operational groundwater monitoring program.

4.2. Rainfall monitoring

To provide data to assess water quality trends, rainfall will be monitored via a rain gauge, which will be checked on each workday, or automated using an electronic weather station.

4.3. Monitoring locations

Surface water quality monitoring will be carried out at six sites, listed in Table 5 and shown in Figure 1 and Figure 2. This is consistent with the Construction phase monitoring. The surface water quality monitoring locations were also monitored during the baseline monitoring period that informed the EIS.

The monitoring allows for the assessment trends in water quality, including natural variations, and will allow sufficient data to enable assessment of any potential impacts measured during operation.

Table 5 Construction phase surface water monitoring program

Sample ID[1]	Sample location	Ancillary Facility	Receiving environment	Analysis suite	Sampling frequency
SW01	Rozelle Bay (down-gradient)	Rozelle civil and tunnel site	Sydney Harbour/ Parramatta River	Physio-chemical parameters[2]	Monthly/ Wet weather[3]
SW02	Whites Creek (up-gradient of Rozelle Interchange)	Rozelle civil and tunnel site	Sydney Harbour/ Parramatta River	Physio-chemical parameters[2]	Monthly/ Wet weather[3]
SW07	Easton Park drain (Up-gradient and down-gradient of construction)	Rozelle civil and tunnel site	Sydney Harbour/ Parramatta River	Physio-chemical parameters[2]	Monthly/ Wet weather[3]
SW11	Iron Cove (downstream)	Iron Cove civil and tunnel site	Sydney Harbour/ Parramatta River	Physio-chemical parameters[2]	Monthly/ Wet weather[3]
SW12	Iron Cove (downstream)	Iron Cove civil and tunnel site	Sydney Harbour/ Parramatta River	Physio-chemical parameters[2]	Monthly/ Wet weather[3]

Note:
1 Sample location ID's retained from EIS and construction phase for consistency
2 Physico-chemical (field) parameter analysis as detailed in Table 6

3 Quarterly wet weather monitoring (at least once every 3 months following 25 mm of continuous rainfall – see Sampling frequency)

4.3.1. Sampling frequency

Surface water quality sampling will be undertaken monthly.

Wet weather monitoring will be carried out (a minimum of once per 3 months where rainfall does not exceed 25mm) when a continuous rainfall event of >25 mm is received in the local catchment during a 24-hour period (as recorded at the Asset's rain gauge(s) or nearby weather station).

For safety reasons sampling will not be undertaken during peak storm-flows. Sampling will be completed when flows are reasonably constant and monitoring points can be safely accessed, monitoring locations will be selected where possible to enable a safe monitoring location during all weather conditions.

4.3.2. Surface water quality parameters

Details of the analytes that will be monitored during the construction phase surface water monitoring and in Table 7, at the locations listed in Table 5 and shown in Figure 1 and Figure 2.

Table 6 Surface water quality monitoring parameters

Category	Parameters[1]
Physico-chemical parameters	▪ Temperature (˚C) ▪ Dissolved Oxygen (mg/L) ▪ Electrical Conductivity (µS/cm) ▪ Reduction-Oxidation Potential (Redox)(mV) ▪ pH ▪ Total dissolved solids (TDS) ▪ Turbidity (NTU) ▪ Visible oil and grease

Note:
[1] Measured in the field using calibrated multi-probe water quality meter(s)

4.3.3. Performance criteria

Baseline monitoring shows that some surface water quality parameters exceed the default ANZECC (2000a) water quality trigger values for slightly to moderately disturbed ecosystems.

This is not unexpected given the highly urbanised and disturbed area and receiving waterways surrounding the project.

Location specific performance criteria (site-specific trigger values (SSTV)) have been developed for downstream (impact) surface water monitoring locations (see Table 7).

SSTV were developed for appropriate parameters using baseline monitoring data and ANZECC (2000a) guideline criteria for slightly to moderately disturbed ecosystems (generally protecting 90% of species) (Table 7).

- The 80th percentile of baseline data is used as the SSTV for those parameters/locations that exceeded the relevant ANZECC (2000a) guideline criteria. It is noted that exceedances of the ANZECC (2000a) guideline criteria are not unexpected due to the highly disturbed nature of the urban catchment area,
- The relevant ANZECC (2000a) guideline criteria is used as the SSTV for parameters where the 80th percentile of baseline data was below the relevant ANZECC (2000a) guideline criteria.

Table 7 Site specific trigger values

Parameter	Units	ANZECC guidelines	SW01	SW02	SW07	SW11	SW12	SW13
pH	pH	7.0-8.5	7.0-8.5	7.0-8.5	7.0-8.5	7.0-8.5	7.0-8.5	7.0-8.5
Electrical Conductivity	µS /cm	125 - 2,200	49,812	23,348	18,190	51,914	51,947	575
Turbidity	NTU	0.5 - 10	8.66	12.98	12.14	28.44	7.44	65.2

The SSTV's provide an easily identifiable indication of a potential change in water quality. A management response would be initiated if any of the following occurs:

- A parameter exceeds the SSTV for any single monitoring event by more than 30%,
- A parameter downstream exceeds the corresponding parameter upstream for any single monitoring event by more than 20%,
- A parameter exceeds the SSTV for two consecutive monthly monitoring events,
- A parameter exceeds the SSTV for half of the sampling events in a twelve-month period.

In the event that any of the above triggers are observed, a review will be initiated immediately to determine the significance of the exceedance(s) and possible causes. The review will assess the baseline data for the relevant waterway, recent rainfall records, other activities within the catchment and recent activities or recorded erosion/sediment control incidents occurring in the catchment and a review of the WTP discharge compliance.

5. Monitoring methodology / Sampling protocol

5.1. Sampling collection

Grab samples will be collected manually from the sampling locations identified in Table 5, Figure 1 and Figure 2. The volume of sample collected will be sufficient for the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s).

5.2. Field measures

Field physico-chemical parameters including EC, pH, DO, TDS, ORP, temperature, and turbidity will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s) or provided for laboratory analysis. Other observations including odour and colour may also be recorded.

The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.

5.3. Recording of field results

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date, location, and sampler details.

5.4. Decontamination

Sampling equipment will be cleaned (decontaminated) between each sample. Where a sample site shows evidence of contamination (i.e. there is an algal bloom, or the site smells strongly of hydrocarbons, sewage or something else) 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 will be followed:

- Rinse the 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
- Allow to dry.

De-ionised and tap water will be available for washing equipment in the field, if required.

5.5. Quality Assurance and documentation

Any sample to be sent to a laboratory will be subject to quality assurance protocols.

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

As part of sampling the following will be undertaken:

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

Samples are to be transported to a NATA-accredited laboratory under documented 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 initiated if required.

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

6. Surface Water Quality Compliance management

6.1. Data analysis and management response

Results from the operational monitoring program will be compared with the SSTVs and with previous results.

Monthly monitoring results for surface water quality will be compared against SSTVs and reported as per Section 6.3 below. If a trigger is observed, a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess available surface water data, baseline data for the relevant waterway, recent rainfall records, and recent activities or recorded erosion/sediment control incidents occurring in the catchment and review of WTP discharge compliance. If the exceedance is determined to be attributable to Asset, the event will be treated as an environmental incident and managed in accordance with the requirements of the OEMP. Corrective and preventative actions will be identified and implemented as part of that process.

6.2. 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.

6.3. Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions and performance criteria. Monitoring reports will be submitted to DPI, EPA, DPI Water and Sydney Water within 30 days of the reporting period unless otherwise agreed with DPI.

The OpSWMP, as approved by the Secretary will be implemented for a period of at least five (5) years following the completion of construction of the Rozelle Interchange (and commence once the mainline tunnels are operational). At least one (1) month prior to the end of the five (5) year monitoring period, a review will be undertaken of future monitoring requirements. The review will determine if additional monitoring is required, and the time period for continued monitoring.

Reporting requirements associated with the Program for the operational phase are presented in Table 8.

Table 8 Reporting requirements

Schedule (during construction)	Requirements	Recipient (relevant authority)
Water Monitoring Reports (every six months)	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period. Surface water quality results will be presented and performance criteria exceedances will be highlighted. Applicable management responses will be documented.	EPA, DPE, DPE Water, Sydney Water
EPL Monitoring Reports and Annual Returns	EPL monitoring reports will be prepared in accordance with the requirements of the EPL. An EPL Annual Return will be prepared in respect of each EPL reporting period (typically 12 months).	EPA

7. Wetland and Mosquito Management

The operational Wetland receives flows from the Operational WTP and stormwater runoff. An Operation and Maintenance Plan has been prepared by a Specialist Wetland Ecologist to detail all monitoring and maintenance required. This plan is included as Annexure B of this Program.

A summary of monitoring requirements and maintenance requirements are outlined below in Table 9 and Table 10.

Table 9 Monitoring Requirements

Monitoring Parameter	Location	Frequency	Trigger for Maintenance
Vegetation	Planted areas of wetland Cell 1 a, 1 b, and 2	Monthly [or fortnightly when required]	Loss of vegetation cover
Weed	Cell 1a, 1 b, and 2	Monthly [or fortnightly when required]	Presence of weeds
Mosquito	at least 10 sites of approximately 1 m2	Monthly [or fortnightly when required]	"'Dominant", "'Abundant" or "'Frequent levels"
Water bird	Cell 1a, 1 b, and 2	Monthly	Water birds creating nuisance
Water level	Cell 1a, 1 b, and 2	Monthly	Plants in >400mm or <50mm depth of water
Flow	Cell 1a, 1 b, and 2	Monthly	Flows not well distributed through cells, Channelised flows, erosion, or plant damage due to preferential flow paths, water level hiqher or lower than desiqn level
Post-flood inspection	Berms, edges, inlet, outlets, macrophyte zones	After flood or severe storm events	Damage
Drought management	Vegetated areas, exposed/dry soils	Weekly or fortnightly during extended	Six weeks of dry surface
Inlet and outlet inspections	Inlets and outlets	Monthly	Blockages, malfunctions, sediment accumulation
Photographic monitoring	8 - 14 designated locations	During each inspection	NA

Table 10 Maintenance Requirements

Issue	Threshold	Response	Responsibility
Loss of vegetation cover	Vegetation health and coverage decreases or coverage falls below 85%	Address causes of plant health/coverage decline Replanting	Operator
Presence of weeds	Weeds present	Undertake weed control in accordance with DPI WeedWise	Operator

Issue	Threshold	Response	Responsibility
Excessive mosquito larvae population	"Dominant", "Abundant" or "Frequent levels"	Lower water levels by 50-100mm for a period of 5 days Consider introducing predators Maintain healthy vegetation Engaging an expert to undertake a mosquito assessment if there is considerable risk to public health	Operator/ Mosquito assessment professional
Inhabitation of the wetland by water birds	Bird inhabitation of wetland	Netting inhabited areas Scare tactics Relocation of the nuisance birds Increase plant density	Operator/ relocation by a licensed spotter catcher to
Unacceptable water levels	Plants in >400mm or <50mm depth of water	Raise or lower water level by adjusting the outlet Consider irrigating plants if lack of water is related to drought conditions	Operator
Channelised/ short-circuited flows	Evidence of channelised flows	Replant if necessary Consult constructed wetland specialist	Operator
Erosion/ scour within the wetland or at inlets or outlets	Presence of scour	Repair or replant to emulate pre-flood conditions and prevent further damage	Operator
Sediment build up within wetland impacting vegetation	>2cm of sediment	Sediment removal Replanting if necessary	Operator
Sediment build up in inlets or outlets	>5cm depth of sediment	Sediment removal	Operator

8. Review and improvement

8.1. Continuous improvement

Monitoring data will be reviewed to provide potential requirements to increase, or decrease, the number of sampling locations and/or the analytical suites. Alterations to SSTV, monitoring locations, analytical suites, or frequencies will be reported in the Water Monitoring Reports.

Continuous improvement of this Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets.

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, and
- Make comparisons with objectives and targets.

8.2. SWQMP update and amendment

Revisions of this Program will be in accordance with the process outlined in the OEMP.

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

9. References

Acid Sulfate Soil Management Advisory Committee (ASSMAC),1998. Acid Sulfate Soil Manual

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

ANZECC/ARMCANZ, 2000b. Australian Guidelines for Water Quality Monitoring and Reporting.

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

NSW Department of Infrastructure, Planning and Natural Resources, 2002. Salinity Potential in Western Sydney Map

RTA, 1999. Guideline for Construction Water Quality Monitoring. NSW Road and Traffic Authority

Annexure A Baseline surface water monitoring results

Baseline Surface Water Monitoring SW01						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	33	5.89	0	52	8.66
pH	-	37	7.49	5.65	8.04	7.904
EC	µS/cm	37	40433.89	403	541180	49812.4
Temp	0C	37	20.74	15.7	28	24.68
DO	Mg/L	37	23.63	-0.16	558	6.656
Redox	mV	37	393.84	209.7	3980	387.04
Chemical analytes						
Ammonia as N	µg/L	3	245	70	240	-
Kjeldahl Nitrogen Total	mg/L	31	3.8	0.2	41.4	1.44
Nitrite (as N)	mg/L	31	0.03	0.01	0.04	0.04
Nitrogen (Total Oxidised)	mg/L	29	0.27	0.01	1.82	0.46
Nitrogen (Total)	mg/L	31	4315	300	41500	2240
Reactive Phosphorus as P	mg/L	31	0.027	0.01	0.08	0.04
Phosphorus (Total)	mg/L	31	0.30	0.02	3.76	0.17
Arsenic	mg/L	34	0.04	0.0013	0.42	0.0892
Cadmium	mg/L	34	0.0018	0.0001	0.006	0.00284
Chromium	mg/L	34	0.00167	0.0004	0.0064	0.00202
Chromium (III+VI)	mg/L	-	-	-	-	-
Copper	mg/L	28	0.010627	0.002	0.0586	0.0134
Ferrous Iron	mg/L	31	0.35	0.05	2.94	0.388
Iron	mg/L	33	0.3965	0.005	4.01	0.353
Lead	mg/L	34	0.0369054	0.0009	6.64	0.11208
Manganese	mg/L	33	0.021821429	0.0012	0.121	0.02484
Mercury	mg/L	34	0.021309	0.00006	0.0422	0.03674
Nickel	mg/L	34	0.44395	0.000008	1	0.00176
Zinc	mg/L	34	0.089169	0.0008	0.053	0.094

Baseline Surface Water Monitoring SW01						
Benzene	µg/L	34	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	34	1	1	1	1
Toluene	µg/L	34	1	1	1	1
Xylene (m & p)	µg/L	34	1	1	1	1
Xylene (o)	µg/L	34	1	1	1	1
Xylene Total	µg/L	34	1	1	1	1
Naphthalene	µg/L	34	2.5	2.5	2.5	2.5
C6-C10	mg/L	34	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	34	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	34	0.05	0.05	0.05	0.05
C10-C16	mg/L	34	0.05	0.05	0.05	0.05
C16-C34	mg/L	34	0.05	0.05	0.05	0.05
C34-C40	mg/L	34	0.05	0.05	0.05	0.05
C10-C40 (Sum of total)	mg/L	34	0.05	0.05	0.05	0.05
C6-C9	mg/L	34	0.01	0.01	0.01	0.01
C10-C14	mg/L	34	0.025	0.025	0.025	0.025
C15-C28	mg/L	34	0.05	0.05	0.05	0.05
C29-C36	mg/L	34	0.025	0.025	0.025	0.025
+C10-C36 (Sum of Total)	mg/L	34	0.025	0.025	0.025	0.025

Baseline Surface Water Monitoring SW02						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	33	20.8	0	430.7	12.98
pH	-	37	7.92	5.38	9.49	8.592
EC	µS/cm	37	8955.027	268	51935	23348
Temp	0C	37	20.11	13	32.5	23.27
DO	Mg/L	37	13.06	2.67	74.5	13.948
Redox	mV	36	335.61	211	584	373.24
Chemical analytes						
Ammonia as N	µg/L	3	190	30	480	-
Kjeldahl Nitrogen Total	mg/L	32	0.13	0.2	1.3	0.8
Nitrite (as N)	mg/L	32	0.8109375	<0.01	0.18	0.13
Nitrogen (Total Oxidised)	mg/L	32	0.88	0.02	2.76	1.11
Nitrogen (Total)	mg/L	32	1543	300	3600	2000
Reactive Phosphorus as P	mg/L	32	0.04	0.01	0.012	0.056
Phosphorus (Total)	mg/L	32	0.09	0.02	0.48	0.134
Arsenic	mg/L	36	0.001172414	0.0005	0.003	0.0016
Cadmium	mg/L	36	0.000162	0.0001	0.00033	0.0002
Chromium	mg/L	36	0.002133	0.0004	0.0056	0.00364
Chromium (III+VI)	mg/L	-	-	-	-	-
Copper	mg/L	36	0.011	0.003	0.119	0.0098
Ferrous Iron	mg/L	32	0.13	0.05	0.62	0.178
Iron	mg/L	35	0.42	0.134	1.15	0.058
Lead	mg/L	36	0.0071	0.0008	0.055	0.0116
Manganese	mg/L	35	0.019	0.006	0.06	0.027
Mercury	mg/L	36	2.93333E-05	0.0000019	0.000049	0.000049
Nickel	mg/L	36	0.00144	0.0006	0.003	0.00196
Zinc	mg/L	36	0.08275	0.017	0.361	0.1362
Benzene	µg/L	36	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	36	1	1	1	1
Toluene	µg/L	36	1	1	1	1

Baseline Surface Water Monitoring SW02						
Xylene (m & p)	µg/L	36	1	1	1	1
Xylene (o)	µg/L	36	1	1	1	1
Xylene Total	µg/L	36	1	1	1	1
Naphthalene	µg/L	36	2.5	2.5	2.5	2.5
C6-C10	mg/L	36	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	36	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	36	0.05	0.05	0.05	0.05
C10-C16	mg/L	36	0.05	0.05	0.05	0.05
C16-C34	mg/L	36	0.05	0.05	0.05	0.05
C34-C40	mg/L	36	0.05	0.05	0.05	0.05
C10-C40 (Sum of total)	mg/L	36	0.05	0.05	0.05	0.05
C6-C9	mg/L	36	0.01	0.01	0.01	0.01
C10-C14	mg/L	36	0.025	0.025	0.025	0.025
C15-C28	mg/L	36	0.05	0.05	0.05	0.05
C29-C36	mg/L	36	0.025	0.025	0.025	0.025
+C10-C36 (Sum of Total)	mg/L	36	0.025	0.025	0.025	0.025

Baseline Surface Water Monitoring SW07						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	33	24.19	0	390.7	12.14
pH	-	37	7.89	5.87	10.06	8.584
EC	µS/cm	37	8124.39	200	50618	18190
Temp	0C	37	19.23	13.9	25.3	22.54
DO	Mg/L	37	8.32	1.94	12.58	10.314
Redox	mV	37	333.34	126	625	378.36
Chemical analytes						
Ammonia as N	µg/L	7	372.86	50	1640	890
Kjeldahl Nitrogen Total	mg/L	36	1.34	<0.1	5.9	1.88
Nitrite (as N)	mg/L	36	<0.041	<0.01	0.13	0.06
Nitrogen (Total Oxidised)	mg/L	30	1.809333333	0.02	4.17	2.54
Nitrogen (Total)	mg/L	36	3080	800	6300	4160
Reactive Phosphorus as P	mg/L	36	0.07	0.01	0.23	0.11
Phosphorus (Total)	mg/L	36	0.21	<0.1	1.28	0.294
Arsenic	mg/L	37	0.0026	0.0006	0.006	0.004
Cadmium	mg/L	37	0.000162	0.0001	0.00033	0.0002
Chromium	mg/L	37	0.002133	0.0004	0.0056	0.00364
Chromium (III+VI)	mg/L	-	-	-	-	-
Copper	mg/L	37	0.016008	<0.01	0.054	0.0186
Ferrous Iron	mg/L	36	0.238	<0.05	1.28	0.326
Iron	mg/L	35	0.91	0.11	4.16	1.8
Lead	mg/L	37	0.027	0.001	0.164	0.0446
Manganese	mg/L	36	0.024	0.0041	0.072	0.038
Mercury	mg/L	37	0.00000725	0.000005	0.00001	0.00001
Nickel	mg/L	37	0.005380556	0.0009	0.014	0.00792
Zinc	mg/L	37	0.17	0.038	0.4	0.25
Benzene	µg/L	37	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	37	1	1	1	1
Toluene	µg/L	37	1	1	1	1

Baseline Surface Water Monitoring SW07						
Xylene (m & p)	µg/L	37	1	1	1	1
Xylene (o)	µg/L	37	1	1	1	1
Xylene Total	µg/L	37	1	1	1	1
Naphthalene	µg/L	37	2.5	2.5	2.5	2.5
C6-C10	mg/L	37	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	37	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	37	0.05	0.05	0.05	0.05
C10-C16	mg/L	37	0.05	0.05	0.05	0.05
C16-C34	mg/L	37	0.05	0.05	0.05	0.05
C34-C40	mg/L	37	0.05	0.05	0.05	0.05
C10-C40 (Sum of total)	mg/L	37	0.05	0.05	0.05	0.05
C6-C9	mg/L	37	0.01	0.01	0.01	0.01
C10-C14	mg/L	37	0.025	0.025	0.025	0.025
C15-C28	mg/L	37	0.05	0.05	0.05	0.05
C29-C36	mg/L	37	0.025	0.025	0.025	0.025
+C10-C36 (Sum of Total)	mg/L	37	0.025	0.025	0.025	0.025

Baseline Surface Water Monitoring SW11						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	27	39.37778	0	647	28.44
pH	-	31	7.865161	6.56	8.29	8.066
EC	µS/cm	31	45142.81	3565	54337	51914
Temp	0C	31	20.62258	13.6	27.2	24.04
DO	Mg/L	31	6.577742	-0.76	9.71	7.692
Redox	mV	31	313.029	62.5	456.1	376.8
Chemical analytes						
Ammonia as N	µg/L	7	60	40	110	86
Kjeldahl Nitrogen Total	mg/L	31	0.05	0.05	0.05	0.05
Nitrite (as N)	mg/L	31	0.01	0.01	0.02	0.01
Nitrogen (Total Oxidised)	mg/L	25	0.11	0.01	0.48	0.17
Nitrogen (Total)	mg/L	31	1500	700	3900	3360
Reactive Phosphorus as P	mg/L	31	0.023	0.01	0.08	0.03
Phosphorus (Total)	mg/L	31	0.311	0.06	1.3	0.682
Arsenic	mg/L	32	0.00258	0.0014	0.006	0.00344
Cadmium	mg/L	32	0.0002	0.001	0.00021	0.0002
Chromium	mg/L	32	0.002772	0.0006	0.0117	0.00512
Chromium (III+VI)	mg/L	-	-	-	-	-
Copper	mg/L	32	0.006815	0.002	0.029	0.0104
Ferrous Iron	mg/L	32	0.15	0.06	0.046	0.198
Iron	mg/L	31	0.7815	0.015	3.97	1.398
Lead	mg/L	32	0.01033	0.0002	0.0622	0.01692
Manganese	mg/L	31	0.021	0.0054	0.0829	0.0344
Mercury	mg/L	32	0.000103	0.000007	0.00035	0.00016
Nickel	mg/L	32	0.001088889	0.0006	0.0028	0.00148
Zinc	mg/L	32	0.025692	0.007	0.106	0.0376
Benzene	µg/L	32	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	32	1	1	1	1
Toluene	µg/L	32	1	1	1	1

Baseline Surface Water Monitoring SW11						
Xylene (m & p)	µg/L	32	1	1	1	1
Xylene (o)	µg/L	32	1	1	1	1
Xylene Total	µg/L	32	1	1	1	1
Naphthalene	µg/L	32	2.5	2.5	2.5	2.5
C6-C10	mg/L	32	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	32	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	32	0.05	0.05	0.05	0.05
C10-C16	mg/L	32	0.05	0.05	0.05	0.05
C16-C34	mg/L	32	0.05	0.05	0.05	0.05
C34-C40	mg/L	32	0.05	0.05	0.05	0.05
C10-C40 (Sum of total)	mg/L	32	0.05	0.05	0.05	0.05
C6-C9	mg/L	32	0.01	0.01	0.01	0.01
C10-C14	mg/L	32	0.025	0.025	0.025	0.025
C15-C28	mg/L	32	0.05	0.05	0.05	0.05
C29-C36	mg/L	32	0.025	0.025	0.025	0.025
+C10-C36 (Sum of Total)	mg/L	32	0.025	0.025	0.025	0.025

Baseline Surface Water Monitoring SW12						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	28	4.017857	-0.2	15	7.44
pH	-	31	7.826452	7.32	8.26	8.024
EC	µS/cm	31	44428.03	465	54271	51947
Temp	0C	31	20.85806	14.4	26.5	24.44
DO	Mg/L	31	5.714194	-1.22	8.52	7.144
Redox	mV	31	268.5484	101.3	479.5	352.44
Chemical analytes						
Ammonia as N	µg/L	8	<5	<0.001	160	<5
Kjeldahl Nitrogen Total	mg/L	32	17.11	0.5	200	1
Nitrite (as N)	mg/L	32	0.21	0.01	0.87	0.01
Nitrogen (Total Oxidised)	mg/L	32	0.0264	0.01	1.1	
Nitrogen (Total)	mg/L	32	664	0.04	1900	1260
Reactive Phosphorus as P	mg/L	32	0.041	0.01	0.25	0.04
Phosphorus (Total)	mg/L	32	133.61	0.03	1200	1.09
Arsenic	mg/L	31	0.00222	0.0014	0.005	0.00238
Cadmium	mg/L	31	0.000331	0.0001	0.0006	0.00054
Chromium	mg/L	31	0.001771	0.0005	0.013	0.0012
Chromium (III+VI)	mg/L	-	-	-	-	
Copper	mg/L	31	0.005092	0.001	0.016	0.00628
Ferrous Iron	mg/L	31	25.12	0.05	160	66
Iron	mg/L	30	0.45	0.036	5.43	0.4126
Lead	mg/L	31	0.005723	0.0003	0.-63	0.00456
Manganese	mg/L	30	0.01947	0.0049	0.068	0.03012
Mercury	mg/L	31	0.0001356	0.000007	0.0006	0.00049
Nickel	mg/L	31	0.005377	0.0005	0.0502	0.0062
Zinc	mg/L	31	0.055815	0.01	0.306	0.0986
Benzene	µg/L	31	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	31	1	1	1	1
Toluene	µg/L	31	1	1	1	1

Baseline Surface Water Monitoring SW12						
Xylene (m & p)	µg/L	31	1	1	1	1
Xylene (o)	µg/L	31	1	1	1	1
Xylene Total	µg/L	31	1	1	1	1
Naphthalene	µg/L	31	2.5	2.5	2.5	2.5
C6-C10	mg/L	31	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	31	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	31	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	31	0.025	0.025	0.025	0.025

Baseline Surface Water Monitoring SW13						
Parameter	Units	Count	mean	min	max	80th percentile
Physiochemical Parameters						
Turbidity	NTU	23	63.53913	0	726.5	65.2
pH	-	27	7.733333	6.8	9.9	8.294
EC	µS/cm	27	530.0741	86	3879	575.2
Temp	0C	27	17.72222	9.3	23.4	20.96
DO	Mg/L	27	5.22	0.13	46.68	5.464
Redox	mV	28	254.2143	0	405	358.7
Chemical analytes						
Ammonia as N	µg/L	3	290	70	510	-
Kjeldahl Nitrogen Total	mg/L	27	3.988461538	0.3	37	4.48
Nitrite (as N)	mg/L	27	0.023	0.01	0.04	0.03
Nitrogen (Total Oxidised)	mg/L	22	0.267	0.01	1.07	0.462
Nitrogen (Total)	mg/L	27	4285	300	37,000	4700
Reactive Phosphorus as P	mg/L	27	0.083846154	0.01	0.46	0.116
Phosphorus (Total)	mg/L	27	1.1164	0.08	6.93	1.852
Arsenic	mg/L	27	0.013985	0.0015	0.103	0.017
Cadmium	mg/L	27	0.002784	0.00019	0.0123	0.00564
Chromium	mg/L	27	0.005687	0.0004	0.048	0.00564
Chromium (III+VI)	mg/L	-	-	-	-	-
Copper	mg/L	27	0.033737	0.0013	0.288	0.0408
Ferrous Iron	mg/L	27	3.01	0.09	22.1	3.4
Iron	mg/L	22	9.3607	0.219	50.6	16.46
Lead	mg/L	27	0.078067	0.0022	0.6	0.1314
Manganese	mg/L	23	1.042326	0.037	8.3	1.056
Mercury	mg/L	27	7.05556E-05	0.000005	0.0002	0.0001
Nickel	mg/L	27	0.005619	0.001	0.021	0.0096
Zinc	mg/L	27	1.263	0.083	5.62	2.628
Benzene	µg/L	27	0.5	0.5	0.5	0.5
Ethylbenzene	µg/L	27	1	1	1	1
Toluene	µg/L	27	1	1	1	1

Baseline Surface Water Monitoring SW13						
Xylene (m & p)	µg/L	27	1	1	1	1
Xylene (o)	µg/L	27	1	1	1	1
Xylene Total	µg/L	27	1	1	1	1
Naphthalene	µg/L	27	2.5	2.5	2.5	2.5
C6-C10	mg/L	27	0.01	0.01	0.01	0.01
C6-C10 less BTEX (F1)	mg/L	27	0.01	0.01	0.01	0.01
F2-NAPHTHALENE	mg/L	27	0.05	0.05	0.05	0.05
C10-C16	mg/L	27	0.05	0.05	0.05	0.05
C16-C34	mg/L	27	0.05	0.05	0.05	0.05
C34-C40	mg/L	27	0.05	0.05	0.05	0.05
C10-C40 (Sum of total)	mg/L	27	0.05	0.05	0.05	0.05
C6-C9	mg/L	27	0.01	0.01	0.01	0.01
C10-C14	mg/L	27	0.025	0.025	0.025	0.025
C15-C28	mg/L	27	0.05	0.05	0.05	0.05
C29-C36	mg/L	27	0.025	0.025	0.025	0.025
+C10-C36 (Sum of Total)	mg/L	27	0.025	0.025	0.025	0.025

ANZECC (2000a) water quality guidelines

Parameter	Units	South-east Australia default triggers			Freshwater		Marine	
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection
Turbidity	NTU	6-50	0.5-10					
pH	-	6.5-8.5	7.0-8.5	6.5-8.5				
EC	µS/cm	125-2,200						
Temp	0C							
DO	Mg/L							
Redox	mV							
Chemical analytes								
Ammonia as N	µg/L	20	15	10	320	900	500	910
Kjeldahl Nitrogen Total	mg/L							
Nitrite (as N)	mg/L							
Nitrogen (Total Oxidised)	mg/L	0.04	0.015	10/1				
Nitrogen (Total)	mg/L	0.35	0.3					
Reactive Phosphorus as P	mg/L	0.02	0.005					
Phosphorus (Total)	mg/L	0.025	0.03					
Arsenic	mg/L			0.05	0.001/0.0008	0.024/0.013	ID	ID
Cadmium	mg/L			0.005	0.00006	0.0002	0.0007	0.0055
Chromium	mg/L			0.05	ID/o.oooo1	ID/0.001	0.008/0.00014	0.027/0.0044
Chromium (III+VI)	mg/L							
Copper	mg/L			1	0.0010	0.0014	0.0003	0.0013
Ferrous Iron	mg/L			0.3	ID	ID	ID	ID
Iron	mg/L			0.3	ID	ID	ID	ID
Lead	mg/L			0.05	0.001	0.0034	0.0022	0.0044
Manganese	mg/L			0.1	1.2	1.9	ID	ID
Mercury	mg/L			0.001	0.00006	0.0006	0.0001	0.0004

Parameter	Units	South-east Australia default triggers			Freshwater		Marine	
		NSW Lowland Rivers	Estuarine	Recreation	99% Protection	95% Protection	99% Protection	95% Protection
Nickel	mg/L			0.1	0.008	0.011	0.007	0.015
Zinc	mg/L			5	0.0024	0.008	0.007	0.015
Benzene	µg/L			10	600	950	500	700
Ethylbenzene	µg/L				ID	ID	ID	ID
Toluene	µg/L				ID	ID	ID	ID
Xylene (m & p)	µg/L				ID	ID	ID	ID
Xylene (o)	µg/L				200	350	ID	ID
Xylene Total	µg/L							
Naphthalene	µg/L				2.5	16	50	70
C6-C10	mg/L							
C6-C10 less BTEX (F1)	mg/L							
F2-NAPHTHALENE	mg/L							
C10-C16	mg/L							
C16-C34	mg/L							
C34-C40	mg/L							
C10-C40 (Sum of total)	mg/L							
C6-C9	mg/L							
C10-C14	mg/L							
C15-C28	mg/L							
C29-C36	mg/L							
+C10-C36 (Sum of Total)	mg/L							

Annexure B Wetland Operation and Maintenance Plan

Annexure I Operational Air Quality Management Plan

WestConnex Rozelle Interchange

Operational Air Quality Management Sub-Plan

Project:	Rozelle Interchange – Design and Construct
Contract Number:	Enter contract number
Document Number:	RIC-JHC-PLN-00-PL-410-001
Revision Date:	15 August 2023

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
A	08/06/2022	JHCPB JV	JHCPB Approvals Advisor	Draft for external review
B	09/11/2022	JHCPB JV	JHCPB Approvals Advisor	Draft for external review
00	02/12/2022	JHCPB JV	JHCPB Approvals Advisor	For TfNSW review
01	28/03/2023	JHCPB JV	JHCPB ESA Manager	For DPE Information
02	15/08/2023	JHCPB JV	JHCPB ESA Manager	For DPE Information

WestConnex

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Annexures

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Glossary of terms

Term / acronym	Definition
AM-1	Ambient monitoring – guide for the siting of sampling units
AM-2	Ambient monitoring – guide for measurement of horizontal wind for air quality applications
AM-4	Ambient monitoring – meteorological guidance for regulatory modelling applications
AM-6	Ambient monitoring – Carbon monoxide
AM-12	Ambient monitoring – Nitrogen oxides
AQCCC	Air Quality Community Consultative Committee, described in more detail in the OEMP, Section 7.5.
Asset	M4-M5 Link Rozelle Interchange Motorway; An interchange at Lilyfield and Rozelle, including a connection to the proposed future Western Harbour Tunnel and Beaches Link project
CEM-2	Continuous emissions monitoring method – Sulfur dioxide or nitrogen dioxide or nitric oxide
CEM-4	Continuous emissions monitoring method – Carbon monoxide
CEM-6	Continuous emissions monitoring method – Velocity or volumetric flow rate of stack gases
CEM-8	Continuous emissions monitoring method – Volatile organic compounds or methanol
CO	Carbon monoxide
CoA	Minister's Conditions of Approval
CRP	Community Relations Plan
DPE	NSW Department of Planning and Environment
DOAS	Differential optical absorption spectroscopy
EIS	M4-M5 Link Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPL	Environment protection licence
FID	Flame ionisation detection
NATA	National Association of Testing Authorities, Australia
NDIR	Non-dispersive infrared
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides
O&M	Operation & Maintenance
O&M Contractor	Transurban
OAQMP	Operation Air Quality Management Plan
OEMP	Operation Environment Management Plan
OMCS	Operations maintenance and controls system
OM-5	Other approved method – 'Fine' particulates (PM_{10})
OM-6	Other approved method – Polycyclic aromatic hydrocarbons (PAHs)
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
PM_{10}	Particulate matter 10 micrometres or less in diameter
PMCS	Plant monitoring and control system
POEO Act	*Protection of the Environment Operations Act 1997*

Term / acronym	Definition
POEO (Clean Air) Regulation 2010	*Protection of the Environment Operations (Clean Air) Regulation 2010*
Project	WestConnex M4-M5 Link Rozelle Interchange Motorway, SSI-7485
Project Company	Transurban
QA	Quality assurance
QC	Quality control
REMM	Revised environmental management measure (from the M4-M5 Link Submissions Report)
RTD	Resistance temperature detector
RX	Receiver head of the in-tunnel air monitor (Tunnel Sensors Viconex 5 Air Quality Monitor)
Secretary, the	The Secretary of the NSW Department of Planning and Environment
SSI	State Significant Infrastructure
TfNSW	Transport for New South Wales
TM-1	Test method – Selection of sampling positions
TM-2	Test method – Velocity or volumetric flow rate or temperature or pressure of stack gases
TM-15	Test method – Solid particles (Total)
TM-22	Test method – Moisture content in stack gases
TM-34	Test method – Volatile organic compounds
TX	Transmitter head of the in-tunnel air monitor (Tunnel Sensors Viconex 5 Air Quality Monitor)
WCX	WestConnex

1 Introduction

1.1 Purpose and application

This Operational Air Quality Management Sub-Plan (OAQMP) forms an appendix to the Operational Environment Management Plan (OEMP). The plan applies to all activities associated with the operation and maintenance of the Asset. The management of air quality impacts in accordance with the Conditions of Approval are identified within this plan.

The reporting system contained in Section 8.1 and Annexure B of this Plan must be approved by the Secretary and fully implemented prior to operation in accordance with condition of approval E27.

This plan will be reviewed and updated in accordance with Section 10 the OEMP. Environmental auditing of the Asset will be in accordance with Section 9.5 of the OEMP, except where specifically relevant to the management of air quality as identified in this OAQMSP.

1.2 Objectives

The OAQMP's objectives are:

- Manage impacts of the Rozelle Interchange's operation and maintenance with respect to maintaining tunnel and ventilation stack emissions within approved limits.
- Notify and report any exceedance in air quality criteria in accordance with the conditions of approval.

1.3 Operation and maintenance activities

Operation and maintenance activities of the Asset that are relevant to air quality are identified in Table 1-1.

Table 1-1: Activities relevant to air quality

Activity
Routine operation: • Traffic operations and monitoring • Equipment and systems management including operation of the ventilation system • Exhaust emissions from plant/equipment used in permanent operations (such as generators, pumps as required) • Exhaust emissions from use of O&M vehicles
Routine maintenance / repair work: • Vegetation clearing and landscape management • Stockpile management • Transport of materials for routine maintenance / repair works • Road infrastructure maintenance and repair • Pavement renewal and resurfacing
Non-routine operation: • Road traffic accidents and incidents • Emergency smoke extraction • Road maintenance plant and machinery
Non-routine maintenance and repair: • Major spill including clean-up • Equipment failure leading to damage, spill or an uncontrolled outcome

1.4 Potential impacts

Potential impacts to air quality associated with the operation and maintenance of the Asset include:

- In-tunnel emissions including NO_2, CO, PM_{10} and $PM_{2.5}$
- Exceedance of in-tunnel, in-stack or ambient air quality criteria due to emergency situations (e.g. fire or system failure) or non-performance of ventilation system
- Transport or disturbance of dust and dirt by heavy vehicles from the Asset to the public road networks, where it may be deposited and then re-suspended by other vehicles using the network
- Exhaust emissions from transport-related operations (such as transportation of materials, movement of maintenance vehicles, employee travel and waste removal).

2 Environmental obligations

2.1 Legislation

Legislation relevant to air quality management for the operation and maintenance of the Asset is included in Table 2-1.

Table 2-1: Legislation relevant to air quality management

Legislation	Relevance
Protection of the Environment Operations Act 1997 *Protection of the Environment (Clean Air) Regulation 2010*	Pollution management Prohibition of burning
National Greenhouse and Energy Reporting Act 2007	Minimisation of greenhouse gas generation
Protection of the Environment Operations (Waste) Regulation 2014 *Protection of the Environment Operations Act 1997* *Waste Avoidance and Resource Recovery Act 2001*	Waste classification, management, storage, transportation and disposal Waste hierarchy: reduction, in preference to reuse and recycling Littering Reduction of resource consumption Minimisation of transport impacts

2.2 Guidelines and relevant documents

The environmental policies, guidelines and principles relevant to the management of air quality during the operation and maintenance of the Asset is identified in Table 2-2.

Table 2-2: Environmental policies, guidelines and principles

Policies, guidelines and principles	Relevance
• G36: Environmental Protection (Roads and Maritime, 2017)	Environmental protection
• Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC, 2007) • Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA, 2016) • 9TP-SD-107/2.0 Air Quality Management Guideline (Transport for NSW, 2016) • Australian Standard: AS3580.8 Methods for sampling and analysis of ambient air (Standards Australia, 2008) • Australian Standard: AS/NZS3580.9 Methods for sampling and analysis of ambient air (Standards Australia, 2013) • Australian Standard 4323.1 – Stationary source emissions, Method 1: Selection of sampling positions • USEPA Method 1 - Sample and Velocity Traverses for Stationary Sources • USEPA Method 2(f) - determination of stack gas velocity and volumetric flow rate with three-dimensional probes	Management of air quality and dust
• The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition (World Council for Sustainable Business Development and World Resources Institute, 2004) • Greenhouse Gas Assessment Workbook for Road projects (Transport Authorities Greenhouse Group, 2013) • National Greenhouse Accounts Factors (Department of Environment and Energy, 2017)	Minimisation of greenhouse gas generation
• Waste Reduction and Purchasing Plan (Roads and Maritime, 2010	Reduction of resource consumption

2.3 Conditions of Approval

Conditions of Approval (CoA) that are relevant to air quality management during operation and maintenance activities are provided in Table 2-3. A cross-reference is included to indicate where each condition is addressed in this OAQMP or other project management documents.

Table 2-3 Conditions of Approval

CoA	Relevant requirement	Reference
E1	In addition to the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1, all reasonably practicable measures must be implemented to minimise the emission of dust and other air pollutants during the construction and operation of the CSSI.	The REMMs and environmental mitigation measures outlined in this section of the OAQMP will be implemented to minimise the emission of dust and other air pollutants during operation of the Rozelle Interchange. Monitoring and reviews will be undertaken to determine the efficacy of these measures in accordance with Section 5 and 6.

CoA	Relevant requirement	Reference
E2	Prior to finalising the detailed design of the CSSI and establishing the ambient air quality monitoring stations required under Condition E24, the Proponent must establish an Air Quality Community Consultative Committee (AQCCC) to provide advice prior to and during the operation of the CSSI. The AQCCC must: (a) be comprised of - (i) two representatives from the Proponent and tunnel operator, (ii) one representative from each of the relevant councils, whose attendance is only required when considering matters relevant to their respective local government area, (iii) three representatives from each local community adjacent to each ventilation facility whose attendance is only required when considering matters relevant to their respective local area, and whose appointment has been approved by an expression of interest process conducted by the Proponent in consultation with the Secretary, and (iv) a Chair who is an independent from the design and construction of the CSSI put forward by the Proponent and approved by the Secretary; (b) meet at least four (4) times a year, or as otherwise agreed by the Chair and the Secretary; (c) review and provide advice on the location of the air quality monitoring stations required under Condition E24, operation environmental management plans and other operation stage documents, compliance tracking reporting, audit reports, or complaints as they relate to air quality; and (d) provide advice on the dissemination of monitoring results and other information on air quality issues. The AQCCC may comprise the same members of the AQCCC established under CSSI approvals for the WestConnex M4 East and New M5 projects (SSI 6307 and SSI 6788) in relation to the ventilation outlets located in Haberfield and St Peters. The AQCCC must operate for up to two (2) years after commencement of operation, or as otherwise approved or directed by the Secretary, in consultation with the Chair.	An AQCCC committee was established in September 2021 and will continue to operate for up to two (2) years after commencement of operation, or as otherwise approved or directed by the Secretary, in consultation with the Chair.. This sub-plan was prepared in consultation with the AQCCC, refer to Section 3 The AQCCC will: (a) be comprised of – i. two representatives from the Proponent and tunnel operator, ii. one representative from each of the relevant councils, whose attendance is only required when considering matters relevant to their respective local government area, iii. three representatives from each local community adjacent to each ventilation facility whose attendance is only required when considering matters relevant to their respective local area, and whose appointment has been approved by an expression of interest process conducted by the Proponent in consultation with the Secretary, and iv. a Chair who is an independent from the design and construction of the CSSI put forward by the Proponent and approved by the Secretary; (b) meet at least four (4) times a year, or as otherwise agreed by the Chair and the Secretary; (c) review and provide advice on the location of the air quality monitoring stations required under Condition E24, operation environmental management plans and other operation stage documents, compliance tracking reporting, audit reports, or complaints as they relate to air quality; and (d) provide advice on the dissemination of monitoring results and other information on air quality issues.

<table>
<tr><th>CoA</th><th>Relevant requirement</th><th>Reference</th></tr>
<tr><td>E2A</td><td>The concentration of a pollutant discharged from the ventilation outlets must not exceed the respective limits specified for that pollutant in Table 3A.
Table 3A: Ventilation Outlet Mass Pollutant Concentrations
<table>
<tr><th>Pollutant</th><th>100 percentile limit</th><th>Units of measurements</th><th>Averaging period</th><th>Reference conditions</th></tr>
<tr><td>Solid particles</td><td>1.1</td><td>mg/m^3</td><td>1 hour, or the minimum sampling period specified in the relevant test method, whichever is the greater</td><td>Dry, 273K, 101.3kPa</td></tr>
<tr><td>NO_2 or NO or both, as NO_2 equivalent</td><td>20</td><td>mg/m^3</td><td>1 hour block</td><td>Dry, 273K, 101.3kPa</td></tr>
<tr><td>NO_2</td><td>2.0</td><td>mg/m^3</td><td>1 hour block</td><td>Dry, 273K, 101.3kPa</td></tr>
<tr><td>CO</td><td>40</td><td>mg/m^3</td><td>1 hour rolling</td><td>Dry, 273K, 101.3kPa</td></tr>
<tr><td>VOC (as propane)</td><td>4.0</td><td>mg/m^3</td><td>1 hour rolling</td><td>Dry, 273K, 101.3kPa</td></tr>
</table></td><td>Pollutant discharge concentration limits from the ventilation outlets will not exceed the values specified in 3A, as discussed in Section 4.1.2.
Monitoring of the relevant pollutants is discussed further in Section 5.2</td></tr>
<tr><td>E3</td><td>The tunnel ventilation system must be designed and operated so that the average concentrations of CO and NO2, calculated along the length of the tunnel, do not exceed the concertation limit specified for that pollutant in Table 4.
Table 4: In-tunnel average limits along length of tunnel
<table>
<tr><th>Pollutant</th><th>Concentration Limit</th><th>Units of measurement</th><th>Averaging period</th></tr>
<tr><td>CO</td><td>87</td><td>ppm</td><td>Rolling 15–minute</td></tr>
<tr><td>CO</td><td>50</td><td>ppm</td><td>Rolling 30–minute</td></tr>
<tr><td>NO_2</td><td>0.5</td><td>ppm</td><td>Rolling 15–minute</td></tr>
</table></td><td>The tunnel ventilation system will be operated to meet the required criteria as identified in Section 4.1.1. Monitoring of the relevant pollutants is discussed further in Section 5.2.</td></tr>
<tr><td>E4</td><td>The concentration of CO as measured at any single point in the tunnel must not exceed the concentration limit specified for that pollutant in Table 5 under all traffic scenarios.
Table 5: In-tunnel single point exposure limits
<table>
<tr><th>Pollutant</th><th>Concentration Limit</th><th>Units of measurement</th><th>Averaging period</th></tr>
<tr><td>CO</td><td>200</td><td>ppm</td><td>Rolling 3–minute</td></tr>
</table></td><td>The tunnel ventilation system will be operated to meet the required criteria as identified in Section 4.1.1. Monitoring of the relevant pollutants is discussed further in Section 5.2.</td></tr>
<tr><td>E5</td><td>The tunnel ventilation system must be designed and operated so that the visibility in the tunnel does not exceed the level specified in Table 6.
Table 6: In-tunnel visibility limits along length of tunnel
<table>
<tr><th>Parameter</th><th>Average extinction co-efficient Limit</th><th>Units of measurement</th><th>Averaging period</th></tr>
<tr><td>Visibility</td><td>0.005</td><td>m^{-1}</td><td>Rolling 15–minute</td></tr>
</table></td><td>The tunnel ventilation system will be operated to meet the required criteria as identified in Section 4.1.1. Monitoring of the relevant pollutants is discussed further in Section 5.2.</td></tr>
</table>

CoA	Relevant requirement	Reference
E6	Should ambient monitoring of air pollutants exceed the following goals, the provisions of Conditions E32, E33 and E34 will apply: (a) CO – 8 hour rolling average of 9.0 ppm (NEPM); (b) NO2 – One hour average of 0.12 ppm (245 µg/m3) (NEPM); (c) PM10 – 24 hour average of 50 µg/m3 (NEPM); (d) PM2.5 – 24 hour average of 25 µg/m3 (NEPM); (e) PM10 – annual average of 25 µg/m3 (NEPM); and (f) PM2.5 – annual average of 8 µg/m3 (NEPM). Note: The notification and reporting obligations under Conditions E32, E33 and E34 relating to ambient monitoring will begin at the commencement of operation of the CSSI. The first annual average concentrations for PM10 and PM2.5 must be calculated on the first day the project has been in operation for 12 months and on a rolling basis thereafter.	The tunnel ventilation system will be operated to meet the required ambient air quality criteria as identified in Section 4.1.3. In the event of an exceedance of this criteria, the provisions of conditions E32, E33 and E34 will apply, as identified in the Ambient Air Quality Goal Protocol.
E7	Conditions E2A, E3, E4, E5, and E6 do not apply in an emergency, as defined in the OEMP required by Condition D1.	The definition of an 'emergency' as it applies to this condition is included in Section 4.1.4
E8	The Proponent must, as soon as reasonably practicable, notify the Secretary and the EPA of any discharge during an emergency.	In the event of an emergency situation that results in discharge(s) that exceed the nominated criteria, the Secretary and the EPA would be notified Refer to Section 4.1.4 of this plan for emergency reporting.
E9	The tunnel ventilation systems must be designed, constructed and operated so as to only release emissions from ventilation outlets and not from the portals or the tunnel support facilities as identified in the documents listed in Condition A1, except for emergency smoke management purposes in the event of a fire in a tunnel or periodic testing of the system as defined in the OEMP required by Condition D1.	The tunnel ventilation system will be operated to release emissions from the ventilation outlets only, and to avoid emissions from the portals except during emergency smoke management and periodic testing. The definition of an 'emergency' as it applies to this condition is included in Section 4.1.4. Periodic testing of the system is addressed in Section 4.2.4
E10	All tunnels must be designed and constructed so as to allow for future modification of the ventilation system if required. The Proponent must submit a report to the Secretary demonstrating how this will be allowed for prior to finalising detailed design.	The tunnels have been designed and constructed to allow for future modification of the ventilation system if required. Additional details are contained within the E10 report that does not constitute part of this OAQMP.
E13	A Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol (Protocol) must be prepared in consultation with the TMC. The Protocol must be reviewed and endorsed by a suitably qualified and experienced independent ventilation specialist. The Protocol must demonstrate that the ventilation and traffic management systems would operate together to ensure conditions of this approval are met	A Tunnel Ventilation, Incident Response and Traffic Management Systems Integration Protocol will be prepared in consultation with Transport Management Centre for the approval of the Secretary, separate to this OAQMP. Information regarding the tunnel ventilation system and integration with the traffic management control system is summarised in Section 4.2.1 and Section 4.2.2, respectively.

CoA	Relevant requirement	Reference
E15	The Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol must be submitted to the Secretary for information no later than one (1) month prior to commencement of operation of a tunnel (whether in full or in part).	The protocol will be submitted to the Secretary for information no later than one month prior to operation.
E16	The Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol, must be implemented for the duration of operation.	The Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol, will be implemented for the duration of operation.
E18	Prior to operation, permanent signage must be installed at each surface tunnel entrance and variable messaging signage provided at regular intervals throughout the tunnel to instruct tunnel users to close windows and turn on recirculated air. Relevant information about this instruction is to be provided on a website, operated by the Proponent, which is maintained throughout operation of the CSSI.	Variable message signs at the entrance to and throughout the tunnel will instruct tunnel users to close windows and turn on recirculated air. This information will also be provided on the project website, which will be maintained throughout operation of the project. Further detail is included in Section 4.2.2.
E19	Prior to operation, the Proponent must investigate, in consultation with the EPA, the measures for smoky vehicle enforcement in the tunnels. The effectiveness of the smoky vehicle enforcement measures must be documented in the Independent Environmental Audit required under Condition A36.	The smoky vehicle emissions procedure is outlined in Section 5.8.
E19A	The Proponent must install monitoring equipment to monitor pollutants from the ventilation outlets. Pollutant monitoring from the ventilation outlets (by sampling and obtaining results by analysis) must be in accordance with the methods and frequencies for the pollutant parameters specified in Table 6A and be undertaken at commencement of and throughout operation. The monitoring equipment must be verified by an independent auditor who is expert in tunnel ventilation outlet design prior to the commencement of monitoring for compliance with the requirements set out in Table 6A. **Table 6A: Ventilation Outlet Emission Monitoring Methodologies** Pollutant / Units of measure / Frequency / Method[1] Solid particles / mg/m³ / Continuous / Special Method 1[4] Solid particles / mg/m³ / Quarterly / TM-15 PM_{10} / mg/m³ / Quarterly / OM-5 $PM_{2.5}$ / mg/m³ / Quarterly / OM-5 NO_2 or NO or both, as NO_2 equivalent / mg/m³ / Continuous / CEM-2 NO_2 / mg/m³ / Continuous / CEM-2 CO / mg/m³ / Continuous / CEM-4 VOC[2] / mg/m³ / Continuous / CEM-8 Speciated VOC / mg/m³ / Annual / TM-34 Speciated PAH[3] / µg/m³ / Annual / OM-6 Parameter / Units of measure / Frequency / Method[1] Velocity / m/s / Continuous / CEM-6 Volumetric flow rate / m³/s / Continuous / CEM-6 Moisture / % / Continuous / TM-22 Temperature / °C / Continuous / TM-2 Other / Units of measure / Frequency / Method[1] Selection of sampling locations / N/A / N/A / TM-1	Installation of monitoring equipment and monitoring of pollutants within the ventilation outlets will be undertaken as identified in Section 5.3. Monitoring of pollutants within the ventilation outlets will be undertaken using the sampling method, units of measure and frequency nominated in this condition, as described in Section 5.3. The monitoring equipment installed for this condition will be independently audited, as described in Section 5.3.

<table>
<tr><th>CoA</th><th>Relevant requirement</th><th>Reference</th></tr>
<tr><td>E20</td><td>The Proponent must continuously monitor (by sampling and obtaining results from analysis) the pollutants within the tunnel specified in Table 7, using the methods approved by the Secretary. Monitoring must commence on the first day of operation of the CSSI and continue throughout the operation of the CSSI.
Table 7: In-Tunnel monitoring methodology<table><tr><th>Pollutant/parameter</th><th>Units of measurement</th></tr><tr><td>CO</td><td>ppm</td></tr><tr><td>NO_2</td><td>ppm</td></tr><tr><td>Visibility</td><td>m^{-1}</td></tr></table></td><td>Continuous monitoring of the pollutants listed in Table 7 will occur, as outlined in Section 4.1.1.
Monitoring will commence on the first day of operation and continue throughout operation of the CSSI.</td></tr>
<tr><td>E21</td><td>The number and location of the monitoring stations inside the tunnel must be determined to permit an accurate calculation, per the requirements of Conditions E3, E4 and E5, and be independently verified in accordance with a methodology developed in consultation with the EPA and approved by the Secretary prior to the operation of the CSSI. As a minimum, monitoring stations must be installed near intakes to the ventilation outlets, at the entry portals and at tunnel and ramp junctions.</td><td>The number and location of in-tunnel monitoring stations is described in Section 5.2 and Figure 1.
The number and location of monitoring stations will be independently verified. The verification method must be approved by the Secretary in consultation with the EPA.</td></tr>
<tr><td>E22</td><td>All sampling points and visibility monitoring points must be audited prior to commencing monitoring, for compliance with the requirements set out in Conditions E3, E4, E5 and E20. Verification and compliance auditing is to be undertaken by an independent person(s) or organisation(s) whose appointment has been approved by the Secretary. The independent person(s) must be a Chartered Professional Engineer (either Mechanical, Chemical or Control Systems engineer).</td><td>Sampling and visibility monitoring points will be audited prior to commencement of monitoring, as described in Section 5.1.</td></tr>
<tr><td>E23</td><td>Air quality monitoring data is to be made available in as close to real time as possible, under the website reporting requirements of Condition E28.</td><td>Availability of monitoring data is discussed in Section 5.7.</td></tr>
</table>

<table>
<tr><th>CoA</th><th>Relevant requirement</th><th>Reference</th></tr>
<tr><td>E24</td><td>The Proponent must monitor (by sampling and obtaining results by analysis) the pollutants and parameters specified in Table 8 using the sampling method, units of measure, and sampling frequency specified in the table. Monitoring must be undertaken at the following locations as a minimum:
(a) two ground level receptors near the Rozelle ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet;
(b) two ground level receptors near the Victoria Road ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet;
(c) two ground level receptors near the Campbell Road ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet with one in a location different to that established under SSI 6788; and
(d) two ground level receptors near the Haberfield ventilation outlet, at location suitable for detecting any impact on air quality from the outlet (these may be the same as those established under SSI 6307).

Table 8: Ambient Air Quality Monitoring Methodologies
<table><tr><th>Pollutant</th><th>Units of measurement</th><th>Averaging Period</th><th>Frequency</th><th>Method[1]</th></tr><tr><td>NO</td><td>pphm</td><td>1-hour</td><td>Continuous</td><td>AM-12</td></tr><tr><td>NO_2</td><td>pphm</td><td>1-hour</td><td>Continuous</td><td>AM-12</td></tr><tr><td>NO_x</td><td>pphm</td><td>1-hour</td><td>Continuous</td><td>AM-12</td></tr><tr><td>PM_{10}</td><td>$\mu g/m^3$</td><td>24-hour</td><td>Continuous</td><td>AS3580.9.8-2008[2]</td></tr><tr><td>$PM_{2.5}$[5]</td><td>$\mu g/m^3$</td><td>24-hour</td><td>Continuous</td><td>AS3580.9.13-2013[3] or as otherwise agreed by the Secretary in consultation with the EPA</td></tr><tr><td>CO</td><td>ppm</td><td>1-hour,8-hour</td><td>Continuous</td><td>AM-6</td></tr><tr><th>Parameter[4]</th><th>Units of measurement</th><th>Averaging Period</th><th>Frequency</th><th>Method[1]</th></tr><tr><td>Wind Speed @ 10 m</td><td>m/s</td><td>1-hour</td><td>Continuous</td><td>AM-2 & AM-4</td></tr><tr><td>Wind Direction @ 10 m</td><td>°</td><td>1-hour</td><td>Continuous</td><td>AM-2 & AM-4</td></tr><tr><td>Sigma Theta @ 10 m</td><td>°</td><td>1-hour</td><td>Continuous</td><td>AM-2 & AM-4</td></tr><tr><td>Temperature @ 2m</td><td>K</td><td>1-hour</td><td>Continuous</td><td>AM-4</td></tr><tr><td>Temperature @ 10 m</td><td>K</td><td>1-hour</td><td>Continuous</td><td>AM-4</td></tr><tr><th>Other</th><th>Units of measurement</th><th>Averaging Period</th><th>Frequency</th><th>Method[1]</th></tr><tr><td>Siting</td><td>NA</td><td>NA</td><td>NA</td><td>AM-1 & AM-4</td></tr></table></td><td>Monitoring of the pollutants will be undertaken as identified in Section 5.4.
The location of the ambient air quality monitoring stations is identified in Section 5.4.</td></tr>
</table>

CoA	Relevant requirement	Reference
E25	The monitoring locations must be selected with the objective of achieving like-to-like comparison of monitoring results with available pre-construction data. The locations must also allow for the review of the accuracy of predicted environmental outcomes discussed in the documents referred to in Condition A1 against monitored air quality as part of the environmental audit required under Condition A36. The location of the monitoring stations must be agreed to by the AQCCC and subject to landowner's and occupier's agreement. The establishment and operation of the monitoring stations is to be undertaken in accordance with recognised Australian standards and undertaken by an organisation accredited by NATA for this purpose and approved by the Secretary in consultation with the EPA and the AQCCC. The quality of the monitoring results must be assured through a NATA accredited process prior to the data being considered as a basis for compliance/auditing purposes.	Consideration was given to the location of pre-construction air quality monitoring locations. Refer to Section 4.1.3 for additional detail.
E26	The Proponent must commence monitoring for at least 12 continuous months prior to operation and continue monitoring for at least two (2) years following the commencement of operation. At the conclusion of the two (2) year operational monitoring period, the Proponent must review the need for the continued use of ambient monitoring stations in consultation with the AQCCC and EPA. Closure or discontinued use of an ambient monitoring station will require the approval of the Secretary	Ambient air quality monitoring at the established monitoring stations commenced 12 months ahead of operation. The location of ambient air quality monitoring stations was determined in consultation with the Air Quality Community Consultative Committee (AQCCC) and selected locations are detailed in Section 5.4 of this OAQMP. Review of the need for continuation of the ambient monitoring stations will be undertaken as required and is identified in Section 6.3.
E27	The Proponent must develop and implement a reporting system for ventilation outlet, in-tunnel and ambient limits. The reporting system must be approved by the Secretary and fully implemented and operational prior to operation. Minimum analytical reporting requirements for air pollution monitoring stations must be as specified in the Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2007, or as updated).	Sections 5.2, 5.3 and 5.4 and Annexure B
E28	Results of hourly updated real-time monitoring and relevant meteorological data must be provided on a website in an easy to interpret format. This data must be preliminary until a quality assurance check has been undertaken by a person or organisation, who is accredited by NATA for this purpose.	Nominated monitoring data will be made available on the Asset website as identified in Section 5.7.

CoA	Relevant requirement	Reference
E29A	The Proponent must notify the Secretary, EPA and Ministry of Health of any recordings above the emission limits (Above-Emission Limit Recording) in Condition E2A as soon as possible and within 24 hours of the recording. This notification must provide details of the circumstances of the event, including: (a) the nature of the event; (b) the concentration levels that occurred; (c) the timing and duration of the event; and the measures employed to minimise the concentration levels.	Notification in relation to exceedance of the criteria specified in conditions E2A is addressed in Section 7.3.
E29B	Within one (1) month of any notification of Above-Emission Limit Recording, the Proponent must prepare and submit to the EPA for information a Report on Above-Emission Limit Recording that details the cause of the exceedance, the effectiveness of any action(s) taken in response to the exceedance and the options available to prevent recurrence. The Report on Above-Emission Limit Recording must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ventilation outlet emission limits.	A report on Above-Emission Limit Recording that details the cause of the exceedance, the effectiveness of any action(s) taken in response to the exceedance and the options available to prevent recurrence will be prepared and provided to the EPA.
E30	In addition to the general reporting requirements specified in Condition E27, the Proponent must notify the Secretary, EPA and Ministry of Health of any recordings above the limits specified in Conditions E3, E4 and E5 as early as possible and within 24 hours of the recorded event. This notification must provide details of the circumstances of the event, including: (a) the nature and location of the event, including details relating to the cause; (b) the timing and duration of the event; (c) the extent and severity of the event; (d) the measures employed to minimise the concentration levels, and measures to improve visibility levels in the event that visibility levels were above the specified limit; (e) the frequency of the event, including whether an event with the same or similar circumstances has occurred previously; and the date when the Proponent will submit a Tunnel Air Quality Management Systems Effectiveness Report in accordance with Condition E31.	The notification and reporting process for any exceedances of Conditions E3, E4, E5 and detailed in Section 7.2.

CoA	Relevant requirement	Reference
E31	Within 20 working days of a request by the Secretary, the Proponent must prepare and submit to the Secretary for information a Tunnel Air Quality Management Systems Effectiveness Report on the overall system performance and cause and major contributor of any exceedances, including: (a) the overall performance and concentration levels in the tunnel for the preceding six (6) month period (or since commencement of operation, where the CSSI has operated for under six (6) months), including average and maximum levels and time periods; (b) details of any instances throughout the operation of the CSSI where pollutant concentration levels in the tunnel have exceeded the limits specified in Conditions E3, E4 and E5; and (c) consideration of improvements to the tunnel air quality management system. The Tunnel Air Quality Management Systems Effectiveness Report is to be prepared by the Proponent and reviewed by a suitably qualified and experienced independent specialist(s) whose appointment has been approved by the Secretary. The Proponent must comply with any requirements arising from the Secretary's review of the Tunnel Air Quality Management Systems Effectiveness Report.	Notification in relation to exceedance of the criteria is addressed in Section 7.2. The Tunnel Air Quality Management Systems Effectiveness Report is to be reviewed by an independent specialist / organisation. The independent specialist / organisation will be approved by the Secretary.
E32	The Proponent must prepare an Ambient Air Quality Goal Protocol for evaluating a potential measurement that exceeds the goals in Condition E6. The Ambient Air Quality Goal Protocol must be developed by the Proponent in consultation with the AQCCC and submitted to the Secretary for approval at least 12 months prior to the commencement of operation of the CSSI. The Ambient Air Quality Goal Protocol must include: (a) a process for notification of a recording above the ambient air quality goals in Condition E6, subject to Condition E33; (b) the template that would be used for the Report on Above-Goal Recording, required by Condition E34; and (c) a process for appointing an independent person/organisation to prepare the Report on Above-Goal Recording. The process must include – i. approval of the independent person (independent of the environmental assessment, design and construction of the CSSI) by the Secretary prior to preparation of the report, and the appointment of the independent person/organisation at least one (1) month prior to the commencement of operation, or at some other time prior to preparation of the report with the agreement of the Secretary.	An Ambient Air Quality Goal Protocol has been prepared and provided as a separate document to the Secretary to satisfy this condition. Also refer to Section 7.4. The Protocol is included in Annexure C.

CoA	Relevant requirement	Reference
E33	In addition to the general reporting requirements specified in Condition E27, the Proponent must notify the Secretary, EPA and Ministry of Health of any recordings above the goals in Condition E6 as soon as possible and within 24 hours of the recording. This notification must provide details of the circumstances of the event, including: (a) the nature of the event; (b) the concentration levels that occurred; (c) the timing and duration of the event; (d) the measures employed to minimise the concentration levels; and the date when the Proponent will submit a Report on Above-Goal Recording in accordance with Condition E34.	An Ambient Air Quality Goal Protocol has been developed to satisfy this condition for any recordings above the limits specified in CoA E6 (CoA E2A, E3 and E4, as specified in this condition, are relevant to in-tunnel criteria). Refer to Section 7.4 and the Ambient Air Quality Goal Protocol.
E34	Within 20 working days of any Notification of Above-Goal Recording, the Proponent must prepare and submit to the Secretary for information a Report on Above-Goal Recording that details the cause and major contributor of the exceedance, the effectiveness of any action(s) taken in response to the exceedance and the options available to prevent recurrence. Where the operation of the tunnel is identified to be a significant contributor to the recorded above-goal reading, the Report on Above-Goal Recording must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under Condition E10.	A Report on Above-Goal Reading will be prepared in accordance with this condition, where required, as described in Section 7.4 and the Ambient Air Quality Goal Protocol.
E35	The provision, operation and maintenance (including all auditing and validation of data) of all air quality monitoring and reporting must be funded by the Proponent.	Noted.
E36	All continuous emissions monitoring systems installed and operated as a requirement of Condition E21 must undergo relative accuracy test audits at an interval not exceeding 12 months, or within another timeframe agreed with the Secretary.	Refer to Section 6.2.
E37	The Proponent must engage a person independent from the design and construction of the CSSI, to audit the air quality monitoring (in-tunnel and ambient) for the CSSI at six (6) monthly intervals following commencement of operation of the CSSI, or at any longer interval if approved by the Secretary.	Six-monthly air quality monitoring audits will be undertaken in accordance with this condition, as described in Section 6.1
E38	The Proponent must consult with the EPA and AQCCC before nominating the proposed auditor to the Secretary. Operation of the CSSI must not commence until the auditor's appointment is approved by the Secretary.	The auditor will be approved by the Secretary in consultation with the EPA and AQCCC. Refer to Section 6.1.

CoA	Relevant requirement	Reference
E39	The auditor must ensure that the operating procedures and equipment to acquire air monitoring, meteorological data and emission monitoring data and monitoring reporting comply with NATA (or equivalent) requirements and sound laboratory practice.	The auditor will ensure that the operating procedures and equipment to acquire air monitoring, meteorological data and emission monitoring data and monitoring reporting comply with NATA (or equivalent) requirements and sound laboratory practice. See Section 6.1
E40	The Proponent must document the results of the audit and make available all audit data for inspection by the Secretary upon request. A copy of the audit report must also be issued to the Proponent and AQCCC.	Air quality monitoring audit results will be documented and made available to the Secretary upon request, as described in Section 6.1
E41	The Proponent must undertake appropriate quality assurance (QA) and quality control (QC) measures for air quality and ventilation outlet emission monitoring data. This must include, but not be limited to: accreditation/quality systems; staff qualifications and training; auditing; monitoring procedure; service and maintenance; equipment or system malfunction; and records/reporting. The QA/QC measures must be approved by an expert independent from the design and construction of the CSSI. The independent expert must be approved by the Secretary prior to monitoring of air quality and ventilation outlet emissions, as appropriate.	QA and QC measures to be implemented during the operation and maintenance of the Asset will be approved by an independent expert, as described in Section 5.6.
E42	The Proponent must assist the relevant planning authority(s) in developing an air quality assessment process for inclusion in a Development Control Plan or other appropriate planning instrument, in considering planning and building approvals for new development in areas adjacent to the ventilation outlets which would be within a potential three-dimensional zone of affectation (buffer volume). This process must include procedures for identifying the width and height of buildings that are likely to be either affected by the plume from the ventilation outlet or affect the dispersion of the plume from the ventilation outlet through building wake effects. A part of this process, the Proponent must provide data detailing the results of modelling of pollution concentrations at various heights and distances from the ventilation outlets. This information must be provided within 18 months following the date of this approval. The Proponent must meet all reasonable costs for the development of this process and any necessary amendments to the planning instrument(s) required to implement the process.	Refer to Section 7.5.

2.4 Revised environmental management measures

The revised environmental management measures (REMMs) identify safeguards and mitigation measures included in the M4-M5 Link Rozelle Interchange Submissions Report that are relevant to the management of air quality during the operations and maintenance of the Asset are included in Table 2-4 below.

Table 2-4: Revised environmental management measures relevant to the management of air quality

REMM	Relevant requirement	Reference
AQ27	An in-tunnel air quality monitoring system will be included in the detailed design. The system will monitor oxides of nitrogen, nitrogen dioxide, carbon monoxide and visibility (as a minimum) throughout the tunnel. Monitoring of each pollutant will be undertaken throughout the tunnel. The locations of monitoring equipment will generally be at the beginning and end of each ventilation section. This will include, for example, monitors at each entry ramp, exit ramp, merge point and ventilation exhaust and supply point. The location of monitors will be governed by the need to meet the in-tunnel air quality criteria for all possible journeys through the tunnel system, especially for nitrogen dioxide. This will require sufficient, appropriately placed monitors to calculate a journey average.	Air quality monitors and location of monitors are identified and discussed in Section 5.2 and Figure 1.
AQ28	Air velocity monitors will be placed in each tunnel ventilation section and at portal entry and exit points. The specific location of air velocity monitors will be subject to the detailed design of the project. The velocity monitors in combination with the air quality monitors will be used to modulate the ventilation within the tunnel to manage air quality and to ensure net air inflow at all tunnel portals.	Air velocity monitors and location of monitors are identified and discussed in Section 5.2 and Figure 1.
AQ29	Ambient air quality monitoring will be carried out in the vicinity of the ventilation outlets installed as part of the project. Monitoring will occur at key representative locations, identified in consultation with an independent air quality specialist and an Air Quality Community Consultative Committee (AQCCC), to allow direct comparison of measured ambient air quality with dispersion model predictions. The monitoring will commence at least 12 months prior to and continue for at least two years following the commencement of operation. Monitoring results and a comparison of monitoring results against dispersion model predictions and relevant ambient air quality criteria will be made publicly available.	Ambient air quality locations are identified in Section 5.4 and will commence monitoring 12 months ahead of operation.

2.5 Environment protection licence

Road tunnel emissions by way of a ventilation stack from the M4-M5 Link are classed as a premised based scheduled activity in Schedule 1 of the Protection of the Environment Operations Act 1997 NSW. Scheduled activities require an environmental protection licence. An environmental protection licence shall be sought and issued prior to operation of the Project.

3 Consultation

This OAQMP has been developed and finalised in consultation with the stakeholders outlined in MCoA E2. Table below summarises the consultation undertaken in the development of this plan.

Table 3-1 Consultation summary

Stakeholder	Engagement	Key issues	Where addressed/ how addressed	Outstanding issues
AQCCC	16/11/2022 – submission of this plan to AQCCC members for review. 29/11/2022 – AQCCC meeting	None raised	NA	NA

4 Air quality control measures

4.1 Goals and limits

The air quality criteria for various parameters, as defined by the Infrastructure Approval for SSI 7485 are identified in the following sections. The caption of each table includes the applicable CoA reference.

4.1.1 In-tunnel

In-tunnel air quality criteria is identified in Table 4-1, Table 4-2, and Table 4-3.

Table 4-1: In-tunnel average limits along length of tunnel (CoA E3)

Pollutant / parameter	Concentration limit	Units of measure	Averaging period
CO	87	ppm	Rolling 15-minute
CO	50	ppm	Rolling 30-minute
NO_2	0.5	ppm	Rolling 15-minute

Table 4-2: In-tunnel single point exposure limits (CoA E4)

Pollutant	Concentration limit	Units of measure	Averaging period
CO	200	ppm	Rolling 3-minute

Table 4-3: In-tunnel visibility limits along length of tunnel (CoA E5)

Parameter	Average extinction co-efficient limit	Units of measure	Averaging period
Visibility	0.005	m^{-1}	Rolling 15-minute

4.1.2 Ventilation outlet

Ventilation outlet air quality criteria is identified in Table 4-4.

Table 4-4: Ventilation outlet mass pollutant concentrations (CoA E2A)

Pollutant	100 percentile limit	Units of measure	Averaging period	Reference conditions
Solid particles	1.1	mg/m^3	1 hour, or the minimum sampling period specified in the relevant test method, whichever is the greater	Dry, 273K, 101.3kPa
NO_2 or NO or both, as NO_2 equivalent	20	mg/m^3	1 hour block	Dry, 273K, 101.3kPa
NO_2	2.0	mg/m^3	1 hour block	Dry, 273K, 101.3kPa
CO	40	mg/m^3	1 hour rolling	Dry, 273K, 101.3kPa
VOC (as propane)	4.0	mg/m^3	1 hour rolling	Dry, 273K, 101.3kPa

4.1.3 Ambient

Ambient air quality criteria are identified in Table 4-5.

Table 4-5: Ambient air quality criteria (CoA E6)

Parameter	Concentration limit	Units of measure	Averaging period	Source
CO	9.0	ppm	Rolling 8-hour	NEPM
NO_2	0.12 (245)	ppm ($\mu g/m^3$)	1 hour	NEPM
PM_{10}	50	$\mu g/m^3$	24 hour	NEPM
$PM_{2.5}$	25	$\mu g/m^3$	24 hour	Proposed NEPM
PM_{10}	25	$\mu g/m^3$	1 year	Meeting of Environment Ministers – Agreed Statement
$PM_{2.5}$	8	$\mu g/m^3$	1 year	Meeting of Environment Ministers – Agreed Statement

4.1.4 Emergency discharge

The air quality criteria identified in Table 4-1 to Table 4-5 (CoA E2A, E3, E4, E5 and E6) do not apply in an emergency situation. An ‘emergency’ has been defined in Table 4-6.

In the event of an emergency situation that results in discharge(s) that exceed the nominated criteria, the Secretary and the EPA would be notified (refer to Section 8.2.4 of the OEMP).

Table 4-6: Definition of 'emergency' by relevant CoA

CoA	Definition of the ‘emergency’ for each condition
E7 E8	An emergency discharge is an emission from the ventilation system that is caused by an incident or set of circumstances which does not ordinarily occur in the everyday use of the tunnel and is beyond: • Merely heavy traffic or congestion, or • The capacity of the tunnel operator to control or to have prevented by taking steps which a prudent, experience and competent operator would have taken. Conditions E2A, E3, E4, and E6 do not apply in the event of this emergency.

CoA	Definition of the 'emergency' for each condition
E9	An emergency smoke management purpose is what is reasonably necessary to manage smoke in response to a fire occurring in the tunnel, including in accordance with instructions given by NSW Emergency Services. An emergency smoke management purpose may also occur during a simulated emergency response exercise as referred to in the Emergency Response Plan required under condition E142 (e) of the approval. Periodic testing of the ventilation system is that which is done in accordance with Section 4.2.4.

4.2 Control mechanisms

4.2.1 Ventilation overview.

Tunnel ventilation is required to enable the tunnel to operate with low risk and with acceptable air quality at all times. The tunnel ventilation system is part of the overall Plant Monitoring and Control System (PMCS) and consists of:

- Exhaust fans
- Supply fans
- Jet fans mounted throughout the tunnel and ramps
- Shutoff and balancing dampers
- Air-flow, pollution and thermal measurement equipment both within the tunnel and at the outlets
- Plant control system
- Rozelle ventilation facility and the Iron Cove Link ventilation facility.

The operating conditions for the tunnel can be divided into the following categories:

- normal operation – traffic is free flowing
- congested operation – traffic is slow moving due to vehicle build up
- incident operation – traffic is slow moving or stopped (due to an accident, breakdown, etc.) in or beyond the tunnel
- fire operations – operations that require the intervention of the Fire Services (e.g. a vehicle fire).

The tunnel must be operated so as not to exceed the pollutant limits in CoA E2A, E3 and E4 (refer to Section 4.1.1 and Section 4.1.2 of this OAQMP), except in the event of an emergency (in accordance with CoA E7, refer to Section 4.1.4).

The ventilation control system software module has the ability to control the required level of ventilation to be operated (including corresponding numbers of supply, exhaust and jet fans within the tunnel) depending on in-tunnel air quality results in order to comply with the minimum air-quality limits under normal operation.

The O&M Contractor may manually adjust the operation of the ventilation system, in anticipation of a traffic impact on ventilation. This adjustment is associated with the incident and will be cleared when the incident is cleared by the Operator. With the nominated ventilation system capacity, the ventilation system alone is capable of meeting incident conditions.

4.2.2 Ventilation and traffic management integration

The traffic management control system (TMCS) monitors traffic speed and flow through the tunnel and activates the operation of traffic control and driver advisory devices in and around the Asset. The TMCS devices are designed to be operated manually and/or automatically and can be used as a means of limiting or stopping vehicles entering the tunnel (e.g. avoiding congestion) which, if required, could be used to control air quality.

While the PMCS and TMCS are stand-alone to guarantee a high level of redundancy, in practice, data is transmitted between the systems to permit an integrated system design approach. Although the ventilation system alone is capable of meeting incident conditions, the best outcome in terms of motorist experience and fire and life safety is achieved by an integrated response using both ventilation and traffic management systems.

The tunnel ventilation system operates together with the TMCS to ensure CoA E2A, E3 and E4 requirements are met for all normal, congested, incident and fire conditions (except during an emergency, as identified in CoA E7, refer to Section 4.1.4). Maintaining these limits will, in turn, ensure the criteria identified in CoA E9 and E14 are not exceeded (except as permitted in those same conditions).

The ventilation control system software module considers CO, visibility, air flow and NO_2 levels from sensors located in the tunnel and traffic flow, traffic speed and traffic incident offset (from the traffic management control system). The software determines the required level of ventilation to be operated to avoid emission discharge to the portals and to avoid exceedance of the pollutant limits.

Variable message signs at the entrance to and throughout the tunnel form part of the project traffic management control system and, during normal traffic conditions, will instruct tunnel users to close windows and turn on recirculated air. This information will also be provided on the project website, which will be maintained throughout operation of the project.

4.2.3 Ventilation intake and extraction

In accordance with CoA E9, the tunnel ventilation system will be operated to release emissions from the ventilation outlets only, and to avoid emissions from the portals and/or tunnel support facilities, except for emergency smoke management purposes (refer to Section 4.1.4) and during periodic testing of the system (refer to Section 4.2.4 of this plan).

4.2.4 Periodic testing

In accordance with CoA E9, the tunnel ventilation system is required to be operated to avoid emissions of tunnel air from the portals and/or the tunnel support facilities. Portal emissions are not permitted, except in the following circumstances:

- Emergency smoke management purposes in the event of a fire in the tunnel
- Periodic testing.

Periodic testing may include, but not be limited to testing during commissioning; replacement, repair and testing of faulty ventilation equipment; and routine testing and maintenance periods of:

- tunnel ventilation equipment,
  - where one or both carriageways are closed to traffic including maintenance of jet fans in the tunnel
  - in the ventilation facilities including axial fans, dampers and sound attenuators, and within the internal outlet
- tunnel ventilation support systems (e.g. substations)
- fire and life safety systems.

Routine testing and maintenance periods will occur during planned maintenance closures of the project tunnels; these are planned to occur seven times per year (one full tunnel closure and three closures of each main carriageway.

Relevant conditions, and how they relate to possible emissions from the portals and/or the tunnel support facility, are included in Table 4-6.

Table 4-7: Instances of periodic testing

CoA	Requirement	Potential for emissions
E143	Fire simulation and hot smoke testing must be undertaken as part of the simulated emergency response exercise to be staged prior to opening of the project to traffic as required in Condition E142(e). The Proponent must respond in writing to any recommendations made by FRNSW and NSW Police as a result of the exercise	Emissions from the portal and/or tunnel support facilities are expected during the simulated emergency response exercise undertaken at least once prior to opening the tunnels to traffic, in accordance with CoA E142(e). The Tunnel Emergency and Evacuation Plan (part of the suite of documents to satisfy the CoA E142 requirement for an Emergency Response Plan) identifies that emergency /evacuation exercises will be undertaken annually post the Date of Opening Completion. Portal and/or tunnel support facility emissions may result during these exercises.
E149	A detailed maintenance-testing program outlining the methods of testing the fire and life safety systems and schedule for implementation must be developed in consultation with FRNSW prior to opening of the project to traffic. The Proponent must respond in writing to any recommendations made by FRNSW.	The detailed maintenance-testing program will be included in the O&M Manual. Maintenance-testing of the fire and life safety systems that may result in emissions from the portal / support facility may include but not be limited to the deluge system, foam generation system, fire pumps, water tanks, hydrant systems, tunnel fire detection and indication systems, fire indicator panels, fire alarms warning devices, fire doors, fire hose reels and fire extinguishers.
E150	Maintenance testing of fire and life safety systems must be undertaken at least annually, or any other interval as required by the design engineer and in consultation of FRNSW. Results of maintenance testing must be made available to FRNSW for review, and the Proponent must respond in writing to any recommendations from FRNSW to ensure the reliability of the fire and life safety systems.	Maintenance testing of the fire and life safety systems will be undertaken a least annually as identified in the maintenance-testing program (CoA E149) included in the O&M Manual. During these events, emissions from the portal and/or tunnel support facility at Cintra Park may result.

4.2.5 Monitoring equipment

In-tunnel

The Tunnel Air Quality Monitors have been selected to provide direct in-situ measurements of NO_2, NO_x, CO, visibility and temperature.

These air quality sensors will be linked to the Plant Monitoring and Control System (PMCS) interface panel located in LV Switch rooms or the Electrical Equipment Room.

Ventilation

Several instruments are required to monitor the parameters in CoA E2A. All instruments and ancillary equipment for each facility are housed in air-conditioned cabinets to provide stable temperature and protection from dust and moisture.

There will be a total of 3 ventilation monitors, one (1) per each operational stack, therefore two (2) will be located at the Rozelle ventilation facility and one (1) will be located at the Iron Cove ventilation facility. Each of the monitors will measure the following:

- Carbon Monoxide (CO)
- Nitrous Oxide (NO)
- Volatile Organic Carbon (VOC)
- Pressure, Humidity, Temperature, Particulate and Velocity.

Manual outlet measurements will also be conducted in accordance with CoA E13. Measurements will be conducted by a specialist contractor, using their own equipment.

Ambient

The ambient air quality monitoring stations contain instruments to monitor the parameters identified in Section 4.1.3 (CoA E6).

Equipment maintenance

In-tunnel monitors and ventilation outlet monitors will be connected to the Operations Maintenance and Controls System (OMCS), which will result in an alarm if an instrument is not functioning correctly. Maintenance and any necessary repair or replacement of monitors will be addressed in the O&M Manual.

All monitoring equipment (including in-tunnel, ventilation stack and ambient air monitors) will be calibrated or verified in accordance with the manufacturer's recommendations. Equipment will be used and maintained, as appropriate. Calibration and maintenance records will be maintained for all monitoring equipment.

5 Monitoring and measurement

5.1 Verification and optimisation

Verification and optimisation of in-tunnel air quality monitoring and ventilation outlet air quality monitoring would be undertaken prior to commencement of operation.

In-tunnel

In accordance with CoA E17 and E22, an independent person or organisation, who must be approved by the Secretary, will be engaged to:

- Review the in-tunnel ventilation and ventilation outlet design of the project and the Tunnel Ventilation, Traffic Incident Response and Traffic Management Systems Integration Protocol prepared in accordance with Condition E13 to verify that:

  (a) the final design achieves the in-tunnel and ventilation outlet limits for all traffic conditions including congestion (as described by the regulatory worst-case scenario in Chapter 9 of the EIS);

  (b) the predicted impacts of the final design are no greater than predicted in the documents listed in Condition A1 for the equivalent operating conditions; and

  (c) the ventilation system has been optimised to achieve effective and responsive treatment of in-tunnel air quality and efficient energy consumption.

- Audit the sampling points and visibility monitoring points, prior to commencing monitoring, for compliance with the requirements set out in Conditions E3, E4, E5 and E20. The independent person(s) must be a Chartered Professional Engineer (either Mechanical, Chemical or Control Systems engineer).

The information required above will be made available to the Secretary on request.

Ventilation outlets

In accordance with CoA E19A, an independent person or organisation will be engaged to:

- verify the monitoring equipment for compliance with the requirements set out in Table 6A of Condition E19A.

5.2 In-tunnel monitoring

The O&M Contractor must monitor the pollutants within the tunnel, using the sampling method, units of measures and frequency specified in Table 5-1. Monitoring will commence on the first day of operation and continue throughout for the duration of operation in accordance with CoA E20.

Table 5-1: In-tunnel monitoring methodology (CoA E20)

Pollutant / parameter	Units of measure	Frequency	Method
CO	ppm	Continuous	Infrared Absorption
NO_2	ppm	Continuous	Differential optical absorption
Visibility	m^{-1}	Continuous	Light transmission opacity

Combined air-quality monitors for CO, NO_2 and visibility have been proposed for the tunnel. Direct optical measurement of NO_2 is carried out using differential absorption. Visibility measurements are done using light transmission opacity technique. NO and CO are measured using an infrared spectroscopy technique. As the

unit measures temperature, all measurements are compensated to ensure stable reading across all conditions.

A total of 52 air quality monitors have been proposed for within the Rozelle Interchange tunnel network. Monitoring stations have been installed near intakes to the ventilation outlets, at the entry portals and at tunnel and ramp junctions as required by CoA E21 as can be seen in Figure 1 below.

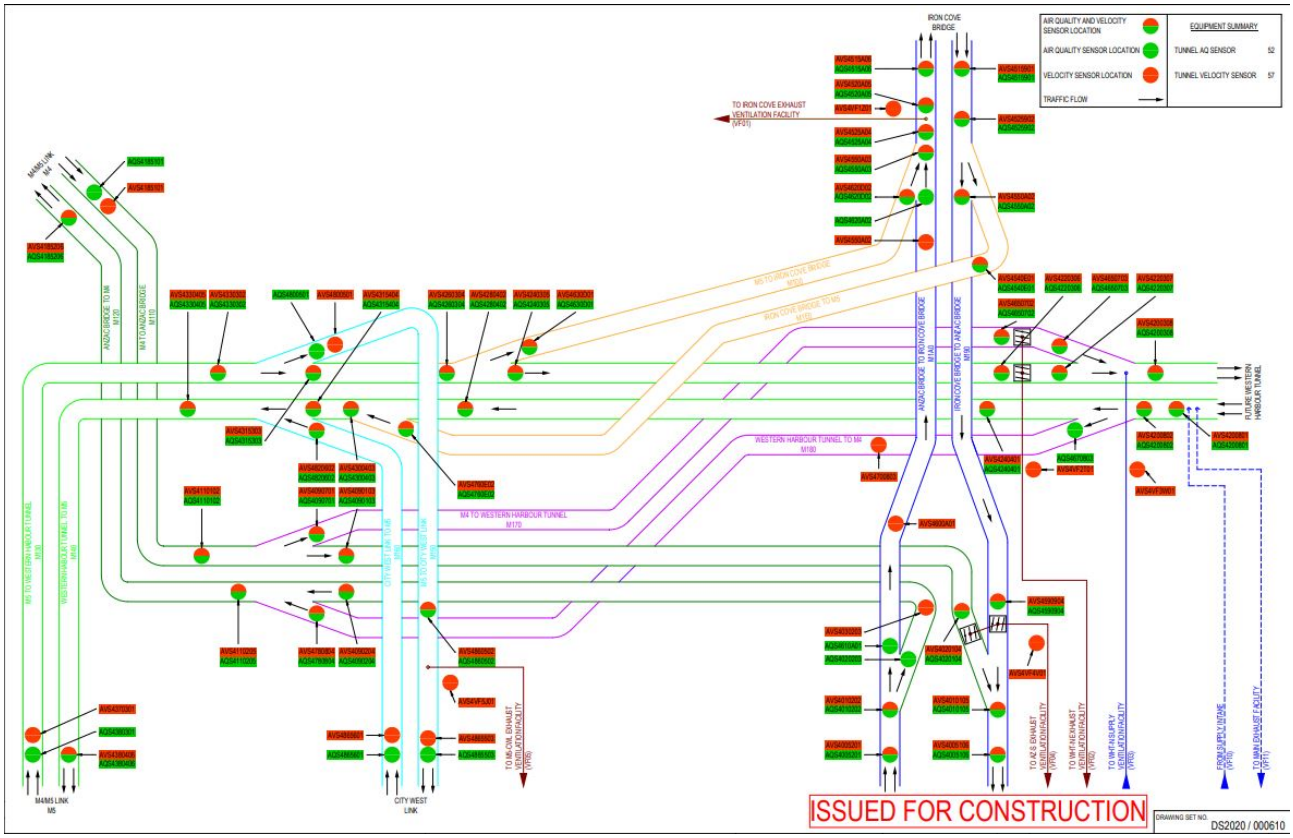


Figure 1: In-tunnel air quality monitoring locations (source: Tunnel Ventilation Report)

A method for independent verification of the number and location of in-tunnel monitors has been developed in accordance with CoA E21 and consulted with EPA. This methodology for verification will be approved by the Secretary prior to operations. The number and siting of the monitoring stations inside the tunnel will then be independently verified in accordance with this method.

Once established, the sampling and visibility monitoring points will be audited prior to the commencement of monitoring for compliance against the requirements identified in Table 5-1 in accordance with CoA E22.

Reporting of in-tunnel monitoring to achieve compliance with CoA E27 will be in accordance with the process detailed in Annexure B. This reporting process must be approved by the Planning Secretary prior to implementation.

5.3 Ventilation outlet monitoring

The O&M Contractor must monitor pollutants within the ventilation outlets, using the sampling method, units of measures and frequency specified in Table 5-2.

Table 5-2: Ventilation outlet emission monitoring methodologies (CoA E19A)

Pollutant	Units of measure	Frequency	Method[1]
Solid particles	mg/m^3	Continuous	Special Method 1[4]

Pollutant	Units of measure	Frequency	Method[1]
Solid particles	mg/m^3	Quarterly	TM-15
PM_{10}	mg/m^3	Quarterly	OM-5
$PM_{2.5}$	mg/m^3	Quarterly	OM-5
NO_2 or NO or both, as NO_2 equivalent	mg/m^3	Continuous	CEM-2
NO_2	mg/m^3	Continuous	CEM-2
CO	mg/m^3	Continuous	CEM-4
VOC[2]	mg/m^3	Continuous	CEM-8
Speciated VOC	mg/m^3	Annual	TM-34
Speciated PAH[3]	$\mu g/m^3$	Annual	OM-6
Parameter	**Units of measure**	**Frequency**	**Method[1]**
Velocity	m/s	Continuous	CEM-6
Volumetric flow rate	m^3/s	Continuous	CEM-6
Moisture	%	Continuous	TM-22
Temperature	°C	Continuous	TM-2
Other	**Units of measure**	**Frequency**	**Method[1]**
Selection of sampling locations	N/A	N/A	TM-1[5]

TABLE NOTES

1. Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA 2007) or an alternative method approved by the Secretary in consultation with the EPA.
2. Must include, but not be limited to: Benzene, Toluene, Xylenes, 1,3-Butadiene, Formaldehyde and Acetaldehyde.
3. Must include, but not limited to; 16 USEPA priority PAHs, namely; Naphthalene, Phenanthrene, Benz(a)anthracene, Benzo(a)pyrene, Acenapthylene, Anthracene, Chrysene, Indeno(1,2,3-cd)pyrene, Acenaphthene, Fluoranthene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Fluorene, Pyrene, Benzo(k)fluoranhtene, Benzo(g,h,i)perylene.
4. Special Method 1 means a method approved by the Secretary in consultation with the EPA. This method will be approved by the Secretary in consultation with the EPA before operation.
5. Alternate sampling plane location for ventilation outlet monitoring has been approved by the Secretary, in consultation with the EPA.

Regarding the solid particle continuous emission monitoring (CEM) method, once the tunnel is operational the project will demonstrate initial and ongoing sampling method performance through successful correlation tests against a reference gravimetric sampling method, in accordance with USEPA Performance Specification 11 1. An assessment will be undertaken to ensure the CEM sampling probes are installed at a location within the stack where the particle concentration measurements are directly representative of the total emissions from ventilation stack. Robust QA/QC programs and procedures will also be developed and implemented in accordance with appropriate guidelines such as USEPA Procedure 22 and Section 5.6 of this plan. Any manual isokinetic testing programs will be designed to ensure representative measurements are collected across the range of expected conditions including, but not limited to: seasonal variability, traffic conditions and stack velocity profiles.

Following the operation of the tunnel, the project will also assess the sampling planes of monitors in the ventilation facilities to confirm compliance with the NSW approved Test Method TM-1 – Selection of sampling positions, including the determination of flow profiles and stratification. The following methods and guidance will be considered when determining the adequacy of the sampling planes:

- Approved Methods for the Sampling and Analysis of Air Pollutants in NSW,

[1] USEPA Performance Specification 11 (PS11): specifications and test procedures for particulate matter continuous emission monitoring systems at stationary sources
[2] USEPA Procedure 2 - Quality Assurance Requirements for Particulate Matter Continuous Emission Monitoring Systems at Stationary Sources.

- Australian Standard 4323.1 – Stationary source emissions, Method 1: Selection of sampling positions,
- USEPA Method 1 - Sample and Velocity Traverses for Stationary Sources, and
- USEPA Method 2(f) - determination of stack gas velocity and volumetric flow rate with three-dimensional probes.

The monitoring equipment will be verified by an independent auditor prior to commencement of monitoring for compliance with the requirements identified in Table 6A of CoA E19A.

Reporting of ventilation outlet monitoring to achieve compliance with CoA E27 will be in accordance with the process detailed in Annexure B. This reporting process must be approved by the Planning Secretary prior to implementation.

5.4 Ambient air quality

The O&M Contractor must monitor the pollutants and parameters, using the sampling method, units of measures and frequency specified in Table 5-3. This will be achieved with two (2) ground level monitoring receptors situated at each of the ventilation outlets at Rozelle and Victoria Road. The exact location has been determined in consultation with the AQCCC and detailed in Table 5-4 below.

Table 5-3: Ambient air quality monitoring methodology (CoA E24)

Pollutant	Units of measure	Averaging period	Frequency	Method[1]
NO	pphm	1-hour	Continuous	AM-12
NO_2	pphm	1-hour	Continuous	AM-12
NOx	pphm	1-hour	Continuous	AM-12
PM_{10}	µg/m^3	24-hour	Continuous	AS3580.9.8-2008[2]
$PM_{2.5}$[5]	µg/m^3	24-hour	Continuous	AS3580.9.12:2013[3]
CO	ppm	1-hour, 8-hour	Continuous	AM-6
Parameter[4]	**Units of measure**	**Averaging period**	**Frequency**	**Method[1]**
Wind speed @10 m	m/s	1-hour	Continuous	AM-2 & AM-4
Wind direction @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Sigma Theta @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Temperature @ 2 m	K	1-hour	Continuous	AM-4
Temperature @ 10 m	K	1-hour	Continuous	AM-4
Other	**Units of measure**	**Averaging period**	**Frequency**	**Method[1]**
Siting	N/A	N/A	N/A	AM-1 & AM-4

TABLE NOTES

1. Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA, 2007) or as otherwise agreed to in writing by the Secretary in consultation with the EPA.
2. AS3580.9.8-2008, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM10 Continuous Direct Mass Method using Tapered Element Oscillating Microbalance Analyser (Standards Australia, 2008).
3. AS3580.9.12:2013, Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – $PM_{2.5}$ beta attenuation monitors. This alternate methodology was approved by the Secretary on 8 September 2017 in consultation with the EPA.
4. TBD - location for meteorological monitoring station(s) to be representative of weather conditions likely to occur in the vicinity of the northern and southern ventilation outlets.
5. Use of tapered element oscillating microbalance monitor was approved by the Secretary on 8 September 2017 in consultation with the EPA.

A total of four (4) ambient air quality monitoring locations have been confirmed with the Air Quality Community Consultative Committee (AQCCC), the locations are shown in the table below (Table 5-4) and their locations shown on the maps in Figure 2.

Table 5-4: Ambient air quality monitoring locations

Site	Location
Site 1	Quirk Street, Rozelle
Site 2	Chapman Road, Annandale
Site 3	Manning Street, Rozelle
Site 4	Bridgewater Park, Rozelle

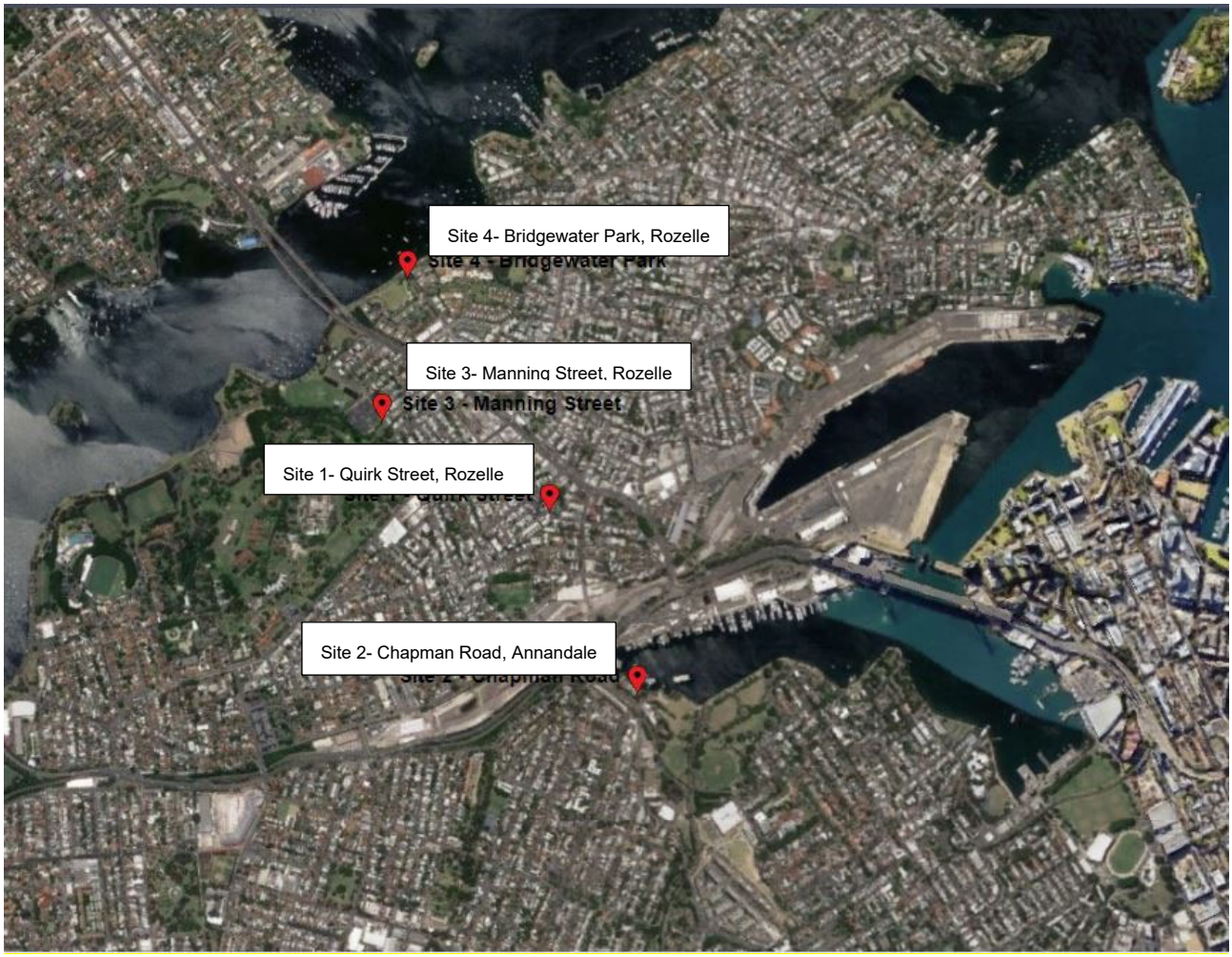


Figure 2: Location of ambient air quality monitoring stations.

The ambient air quality monitoring stations were established and are operated by Ecotech Pty Ltd. Ecotech Pty Ltd were approved by the Secretary on 11 January 2022 (after satisfactory consultation with the EPA and AQCCC) as being an organisation sufficiently skilled and accredited by the National Association of Testing Authorities Australia to supply and monitor the air quality monitoring station as required under CoA E8. Ambient air monitoring will be undertaken for at least 12 continuous months prior to operation or any other period in accordance with the Infrastructure Approval.

Reporting of in-tunnel monitoring to achieve compliance with CoA E27 will be in accordance with the process detailed in Annexure B. This reporting process has been approved by the Planning Secretary prior to implementation.

5.5 Non-conformity, correction and preventative actions

Environmental incident reports will be used to record non-conformances. Following the identification of a non-conformance, corrective actions will be identified and determined by the relevant manager and will reflect the nature and scale of the incident and whether it presents any material risk to human health, the environment or property.

Corrective actions will be preventative based, where possible. They will be implemented, monitored, checked and reviewed.

For further detail refer to Section 9.8 of the OEMP.

5.6 Quality assurance / quality control

The air monitoring (and air sampling, if required) will be carried out by a qualified and NATA accredited technician. Air sampling analysis will be carried out in accordance with ISO17025 at a NATA accredited laboratory under the quality assurance and quality control (QA/QC) protocol requirements at the time of air monitoring (and sampling). The QA/QC measures for air quality and ventilation outlet emission monitoring data will be undertaken, including, but not limited to:

- quality systems;
- staff qualifications and training;
- auditing;
- up-to-date Standard Operating Procedures;
- calibration, service and maintenance of all monitoring instruments;
- equipment or system malfunction;
- records / reporting.

The QA/QC measures to be implemented during the operation of the Asset will be approved by an independent expert, who is approved by the Secretary prior to monitoring of air quality and ventilation outlet emissions.

5.7 Availability of monitoring data

Information regarding the air quality monitoring required during operation of the Asset will be made available on the WestConnex website. Information will include hourly updated real-time ambient monitoring of:

- PM_{10}, $PM_{2.5}$, NO_2, and CO at the approved monitoring stations (CoA E3);
- in-tunnel CO, NO_2 and visibility (CoA E3);
- ventilation outlet measurements (CoA E2);
- relevant meteorological data (CoA E19).

In addition to hourly updated real-time data for the above parameters being made available on the website, meeting the requirement of E23, the monitoring data will be made available each month in hard copy format in an easy to interpret format, as well as made publicly available on the WestConnex website (www.westconnex.com.au). The data will be preliminary until a quality assurance check has been undertaken as outlined in Section 5.6. At least one month prior to the commencement of operation of the Asset, the local community will be notified (by way of newsletter and newspaper advertisement) of the availability of this information.

5.8 Smoky vehicle emissions

As per requirements outlined in CoA E19, the EPA was consulted regarding the measures needed to monitor smoky vehicles within the tunnel. Following this consultation period, it was determined that smoky vehicles will not be monitored in the Rozelle Interchange tunnel network. This decision was based on previous ineffectiveness of smoky vehicle monitoring within other sections of the WestConnex tunnel network.

Smoky vehicle monitoring will not occur and therefore not be reported in the Environmental Audit as stated in Condition E19.

6 Auditing and review

6.1 Six-monthly audits

The O&M Contractor will appoint an external auditor, independent from the design and construction of the CSSI, to conduct an audit of the air quality monitoring (in tunnel and ambient) at six-monthly intervals, or at any longer interval if approved by the Secretary. The auditor must be approved by the Secretary, in consultation with the EPA and the AQCCC. Audits will commence six (6) months after the commencement of operation (except for those audits of the ambient air quality monitoring, described below).

The audit will review the operating procedures and equipment to acquire air monitoring, meteorological data and emission monitoring data and monitoring reporting complies with NATA (or equivalent) requirements and sound laboratory practice.

The audit report will be issued directly to the Project Company and the AQCCC. All audit data will be made available to the Secretary upon request.

6.2 Ventilation outlet review and accuracy audit

In accordance with CoA E36 all continuous emissions monitoring systems installed and operated as a requirement of CoA E21, must undergo relative accuracy test audits at an interval not exceeding 12 months, or as otherwise agreed to by the Secretary.

6.3 Ambient air quality monitor review

In accordance with CoA E26, at the conclusion of the two (2) year operational monitoring period, the Project Company, will review the need for the continued use of ambient monitoring stations in consultation with the AQCCC and EPA. Closure or discontinued use of an ambient monitoring station will require the approval of the Secretary.

7 Notification and reporting

7.1 Air quality reporting system

A reporting system for in-tunnel, ventilation outlet and ambient air quality limits will be developed in accordance with CoA E27. The air quality reporting system must be approved by the Secretary and fully implemented and operational prior to operation. Minimum analytical reporting requirements for air pollution monitoring stations must be as specified in the *Approved Methods of Modelling and Assessment of Air Pollutants in NSW* (EPA 2007, or as updated).

7.2 In-tunnel

The Project Company will notify the Secretary, EPA and NSW Health of any recordings above the limits specified in CoA E3, E4 and E5 within 24 hours of the recorded event. The notification will include:

- Nature of the event, including details relating to the cause;
- Timing and duration of the event;
- Extent and severity of the event;
- Measures employed to minimise the concentration levels, and measures to improve visibility levels in the event that visibility levels were above the specified limit;
- Frequency of the event, including whether an event with the same or similar circumstances has occurred previously; and
- Date when the Proponent will submit a Tunnel Air Quality Management Systems Effectiveness Report in accordance with Condition E31 if requested by the Secretary.

If requested, the O&M Contractor will prepare a Tunnel Air Quality Management Systems Effectiveness Report within 20 working days of the request. The report will consider the overall system performance and cause and major contributor of any exceedance, detailing the following:

- The overall performance and concentration levels in the tunnel for the preceding six (6) month period (or since commencement of operation, where the CSSI has operated for under six (6) months), including average and maximum levels and time periods;
- Details of any instances throughout the operation of the CSSI where pollutant concentration levels in the tunnel have exceeded the limits specified in conditions E3, E4 and E5;
- Consideration of improvements to the tunnel air quality management system.

The report must be reviewed by a suitably qualified and experienced independent specialist(s) / organisation, who must be approved by the Secretary.

Requirements resulting from the Secretary's review of the Tunnel Air Quality Management Systems Effectiveness Report will be implemented during operation of the Asset.

7.3 Ventilation outlet

The Project Company will notify the Secretary, EPA and NSW Health of any recordings above the emission limits (Above-Emission Limit Recording) as specified in CoA E2A as soon as possible and within 24 hours of the recording.

The O&M Contractor will prepare a notification detailing the circumstances of the event including:

- Nature of the event;

- Concentration levels recorded;
- Timing and duration of event; and
- Measures employed to minimise the concentration levels.

In accordance with CoA E29B the O & M Contractor will prepare an Above-Emissions Limit Recording report for submission to the EPA within one (1) month of any notification. The report must include the following details:

- Cause of exceedance;
- Effectiveness of any action(s) taken;
- Options available to prevent recurrence; and
- Considerations of air quality management systems improvements to achieve compliance.

7.4 Ambient air quality

An Ambient Air Quality Goal Protocol has been prepared in accordance with CoA E32 in consultation with the AQCCC and submitted to the Secretary for approval at least 12 months prior to commencement of operation of CSSI.

Project Company will notify the Secretary, EPA and NSW Health with a Notification of Above-Goal Recording of any recordings above the limits specified in CoA E6 within 24 hours. The notification will include:

- Nature of the event;
- Concentration levels recorded;
- Timing and duration of event; and
- Measures employed to minimise the concentration levels
- The submission date of the Report on Above-Goal Reading in accordance with CoA E34.

Within 20 working days of any Notification of Above-Goal Recording, Project Company will prepare a Report on Above-Goal Reading that details the cause and major contributor of the exceedance, the effectiveness of any actions and the options to prevent recurrence.

Where the operation of the tunnel is identified to be a significant contributor to the recorded above-goal reading, the Report on Above-Goal Reading must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under CoA E10 and discussion of whether those improvements are feasible and reasonable.

Requirements resulting from the Secretary's review of the Report on Above-Goal Reading will be implemented during operation of the Asset.

7.5 Local and Sub-Regional Air Quality

The Proponent has assisted the relevant planning authority(s) by developing an air quality assessment process for inclusion in a Development Control Plan (DCP) or other appropriate instrument. The process includes procedures to identify width and height of buildings that are or will be affected by the ventilation plume or affect the dispersion of the plume.

The Proponent has provided the data detailing the results of the pollution concentration modelling at various heights and distances from the ventilation outlets and provide it to the Secretary in accordance with condition

E42. The DCP will consider planning and building approvals for new development within a potential three-dimensional zone of affectation (buffer volume) of the ventilation outlets.

Annexure A Summary monitoring table

CoA	Requirement	Parameter	Frequency	Responsibility
E20	In-tunnel monitoring	CO NO_2 Visibility	Continuous	O&M Contractor
E19A	Ventilation outlets	Solid particles	Continuous	O&M Contractor
		Solid particles PM_{10} $PM_{2.5}$	Quarterly	
		NO_2 or NO or both, as NO_2 equivalent NO_2 CO VOC[1]	Continuous	
		Speciated VOC Speciated PAH[2]	Annual	
		Velocity Volumetric flow rate Moisture Temperature	Continuous	
E24	Ambient air quality monitoring	NO NO_2 NO_x PM_{10} $PM_{2.5}$ CO Wind speed @ 10m Wind direction @ 10m Sigma Theta @ 10m Temperature @ 2m Temperature @ 10m	Continuous	O&M Contractor

Notes:

1. Must include, but not be limited to: Benzene, Toluene, Xylenes, 1,3-Butadiene, Formaldehyde and Acetaldehyde

2. Must include, but not limited to: 16 USEPA priority PAHs, namely; Napthalene, Phenanthrene, Bez(a)anthracene, Benzo(a)pyrene, Acenapthylene, Anthracene, Chrysene, Indeno(1,2,3-cd)pyrene, Acenaphthene, Fluoranthene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Fluorene, Pyrene, Benzo(k)fluoranhtene, Benzo(g,h,i)perylene.

Annexure B Air Quality Reporting System

WestConnex Rozelle Interchange

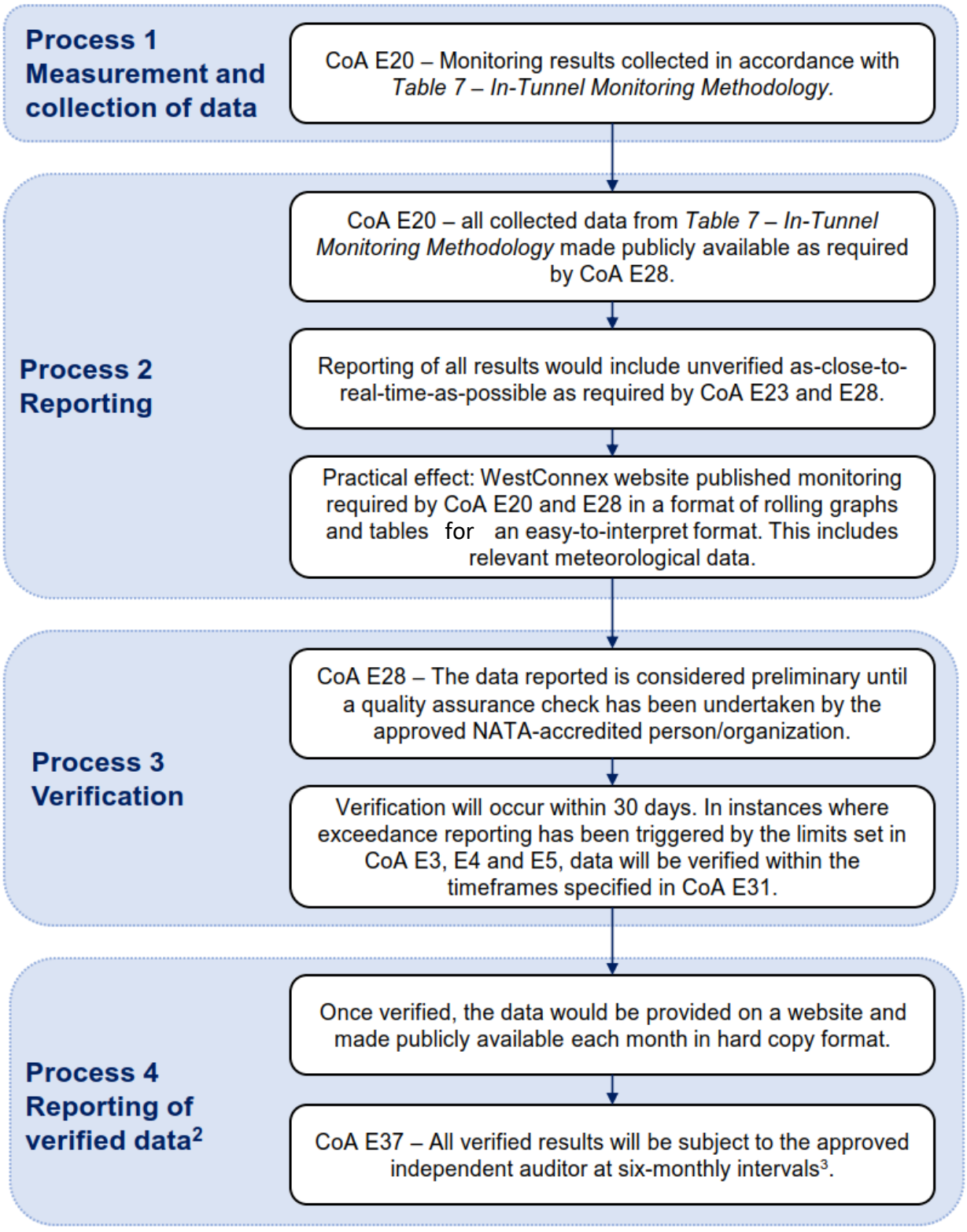
Operational Air Quality Reporting System

Project:	Rozelle Interchange – Design and Construct
Document Number:	Annexure B to RIC-JHC-PLN-00-PL-410-001
Revision Date:	7 July 2023

Document Approval

Rev	Date	Prepared by	Reviewed by	Remarks
00	20/06/2023	JHCPB JV	C Scarf	For TfNSW Review
01	22/06/2023	JHCPB JV	C Scarf	For DPE approval
02	5/07/2023	JHCPB JV	C Scarf	Addressing DPE comment, for approval.

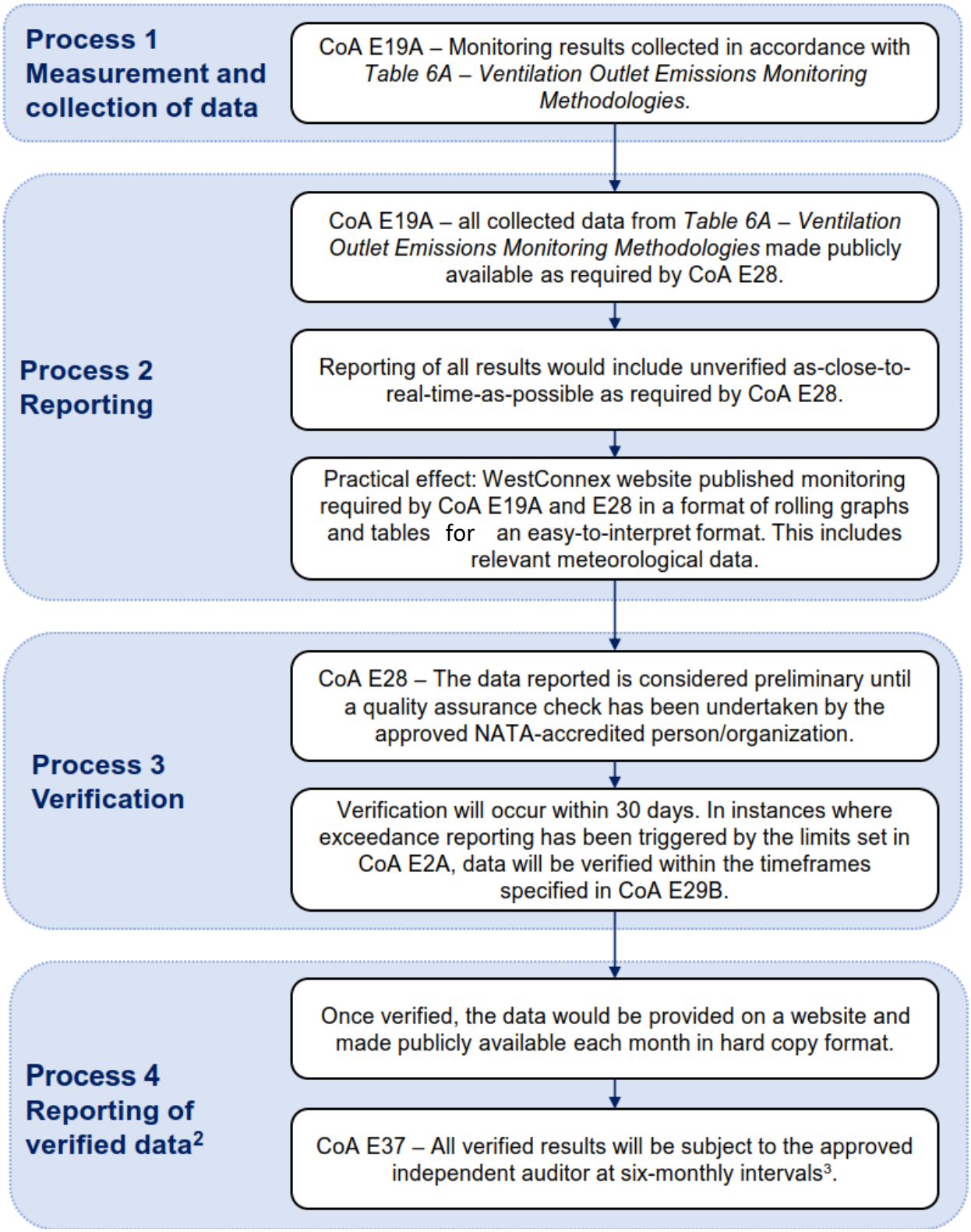
In-Tunnel Air Quality Reporting[1] Process



Notes:

1. All monitoring stations would include the minimum analytical reporting requirements specified in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2022)* for the parameters specified in CoA E20 and E28.
2. This is an important process used to determine whether there is a verified above limit reading substantiating the earlier triggering of CoA E30 and E31.
3. As specified in CoA E37, E39 and E40, all results will be subject to six monthly audits by the approved independent auditor. The audit report will be issued to Transport for NSW, the AQCCC and Secretary (upon request).

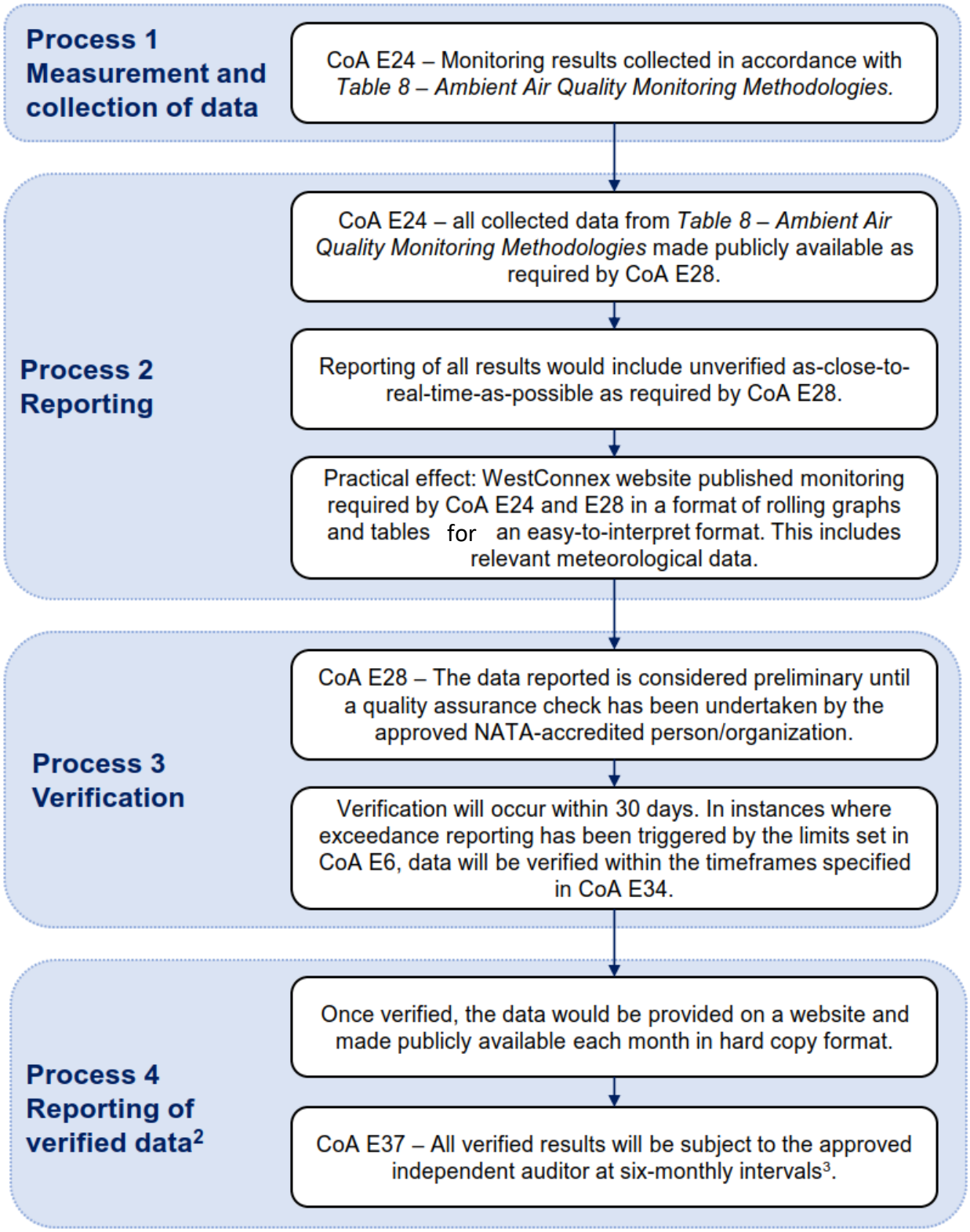
Ventilation Outlet Emission Reporting[1] Process



Notes:

1. All monitoring stations would include the minimum analytical reporting requirements specified in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2022)* for the parameters specified in CoA E19A.
2. This is an important process used to determine whether there is a verified above limit reading substantiating the earlier triggering of CoA E29A and E29B.
3. As specified in CoA E37, E39 and E40, all results will be subject to six monthly audits by the approved independent auditor. The audit report will be issued to Transport for NSW, the AQCCC and Secretary (upon request).

Ambient Air Quality Reporting[1] Process



Notes:

1. All monitoring stations would include the minimum analytical reporting requirements specified in *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2022)* for the parameters specified in CoA E24.
2. This is an important process used to determine whether there is a verified above limit reading substantiating the earlier triggering of CoA E33 and E34.
3. As specified in CoA E37, E39 and E40, all results will be subject to six monthly audits by the approved independent auditor. The audit report will be issued to Transport for NSW, the AQCCC and Secretary (upon request).

Annexure C Ambient Air Quality Goal Protocol

WestConnex M4-M5 Link
Rozelle Interchange

Ambient Air Quality Goal Protocol

Condition E32

Revision history

Rev No	Revised by	Reviewed by	Date	Description/Summary of Changes
A	E Busuttil	A Broger	13/7/22	First Draft
B	A Broger	C Scarf	19/07/22	External draft
C	A Broger	A Broger	27/07/22	External draft for AQCCC
D	A Broger	TfNSW	12/08/2022	For DPE
00	A Broger	A Broger	05/09/2022	For DPE

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Glossary

Term Used	Explanation
AM-1	Ambient monitoring – guide for the siting of sampling units
AM-2	Ambient monitoring – guide for measurement of horizontal wind for air quality applications
AM-4	Ambient monitoring – meteorological guidance for regulatory modelling applications
AM-6	Ambient monitoring – Carbon monoxide
AM-12	Ambient monitoring – Nitrogen oxides
AGR	Above-goal reading (ambient monitoring only)
AQCCC	Air Quality Community Consultative Committee
Background levels	Existing concentrations of pollutants in the ambient air
CO	Carbon Monoxide
CoA	Minister's Conditions of Approval
DPE	NSW Department of Planning and Environment
EMT	Emergency Management Team
EPA	NSW Environment Protection Authority
I&M	Incident and Maintenance
I&M Contractor	The contractor engaged to deliver the incident and maintenance contract for the RICproject.
NEPM	National Environment Protection (Ambient Air Quality) Measure
NATA	National Association of Testing Authorities, Australia
NO_2	Nitrogen Dioxide
OAQMP	Operation Air Quality Management Plan
OEH	NSW Office of Environment and Heritage
OEMP	Operation Environmental Management Plan
PM_{10}	Particulate matter (10 micrometres or less in diameter)
$PM_{2.5}$	Particulate matter (2.5 micrometres or less in diameter)
Project, the	M4-M5 Link Stage 2 - WestConnex Rozelle Interchange
Project Company	WCXRIC PT Pty Ltd in its capacity as trustee of the WCXRIC Project Trust or its successor intitle or assigns
Reasonable and Feasible	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account the cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements.
Relevant council(s)	Inner West Council
RIC	Rozelle Interchange

Secretary	Secretary of the Department of Planning and Environment
Secretary's approval	A written approval from the Secretary
SSI	State Significant Infrastructure
TfNSW	Transport for New South Wales
WHT	Western Harbour Tunnel portion of SSI 8863

1 Introduction

1.1 Purpose and overview

This Ambient Air Quality Goal Protocol has been developed to satisfy the requirements of condition E32 of the Conditions of Approval for the WestConnex M4-M5 Link project. This protocol relates specifically to works under Stage 2 of the M4-M5 Link (the Project), as described in the Staging Report.

Condition E32 requires that an Ambient Air Quality Goal Protocol (Protocol) be prepared for the evaluation of a potential measurement that exceeds the ambient air quality goals listed in CoA E6. The Protocol is to include a process for notification of a recording above ambient air quality goals in Condition E6, subject to Condition E33; the template used for the Report on Above-Goal Recording; and the process for appointing an independent person or organisation to prepare the Report on Above-Goal Recording.

1.2 Environmental management system

The Incident and Maintenance (I&M) Contractor will utilise an Integrated Management System for environmental management. The I&M Contractor's environmental management system (EMS) has been certified as complying with AS/NZS ISO 14001.

The EMS includes the Operation Environmental Management Plan (OEMP) which provides the detail of how the environmental aspects of the project will be managed during the operational phase. The OEMP provides the overall framework for the system and procedures to ensure environmental impacts are minimised and legislative and other requirements are fulfilled.

This Ambient Air Quality Goal Protocol forms part of the management system documents which are to be implemented on WestConnex M4-M5 Link Stage 2. It is to be read in conjunction with the other management system documents including the OEMP, the Operation Air Quality Management Plan and the reporting system for in-tunnel, ambient and ventilation outlet limits.

1.3 Consultation

In accordance with condition E32, the Ambient Air Quality Goal Protocol must be prepared in consultation with the WestConnex M4-M5 Link RIC Air Quality Community Consultative Committee (AQCCC).

The AQCCC were consulted during the preparation of this document. The AQCCC were sent a draft of the protocol prior to the August 2022 meeting where the protocol was then discussed. Minor editorial changes were made following comments provided by the AQCCC.

2 Environmental obligations

Legislative obligations relating to air quality, including ambient air quality, are detailed within the Operational Air Quality Management Plan.

2.1 Conditions of Approval

Conditions of Approval for WestConnex M4-M5 Link that are relevant to the Ambient Air Quality Goal Protocol (Protocol) are provided in Table 1.

A cross-reference is included to indicate where each condition is addressed in this Protocol or other project management documents.

Table 1- Conditions of Approval

CoA	Relevant requirement	Reference
A40	The Secretary must be notified as soon as possible and in any event within 24 hours of any incident.	Figure 3
E6	Should ambient monitoring of air pollutants exceed the following goals, the provisions of Conditions E32, E33 and E34 will apply: (a) CO – 8 hour rolling average of 9.0 ppm (NEPM); (b) NO2 – One hour average of 0.12 ppm (245 µg/m3) (NEPM); (c) PM10 – 24 hour average of 50 µg/m3 (NEPM); (d) PM2.5 – 24 hour average of 25 µg/m3 (NEPM); (e) PM10 – annual average of 25 µg/m3 (NEPM); and (f) PM2.5 – annual average of 8 µg/m3 (NEPM). Note: The notification and reporting obligations under conditions E32, E33 and E34 relating to ambient monitoring will begin at the commencement of operation of the CSSI. The first annual average concentrations for PM10 and PM2.5 must be calculated on the first day the project has been in operation for 12 months and on a rolling basis thereafter.	Section 3
E7	Conditions E3, E4, E5, and E6 do not apply in an emergency, as defined in the OEMP required by Condition D1.	Refer to Section 3.1
E8	The Proponent must, as soon as reasonably practicable, notify the Secretary and the EPA of any discharge during an emergency.	Refer to Section 3.1
E10	All tunnels must be designed and constructed so as to allow for future modification of the ventilation system if required. The Proponent must submit a report to the Secretary demonstrating how this will be allowed for prior to finalising detailed design.	A separate report has been submitted to the Secretary for information.

E24 The Proponent must monitor (by sampling and obtaining results by analysis) the pollutants and parameters specified in Table 8 using the sampling method, units of measure, and sampling frequency specified in the table. Monitoring must be undertaken at the following locations as a minimum:

(a) two ground level receptors near the Rozelle ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet;

(b) two ground level receptors near the Victoria Road ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet;

(c) two ground level receptors near the Campbell Road ventilation outlet, at locations suitable for detecting any impact on air quality from the outlet with one in a location different to that established under SSI 6788; and

(d) two ground level receptors near the Haberfield ventilation outlet, at location suitable for detecting any impact on air quality from the outlet (these may be the same as those established under SSI 6307).

Refer to Section 4.2

Monitoring for the Campbell Road and Haberfield ventilation outlets are addressed by the M4-M5 Link Stage 1 project in accordance with the M4-M5 Link Staging Report.

Table 8 — Ambient Air Quality Monitoring Methodologies

Pollutant	Units of measurement	Averaging Period	Frequency	Method[1]
NO	pphm	1-hour	Continuous	AM-12
NO_2	pphm	1-hour	Continuous	AM-12
NO_x	pphm	1-hour	Continuous	AM-12
PM_{10}	µg/m³	24-hour	Continuous	AS3580.9.8-2008[2]
$PM_{2.5}$[5]	µg/m³	24-hour	Continuous	AS3580.9.13-2013[3] or as otherwise agreed by the Secretary in consultation with the EPA
CO	ppm	1-hour,8-hour	Continuous	AM-6
Parameter[4]	**Units of measurement**	**Averaging Period**	**Frequency**	**Method[1]**
Wind Speed @ 10 m	m/s	1-hour	Continuous	AM-2 & AM-4
Wind Direction @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Sigma Theta @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Temperature @ 2m	K	1-hour	Continuous	AM-4
Temperature @ 10 m	K	1-hour	Continuous	AM-4
Other	**Units of measurement**	**Averaging Period**	**Frequency**	**Method[1]**
Siting	NA	NA	NA	AM-1 & AM-4

Notes:

1. Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA, 2007) or as otherwise agreed by EPA.

2. AS3580.9.8-2008, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM10 Continuous Direct Mass Method using Tapered Element Oscillating Microbalance Analyser (Standards Australia, 2008).

3. AS 3580.9.13-2013, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM2.5 Continuous Direct Mass Method using a Tapered Element Oscillating Microbalance Analyser (Standards Australia, 2013).

4. TBD - location for meteorological monitoring station(s) to be representative of weather conditions likely to occur in the vicinity of the Haberfield, Rozelle (including the Rozelle Rail Yards and Victoria Road) and Campbell Road ventilation outlets.

5. Appropriately modified to include size selective inlet for PM2.5 or as otherwise approved by the EPA.

E32	The Proponent must prepare an Ambient Air Quality Goal Protocol for evaluating a potential measurement that exceeds the goals in Condition E6. The Ambient Air Quality Goal Protocol must be developed by the Proponent in consultation with the AQCCC and submitted to the Secretary for approval at least 12 months prior to the commencement of operation of the CSSI. The Ambient Air Quality Goal Protocol must include: (a) a process for notification of a recording above the ambient air quality goals in Condition E6, subject to Condition E33; (b) the template that would be used for the Report on Above-Goal Recording, required by Condition E34; and (c) a process for appointing an independent person/organisation to prepare the Report on Above-Goal Recording. The process must include - (i) approval of the independent person (independent of the environmental assessment, design and construction of the CSSI) by the Secretary prior to preparation of the report, and (ii) the appointment of the independent person/organisation at least one (1) month prior to the commencement of operation, or at some other time prior to preparation of the report with the agreement of the Secretary.	This document (a) Section 5 and Appendix A (b) Section 5 and Appendix B (c) (i) Section 6 (ii) Section 6
E33	IN addition to the general reporting requirements specified in Condition E27, the Proponent must notify the secretary, EPA, and Ministry of Health of any recordings above the goals in Condition E6 as soon as possible and within 24 hours of the recording. This notification must provide details of the circumstances of the event, including: (a) The nature of the event; (b) The concentration levels that occurred; (c) The timing and duration of the event; (d) The measures employed to minimise the concentration levels; and (e) The date when the Proponent will submit a Report on Above-Goal Recording in accordance with Condition E34.	Section 5 Section 5.1.2 Section 3 Appendix A
E34	Within 20 workings days of any Notification of Above-Goal Recording, the Proponent must prepare and submit to the Secretary for information a Report on Above-Goal Recording that details the cause and major contributor of the exceedance the effectiveness of any action(s) taken in response to the exceedance and the options available to prevent recurrence. Where the operation of the tunnel is identified to be a significant contributor to the recorded above-goal reading, the Report on Above-Goal Recording must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under Condition E10.	Section 5.3 Appendix B

2.2 Revised environmental management measures

The revised environmental management measures (REMMs) relevant to ambient air quality monitoring during the operations and maintenance of the Asset are included in Table 2.

Table 2- Revised environmental management measures relevant to ambient air quality monitoring

REMM	Relevant requirement	Reference
AQ29	Ambient air quality monitoring will be carried out in the vicinity of the ventilation outlets installed as part of the project. Monitoring will occur at key representative locations, identified in consultation with an independent air quality specialist and an Air Quality Community Consultative Committee (AQCCC), to allow direct comparison of measured ambient air quality with dispersion model predictions. The monitoring will commence at least 12 months prior to and continue for at least two years following the commencement of operation. Monitoring results and a comparison of monitoring results against dispersion model predictions and relevant ambient air quality criteria will be made publicly available.	This document Section 5 Section 6 Appendix B

3 Ambient air quality goals

The ambient air quality criteria for the Project are defined in Condition E6 and are provided below in Table 3

Table 3 Ambient air quality criteria (condition E6)

Parameter	Concentration limit	Units of measure	Averaging period	Source
CO	9.0	ppm	Rolling 8-hour	NEPM
NO_2	0.12 (245)	ppm (µg/m^3)	1 hour	NEPM
PM_{10}	50	µg/m^3	24 hour	NEPM
$PM_{2.5}$	25	µg/m^3	24 hour	NEPM
PM_{10}	25	µg/m^3	1 year	NEPM
$PM_{2.5}$	8	µg/m^3	1 year	NEPM

In accordance with Condition E6, should ambient monitoring of air pollutants exceed the goals listed in Table 3, Conditions E32, E33 and E34 apply and notification and reporting of the above-goal reading shall occur as required.

For the reporting of above-goal readings of the annual average (1-year averaging period), the first annual average result will not be available until at least 12 months following the commencement of operation. As the first annual average result will not be available until this time, any notifications or reports of above-goal readings of the annual average will also not be available until at least 12 months following the commencement of operation. This is also in accordance with Condition E6.

3.1 Emergency discharge

In accordance with Condition E7, the air quality criteria identified in Table 3 do not apply in an emergency situation. An 'emergency' has been defined in Table 4 below.

Table 4 Definition of 'emergency' by relevant CoA

CoA	Definition of the 'emergency' for each condition
E7 E8	An emergency discharge is an emission from the ventilation system that is caused by an incident or set of circumstances which does not ordinarily occur in the everyday use of the tunnel and is beyond: • Merely heavy traffic or congestion, or • The capacity of the tunnel operator to control or to have prevented by taking steps which a prudent, experienced and competent operator would have taken. Conditions E2A, E3, E4, E5, E6, E9 and E14 do not apply in the event of this emergency.
E9	An emergency smoke management purpose is what is reasonably necessary to manage smoke in response to a fire occurring in the tunnel, including in accordance with instructions given by NSW Emergency Services. An emergency smoke management purpose may also occur during periodic testing of the system.
E142	An emergency to which the Plan applies is an out-of-the-ordinary event, or set of circumstances that causes or threatens to cause harm to the safety or well-being of the community, employees, or users of the Motorway or associated assets. It requires a coordinated response from NSW Emergency Services and the Tunnel Operator.

In the event of an emergency situation that results in discharge(s), the Secretary and the EPA would be notified.

4 Monitoring

4.1 Monitoring methodologies

The Project will monitor the pollutants and parameters, using the sampling method, units of measure and frequency specified in Table 5.

Table 5 Ambient air monitoring methodologies

Pollutant	Units of measure	Averaging period	Frequency	Method[1]
NO	pphm	1-hour	Continuous	AM-12
NO_2	pphm	1-hour	Continuous	AM-12
NOx	pphm	1-hour	Continuous	AM-12
PM_{10}	$\mu g/m^3$	24-hour	Continuous	AS3580.9.8-2008[2]
$PM_{2.5}$[5]	$\mu g/m^3$	24-hour	Continuous	AS3580.9.12:2013[3]
CO	ppm	1-hour, 8-hour	Continuous	AM-6
Parameter[4]	**Units of measure**	**Averaging period**	**Frequency**	**Method[1]**
Wind speed @10 m	m/s	1-hour	Continuous	AM-2 & AM-4
Wind direction @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Sigma Theta @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Temperature @ 2 m	K	1-hour	Continuous	AM-4
Temperature @ 10 m	K	1-hour	Continuous	AM-4
Other	**Units of measure**	**Averaging period**	**Frequency**	**Method[1]**
Siting	N/A	N/A	N/A	AM-1 & AM-4

TABLE NOTES

1. Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA, 2007) or as otherwise agreed to in writing by the Secretary in consultation with the EPA.
2. AS3580.9.8-2008, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM10 Continuous Direct Mass Method using Tapered Element Oscillating Microbalance Analyser (Standards Australia, 2008).
3. AS3580.9.12:2013, Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM2.5 beta attenuation monitors. This alternate methodology was approved by the Secretary on 16 August 2022 in consultation with the EPA.
4. TBD - location for meteorological monitoring station(s) to be representative of weather conditions likely to occur in the vicinity of the northern and southern ventilation outlets.
5. Appropriately modified to include size selective inlet for PM2.5 or as otherwise approved by the EPA

The ambient air quality monitoring stations will be established and operated by Ecotech Pty Ltd. Ecotech Pty Ltd were approved by the Secretary on 11 January 2022 (after satisfactory consultation with the EPA

and AQCCC) as being an organisation sufficiently skilled and accredited by the National Association of Testing Authorities Australia to supply and monitor the air quality monitoring station as required under Condition E25.

Ambient monitoring of pollutants for the purposes of notification and reporting obligations under Conditions E32, E33 and E34 will begin at the commencement of operation. As such, the first annual average of pollutants will be available 12 months following the commencement of operations.

4.2 Monitoring locations

Ambient air quality monitoring occurs at four monitoring locations. These are described in Table 6 and shown in Figure 1 and Figure 2.

Table 6 Ambient air quality monitoring locations

No.	AQCCC No.	Location	Condition E24 criteria
1	Site B5	Chapman Road, Annandale	E24(a) near Rozelle Outlets
2	Site A3	Quirk St, Rozelle	E24(a) near Rozelle Outlets
3	Site C6a	Ausgrid Park	E24(b) near Iron Cove Outlets
4	Site D1	Bridgewater Park	E24(b) near Iron Cove Outlets

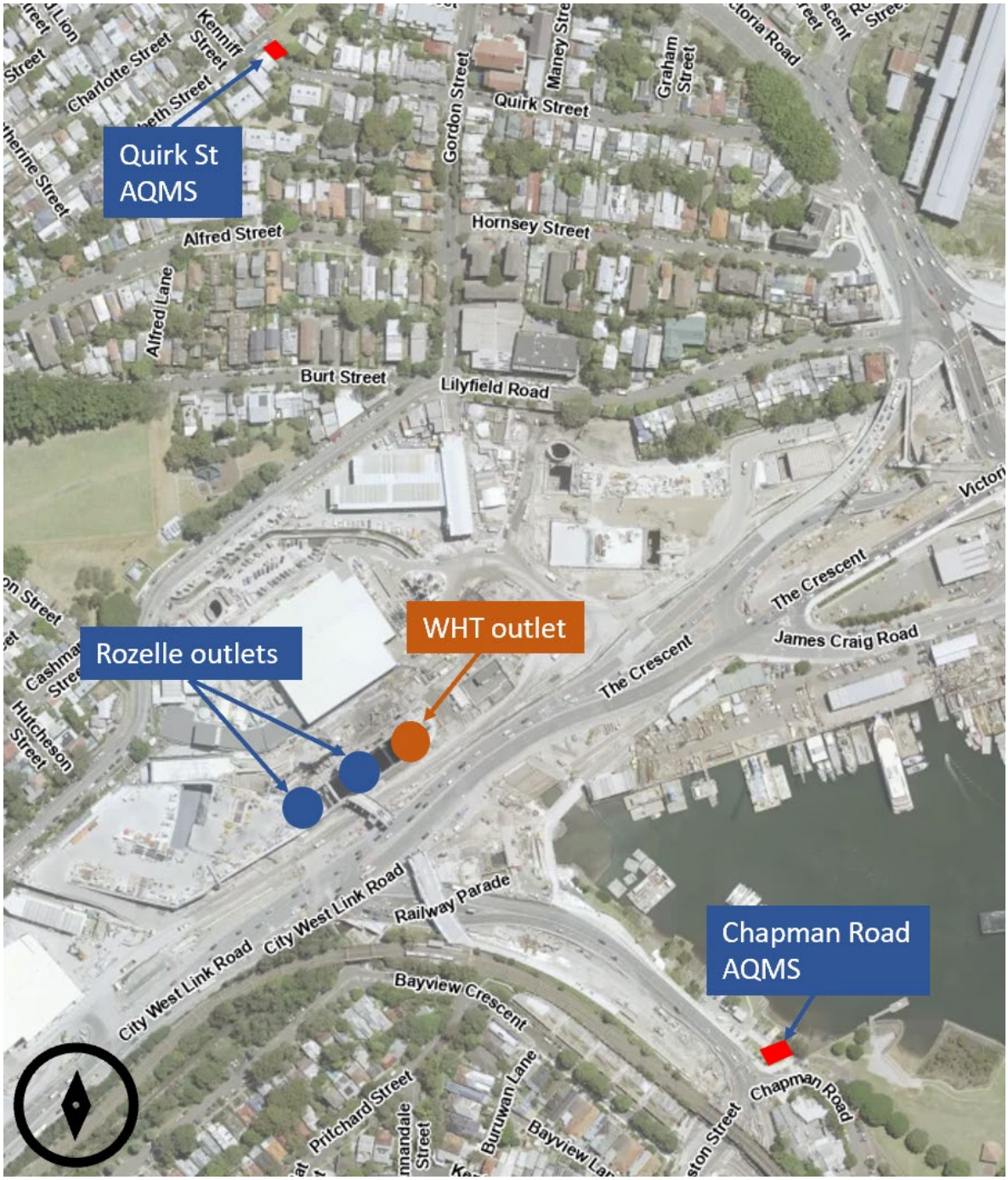

Figure 1 Ambient Air Quality Stations Near Rozelle Outlets

Figure 2 Ambient air quality monitoring stations near Iron Cove Link Outlet

5 Notification and reporting of above-goal readings

The key steps in notification and reporting of above-goal readings are detailed within Figure 3 and include:

1. Notify the above-goal reading.
2. Investigate the above-goal reading.
3. Report the above-goal reading.

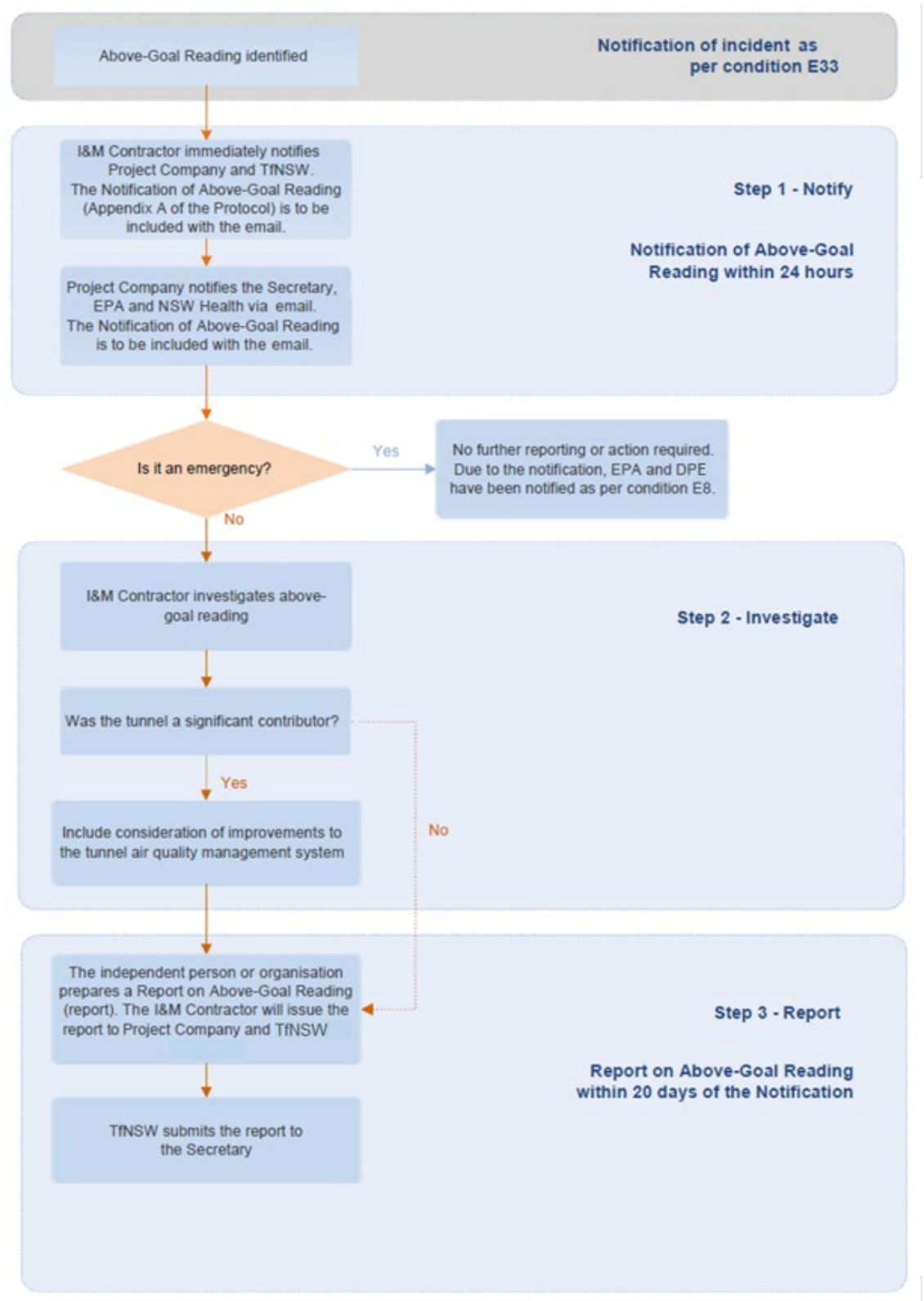

Figure 3-Notification and reporting process for above-goal reading

5.1 Notify the above-goal reading

When ambient monitoring of air quality exceeds the air quality goals detailed within Condition E6, the steps within Section 5.1.1 and Section 5.1.2 will be followed.

5.1.1 Notifying Project Company and TfNSW

Upon identification of an above-goal reading, the I&M Contractor will immediately notify the Project Company and TfNSW.

The email notification included in Section 5.1.2 will be provided along with the completed form within Appendix A.

5.1.2 Notifying the Secretary, EPA and NSW Health

Project Company will notify the Secretary, EPA and NSW Health. The notification is to be provided within 24 hours of the reading.

Form of notification

As per Condition E33 the form of notification will be via the major projects portal for the Secretary and email for all other agencies. The Notification of Above-Goal Reading form (Appendix A) will be attached or included with the email. As required by Condition E33, the Notification of Above-Goal Reading form will provide details of:

(a) the nature of the event;
(b) the concentration levels that occurred;
(c) the duration of the event;
(d) measures employed to minimise the concentration levels;
(e) the date when the Proponent will submit a Report on Above-Goal Reading in accordance with Condition E34.

The sample content of the email is indicated in Figure 4. The Notification of Above-Goal Reading form supplements any details included in the email main body and will include the full scope of information as required by Condition E33.

Figure 4- Sample content of the email notification

An example of an email which would be issued is provided in Figure 5.

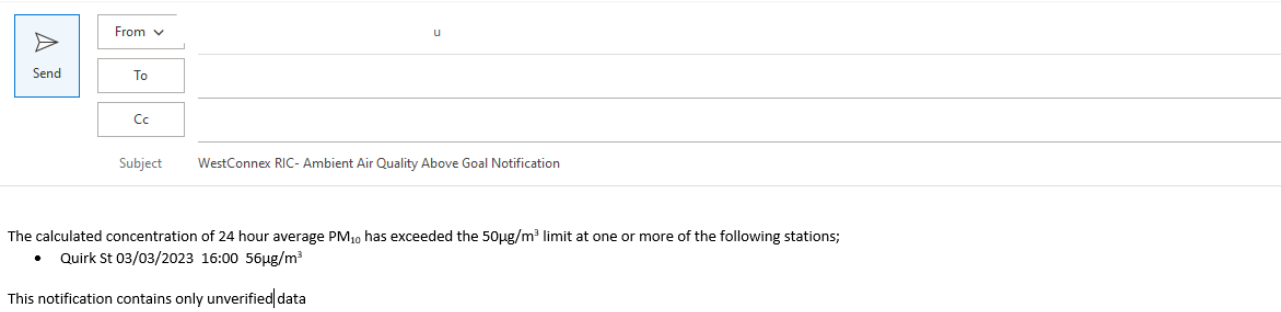

Figure 5 - An example of an email for issue. The form within Appendix A will be included

The Notification of Above-Goal Reading form within Appendix A will be attached or included with the email notification.

5.1.3 Contact details for notification

Table 7 provides the contact details for those stakeholders that will be notified.

Table 7 Contact details for stakeholders that are to be notified

Organisation	Contact Position	Telephone	Email
Department of Planning & Environment	Secretary of the Department Team Leader Compliance – Government Projects		Submitted via the Major Projects Planning Portal compliance@planning.nsw.gov.au
EPA	Duty Officer	(02) 9995 5000 or 131 555	info@environment.nsw.gov.au
NSW Health	Director, Environmental Health	(02) 9424 5817	Moh-ehp@health.nsw.gov.au
TfNSW	TBA	TBA	TBA prior to commencement of operation
Project Company	TBA	TBA	TBA prior to commencement of operation

It is the responsibility of the organisations detailed above to contact the I&M Contractor, in writing to I&M Manager (MCC) should their contact details change.

5.2 Investigate the above-goal reading

To determine whether an Above-Goal Reading is attributable to external phenomena or events or emissions from the M4-M5 Link RIC Motorway tunnel outlets, the below investigations will be undertaken.

5.2.1 Validate results

Within two days of the above-goal reading, the data will be quality validated.

If the data validity checks confirm that the recorded Above-Goal Reading was not valid and was due to an instrument fault or data error, the independent person will complete the Report for Above-Goal Reading (Appendix B) and will submit this document to Project Company and TfNSW. TfNSW will submit the report to Department of Planning and Environment.

A copy will also be placed on the WestConnex website.

If the data validity checks confirm that the recorded Above-Goal Reading was valid, the I&M Contractor will proceed to Section 5.2.2.

5.2.2 Assess whether an emergency occurred

Should the investigation determine that an emergency occurred (as defined in Section 3.1), no further reporting shall occur.

It is considered that notification of the above-goal reading to DPE and EPA has occurred in accordance with Condition E33 through submission of the *Notification of Above-Goal Reading*.

A written record of the result of the investigation (ie that it is an emergency) is to be retained by the I&M Contractor and Project Company and TfNSW are to be advised of the finding.

5.2.3 Further investigation of valid results

If the investigation confirms that the data is valid, and an emergency does not appear to have occurred, further investigations will be undertaken, and the I&M Contractor will request the independent person/organisation prepare a Report on Above-Goal Reading.

Further investigations of the potential cause may include the below steps.

Sydney-wide events

Obtain data for other ambient air quality monitoring stations in the Sydney Basin from the EPA for concurrent monitoring periods to determine whether the Above-Goal Reading is a Sydney-wide event.

If the monitored Above-Goal Reading is widespread, it is likely that there was an external cause. In this instance, the I&M Contractor will contact relevant authorities such as the Bureau of Meteorology and State Emergency Services to determine if a regional event has occurred consistent with the recorded Above-Goal Reading.

Locally specific events

If the Above-Goal Reading is not widespread throughout the Sydney basin, a local cause is possible and supplementary investigations should be undertaken, such as consulting with relevant stakeholders such as (for example) EPA or relevant Councils, with the aim of establishing whether a specific localised source may have affected one or more monitoring stations. Localised activity (e.g. rubbish burning or unusually high emissions from an industrial premise (with unfavourable weather conditions)) may adversely affect the readings.

Monitoring equipment calibration

In the circumstance where the investigations are unable to identify a logical cause of the Above-Goal Reading, further investigations may be undertaken to investigate whether the monitoring equipment is calibrated and functioning effectively.

Assessment of outlet emissions

A review of the ventilation outlet emissions data will be checked to determine whether emissions are higher or considerably different to emissions over previous periods, with similar traffic conditions within the tunnel.

Assessment of background data

An assessment against background data (or pre-operational data) may also occur.

5.3 Report the above-goal reading

If the investigation confirms that there was not an emergency, the I&M Contractor will request the independent person/organisation to prepare a *Report on Above-Goal Reading*.

The *Report on Above-Goal Reading* (Report) (Appendix B) will detail the cause and major contributor of the Above-Goal Reading and options available to prevent recurrence.

Where the operation of the tunnel is identified as a significant contributor to the recorded Above-Goal reading, the *Report on Above-Goal Reading* must include consideration of improvements to the Air Quality Management System so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under Condition E10 and discussion of whether or not those improvements are reasonable and feasible.

The Report will be submitted within 20 working days of any *Notification of Above-Goal Reading* and the Proponent will comply with any requirements arising from the Secretary's review of the Report.

6 Process of appointing an independent person / organisation

6.1 Definition of an independent person / organisation

The Australian Securities and Investment Commission (ASIC) *Regulatory Guide 112 Independence of Experts (March 2011)* states that an expert must not be associated with certain interested parties, and must disclose certain interests and relationships, when preparing reports[2].

Any disclosures should be contained within the report/s, relate to relationships or interests existing at the time of preparation of the report or existing in the previous two years and be timely, prominent, specific and meaningful.[3]

DPE have developed a guideline on the appointment of independent experts titled *Seeking approval from the Department for the appointment of independent experts*. The requirements within the guide plus the ASIC literature will be used to determine the independent expert nominated by the project.

6.2 Selection criteria

Appropriately qualified independent persons/organisations will be identified prior to selection on the basis of meeting the requirements contained within the guide produced by DPIE, *Seeking approval from the Department for the appointment of independent experts.*

In selecting an appropriate independent expert, the following requirements set forth from DPIE will be adhered to;

1. The independent expert will be a member of a relevant professional body
2. not have a close relationship with the proponent/contractor
3. not have any pecuniary interest
4. not accept any inducement or benefit
5. exercise their own independent, professional judgement

Other items to be considered that ASIC states[4] are relevant factors include:

(a) Whether the expert has adequate resources (which may include access to appropriate third-party specialists) to perform the necessary work
(b) The qualifications of the expert and whether the expert has the requisite level of technical expertise (including whether the expert meets the requirements of any relevant industry codes)
(c) The experience of the expert. For example, a commissioning party may ask what comparable transactions the expert has given an opinion on and whether that experience is relevant to the current transaction
(d) Whether the expert can meet the timeframe required for the report to be produced, and
(e) Whether there are any independence issues

6.3 Appointment Process

The process for appointing an independent person/organisation to prepare a Report for Above-Goal Reading is as follows:

1. Select independent person/organisation on the basis of DPIE's guideline (refer above).

2. Ensure that any pre-engagement discussions do not compromise the expert's independence. For example, these discussions should not deal with how the expert proposes to evaluate the transaction or the merits of the transaction.[5]
3. Seek written approval from the Secretary ensuring all criteria set forth in the Departments guidelines are met. Nomination and consultation with Project Company andTfNSW.
4. Before commencing work, an expert should obtain written terms of engagement[6] from the commissioning party that:
   i. set out the scope and purpose of the report
   ii. set out the facts of the proposal and relevant data
   iii. recognise the expert's right to refuse to give an opinion or report at all if it is not given the information and explanations it requires to prepare the report
   iv. give the expert the same access to the commissioning party's records as the auditor of the commissioning party; and
   v. set out the fee.
5. Ensure appointment of the independent person/organisation is prior to commencement of operation, or at some other time prior to preparation of the report with agreement of the Secretary.

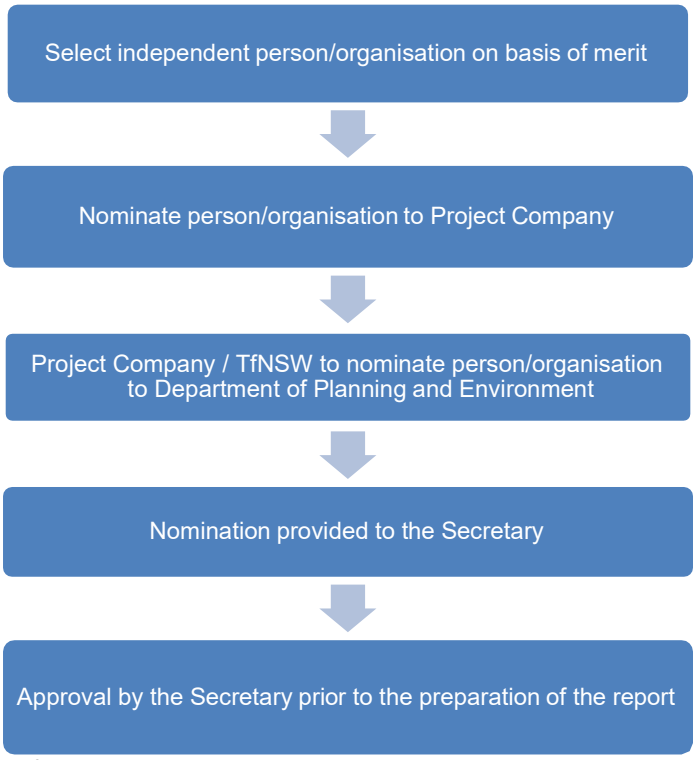

Figure 6- Process of appointment

The independent person or organisation shall not prepare a *Report on Above-Goal Reading* until approval has been received.

The Secretary may ask for additional information where a document is required to be submitted to the Secretary and the document is considered incomplete or not fully addressing the requirements of a condition. When further information is requested, the Proponent will respond with an updated submission.

2 *RG 112.7 Regulatory Guide 112 Independence of Experts (March 2011) Part (a)*
3 *RG 112.31 – 112.35 Regulatory Guide 112 Independence of Experts (March 2011)*
4 *RG 112.40 Regulatory Guide 112 Independence of Experts (March 2011)*
5 *RG 112.41 Regulatory Guide 112 Independence of Experts (March 2011)*
6 *RG 112.42 Regulatory Guide 112 Independence of Experts (March 2011)*

Appendix A Notification of Above-Goal Reading

Notification of above-goal reading WestConnex RIC To be notified immediately to Project Company and TfNSW. Project Company is to notify DPE, EPA and NSW Health within 24 hours.		
Date		
Time (start and finish)		
Relevant location	☐ Quirk Street	☐ Chapman Rd
	☐ Ausgrid Park	☐ Bridgewater Park
Relevant goal	☐ CO – 8 hour rolling average of 9.0 ppm	
	☐ NO_2 – One hour average of 0.12 ppm (245 µg/m^3)	
	☐ PM_{10} – 24 hour average of 50 µg/m^3	
	☐ $PM_{2.5}$ – 24 hour average of 25 µg/m^3	
	☐ PM_{10} – Annual average of 25 µg/m^3	
	☐ $PM_{2.5}$ – Annual average of 8 µg/m^3	
Above-goal reading Detail the above-goal reading thatwas received		
Duration Detail the duration of the above-goal reading or event		
Nature of event Detail nature of the event that contributed to the above-goal reading		
Was the data valid? If unknown at this stage, please indicate. Refer section 5.2.1 of this Protocol.		
Was there an emergency? Refer section 3.1 of this Protocol. If this is unknown at this stage, please indicate.		
Measures employed Detail measures employed to minimise the concentration levels		
Commitment to prepare and submit a Report on Above-Goal Reading A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.		
Person responsible for notification	Name	
	Position	
	Organisation	

Appendix B Report on Above-Goal Reading

Report on Above-Goal Reading WestConnex M4-M5 Link RIC To be submitted to DPE within 20 working days of the Report of Above-Goal Reading	
Details of the Above-Goal Reading Attach relevant Notification of Above-Goal Reading	
Was the data valid? If invalid, include any details or justifications for the invalidity	
Comparison with long term monitoring trends and background air quality data This is not required to be completed	
Cause or major contributorof the Above-Goal Reading If the cause or major contributor are not able to be determined, then known facts of what was occurring at the time should be included (eg traffic information, ventilation outlet monitoring records etc)	
Options to prevent recurrence and effectiveness of actions taken This is to include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under Condition E10, and discussion of whether those improvements are feasible and reasonable. The effectiveness of any action(s) taken in response to the exceedance shall be documented below.	
Person responsible forreport	Name
	Position
	Organisation
	Date

Appendix C Contact list

Environmental contacts

Title	Name	Phone number
I&M Contractor project representatives		
Incident and Maintenance Manager	To be provided prior to commencement of operation	To be provided prior to commencement of operation
QSE Manager	To be provided prior to commencement of operation	To be provided prior to commencement of operation
Role TBC	To be provided prior to commencement of operation	To be provided prior to commencement of operation
Project Company representatives		
Project Company Project Representative	To be provided prior to commencement of operation	To be provided prior to commencement of operation
TfNSW		
TfNSW Project Representative	To be provided prior to commencement of operation	To be provided prior to commencement of operation
Stakeholders and relevant agencies		
Department of Planning & Environment (DPE)	Secretary of the Department Team Leader Compliance – Government Projects	Submitted via the Major Projects Planning Portal compliance@planning.nsw.gov.au
Fire and Rescue NSW		000 (emergency) 1300 729 579 (non-emergency)
EPA		(02) 9995 5000 131 555
Ministry of Health / Camperdown Public Health Unit		Business hours: (02) 9515 9420 After hours: (02) 9515 6111 (ask for Public Health Officer on call)
SafeWork NSW		131 050
Inner West Council		(02) 9392 5000
Transport Management Centre		(02) 8396 1400

Annexure J Performance Outcomes

Performance outcomes from Appendix A of the EIS relevant to operation of the Asset are detailed below;

Desired performance outcome		Reference
Air Quality	The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	Air quality impacts during operation will be managed through the implementation of the Operational Air Quality Management Plan. Refer to Annexure I.
Noise and Vibration – Amenity	Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community.	Operational noise impacts and required mitigation measures were assessed in the ONVR required by CoA E92. Within 12 months of the commencement of operation, monitoring will be undertaken to compare actual noise performance of the Asset against the ONVR noise predictions and assess whether additional mitigation is required. This monitoring and assessment will be documented in an Operational Noise Compliance Report. Refer to Section 5.5.4 and Table 9-5. Mitigation measures relevant to noise and vibration are detailed in Section 5.5.
Noise and Vibration – Structural	Increases in noise emissions and vibration affecting environmental heritage as defined in the Heritage Act 1977 during operation of the project are effectively managed.	Mitigation measures and monitoring relevant to noise emissions and vibration affecting environmental heritage are detailed in Section 5.5.
Water – Hydrology and Quality	Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources. The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	Surface water and groundwater impacts during operation, including operating to protect the NSW Water Quality Objectives, will be managed through the implementation of the Operational Water Management Plan. Refer to Annexure F. The Asset has been designed to incorporate features which will reduce the consumption of potable water throughout operation and promote the reuse of non-potable water. These reuse options were assessed in the Operational Water Reuse Strategy which was prepared to address CoA E198 and approved by the nominee of the Planning Secretary.

Desired performance outcome		Reference
Flooding	The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure.	The design of the Asset's drainage and water treatment systems were informed by flooding modelling as required in CoA E151 to ensure adverse impacts were minimised. In accordance with CoA E153, a Flood Review Report will be prepared after the first defined flood event. This review will assess the actual flood impact against that predicted by the flood modelling completed during detailed design. This review will also assess whether additional mitigation measures are required to minimise adverse impacts on nearby properties, structures and infrastructure. Refer to Section 5.16, 9.4 and 9.7.
Heritage	The design, construction and operation of the project facilitates, to the greatest extent possible, the long-term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	The Project has been designed and constructed to avoid operational impacts to heritage. Relevant legislative requirements are listed in Section 4.1.3, heritage guidelines and principals are listed in Section 4.2. Mitigation measures relevant to heritage conservation areas, particularly street trees, are detailed in Section 5.10.
Waste	All wastes generated during the construction and operation of the project are effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values.	Waste generated during operation will be managed in accordance with the relevant legislation and guidelines detailed in Section 4.1.3 and 4.2. Mitigation measures relevant to waste management are detailed in Section 5.12.